

# HARVESTING AND SOWING

Reflections and testimony  
on a mathematician's past

by

Alexandre GROTHENDIECK



### Carmona Note :

This text was transcribed and edited by Mateo Carmona. The transcription is as faithful as possible to the typescript. This edition is provisional. Remarks, comments and corrections are welcome.

<https://agrothendieck.github.io/>

### Niels Note :

This version has been very poorly translated using DeepL. I believe it is the first full english translation. I have plans to edit it,neaten it up, and pass it through some better translation tools – get it audited by the french-speaking mathematics community. For now this will have to do.

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Presentation of the Themes

or

PRELUDE IN FOUR MOVEMENTS

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Université des Sciences et Techniques du Languedoc, Montpellier  
and Centre National de la Recherche Scientifique (French National  
Centre for Scientific Research)

To my Parents

## HARVESTS AND WEEKS: Presentation of the Themes

or

### Prelude in Four Movements (Summary)

By way of Foreword .

A walk through a work - or the Child and the Mother

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N.B. This "fascicule 0<sub>1</sub>" of the provisional edition of Récoltes et Semailles is intended (as the table of contents shows) to be placed before the fascicule (taking the place of n 0° 2 ) which had been distributed previously, under the title "Lettre - Introduction" ; with the exception, however, of the "Postscript Epilogue" (numbered L 44 to L 56), which is (as its name suggests) a "postscript" to the "Letter" (pages L 1 to L 43) opening this "issue 0<sub>2</sub>". Together, the two fascicles form the introductory part of Récoltes et Semailles, known as the "Présentation des Thèmes" or "Prélude en Quatre Mouvements".

## En Guise d'Avant-propos. .

30 January 1986

All that was left was to write the foreword and send Harvest and Sowing to the printer. And I swear I had the best will in the world to write something that would do the job. Something *reasonable* this time. No more than three or four pages, but well-written, to present this enormous 'pavé' of more than a thousand pages. Something that will 'hook' the jaded reader, that will make him or her realise that in these unreassuring 'more than a thousand pages', there could be things that interest them (or even concern them, who knows?). That's not really my style, the hook, that's not. But I was going to make an exception for once! The publisher who was mad enough to take the risk (of publishing this obviously unpublishable monster) had to break even somehow.

And then no, it didn't come. But I did my best. And not just for one afternoon, as I'd planned, just as quickly as possible. Tomorrow I'll have been at it for exactly three weeks, with the leaves piling up. What I've come up with, that's for sure, is not what you could decently call a 'foreword'. I've missed it again! You can't do things over again at my age - and I'm not cut out to sell or make people sell. Even when it comes to pleasing myself and my friends...

What I came up with was a sort of long 'walk' with commentary, through my work as a mathematician. A walk aimed primarily at the 'layman' - those who 'have never understood anything about maths'. And also for me, who had never had the leisure of such a walk. One thing led to another and I found myself saying things that until then had always remained unsaid. As chance would have it, these are also the things that I feel are the most essential in my work. There's nothing technical about them. It's up to you to see whether I've succeeded in my naïve attempt to 'get them across' - an attempt that's probably a bit crazy itself. My satisfaction and my pleasure would be to have been able to make you feel them. Things that many of my learned colleagues no longer know how to feel. Perhaps they've become too learned and too prestigious. They often lose touch with the simple, essential things.

In the course of this 'walk through a work', I talk a little about my life too. And a little, here and there, about what Harvest and Sowing is all about. I talk about it again, in more detail, in the 'Letter' (dated May last year) that follows the 'Walk'. This

This letter was intended for my former students and 'old friends' in the mathematical world. But there's nothing technical about it either. It can easily be read by any reader interested in learning, through a 'first-hand' account, the ins and outs that finally led me to write *Récoltes et Semailles*. Even more than the Promenade, it will also give you a taste of a certain atmosphere in the mathematical 'big world'. And also (like the Promenade), of my style of expression, which is a bit special, it seems. And also of the spirit that expresses itself through this style - a spirit that is not appreciated by everyone either.

In the Promenade and throughout Harvest and Sowing, I talk about *mathematical work*. It's work that I know well and first-hand. Most of what I say about it is true, surely, for all creative work, all work of discovery. It's true, at least, of so-called 'intellectual' work, that which is mostly done 'in your head', and by writing. Such work is marked by the blossoming and flowering of an *understanding of* the things we are probing. But, to take an example from the opposite end of the spectrum, the passion of love is also an impulse of discovery. It opens us up to what is known as 'carnal' knowledge, which is also renewed, expanded and deepened. These two impulses - the one that drives the mathematician at work, let's say, and the one in the lover - are much closer than we generally suspect, or are prepared to admit to ourselves. I hope that the pages of Harvest and Sowing will help you to realise this, in your work and in your everyday life.

During the Promenade, the focus will be on the mathematical work itself. On the other hand, I remain virtually silent on the *context* in which this work takes place, and on the *motivations* that come into play outside the working time itself. This runs the risk of giving me, or mathematicians or 'scientists' in general, a flattering but distorted image. Like a 'great and noble passion', without any correction whatsoever. In line, in short, with the great 'Myth of Science' (with a capital S, please!). The heroic, Promethean myth into which writers and scientists have fallen (and continue to fall) at the drop of a hat. Only historians, perhaps, have ever resisted this seductive myth. The truth is that ambition and vanity play as important and almost universal a role in the motivations of 'scientists', which sometimes drive them to invest countless hours in their work, as in any other profession. It takes more or less coarse, more or less subtle forms, depending on the person concerned. I do not claim

in no way an exception. I hope that reading my testimony will leave no doubt on this point.

It is also true that the most devouring ambition is powerless to discover the slightest mathematical statement, or to prove it - just as it is powerless (for example) to 'get a hard-on' (in the true sense of the word). Whether you're a woman or a man, what 'gives you a hard-on' is in no way ambition, the desire to shine, to display power, in this case sexual power - quite the contrary! But it is the acute perception of something strong, very real and very delicate at the same time. You could call it 'beauty', and that's one of the thousand faces of this thing. Being ambitious doesn't necessarily prevent you from sometimes feeling the beauty of a being, or of a thing, all right. But what's certain is that it's *not* ambition that makes us feel it. ...

The man who first discovered and controlled the fire was exactly like you and me. Not at all what we think of as a "hero", a "demigod" and so on. Surely, like you and like me, he experienced the bite of anguish, and the vanity ointment that makes you forget the bite. But when he 'knew' the fire, there was no fear and no vanity. That is the truth of the heroic myth. Myth becomes insipid, it becomes ointment, when it serves to hide from us *another* aspect of things, just as real and just as essential.

My purpose in Harvest and Sowing was to talk about both aspects - the drive for knowledge, and fear and its vain antidotes. I think I 'understand', or at least *know*, the drive and its nature. (Perhaps one day I'll discover, in amazement, just how deluded I've been... .) But as far as fear and vanity are concerned, and the insidious blocks to creativity that stem from them, I know full well that I haven't got to the bottom of this great enigma. And I don't know if I'll ever get to the bottom of this mystery, in the years I have left to live... .

In the course of writing Harvest and Sowing, two images emerged to represent these two aspects of the human adventure. They are *the child* (aka *the worker*), and the *Boss*. In the Walk we're about to take, we'll be talking almost exclusively about the "child". It is also the child that appears in the subtitle "*The Child and the Mother*". This name will become clearer, I hope, in the course of the walk.

In the rest of the reflection, it's the Boss who takes centre stage. He's not a boss for nothing! In fact, it would be more accurate to say that he is

not *of one* boss, but *of the* bosses of competing companies. But it's also true that all bosses are alike in most respects. And when we start talking about Bosses, it also means that there are going to be some 'bad guys'. In Part I of the reflection ('Fatuity and Renewal', which follows this introductory part, or the 'Prelude in Four Movements'), I'm mainly the 'villain'. In the next three parts, it's mainly 'the others'. Each to his own!

In other words, as well as deep philosophical reflections and (by no means contrite) 'confessions', there will be 'vitriolic portraits' (to use the expression of one of my colleagues and friends, who found himself in a bit of a bind...). Not to mention a number of large-scale 'operations'. Robert Jaulin(\*) assured me (half-jokingly) that in *Récoltes et Semailles* I was doing 'the ethnology of the mathematical environment' (or perhaps the sociology, I don't really know). It's flattering, of course, to learn that (without even knowing it) you're doing learned things! It's a fact that during the 'investigation' part of my reflection (and to my own detriment...), I saw a good part of the mathematical establishment pass through the pages I was writing, not to mention a number of colleagues and friends of more modest status. And over the last few months, since I sent out the provisional edition of *Récoltes et Semailles* last October, they've been at it again. Decidedly, my testimonial came as a bombshell. There were echoes in every tone, really (except that of boredom. . . ). Almost every time, it was not at all what I would have expected. And there was also a lot of silence, which says a lot. Clearly, I had (and still have) a lot to learn about what goes on in people's heads, among my ex-students and other more or less well-placed colleagues - sorry, about the 'sociology of the mathematics world' I mean

! To all those who have already come to make their contribution to the great sociological work of my old age, I would like to express my gratitude here and now.

Of course, I was particularly sensitive to the warm echoes. There have also been a few rare colleagues who have told me about an emotion, or a feeling (unspoken until now) of crisis or degradation within the mathematical community of which they feel a part.

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(\*) Robert Jaulin is an old friend. I understand that he finds himself in a somewhat similar situation (as a 'white wolf') vis-à-vis the establishment in ethnology as I do vis-à-vis the mathematical 'beau monde'.

Outside this circle, among the very first to give a warm, even emotional, welcome to my account, I would like to mention Sylvie and Catherine Chevalley (\*), Robert Jaulin, Stéphane Deligeorge and Christian Bourgois. If *Récoltes et Semailles* is going to be distributed more widely than the initial provisional print run (intended for a very restricted circle), it is above all thanks to them. Thanks, above all, to their communicative conviction: that what I had tried to grasp and say had to be said. And that it could be heard in a wider circle than that of my colleagues (who are often sullen, even surly, and not at all willing to question themselves...). So it was that Christian Bourgois did not hesitate to run the risk of publishing the unpublishable, and Stéphane Deligeorge did me the honour of including my indigestible testimony in the '*Epistémè*' collection, alongside (for the time being) Newton, Cuvier and Arago. (I couldn't have wished for better company!) To each and every one of you, for your repeated expressions of sympathy and confidence, at a particularly 'sensitive' time, I am happy to express my deepest gratitude.

And here we are, at the start of a Promenade through a work, as an introduction to a journey through a life. A long journey, yes, of a thousand pages or more, and well packed each one. It has taken me a lifetime to complete this journey, without having exhausted it, and more than a year to rediscover it, page after page. Words have sometimes been reluctant to come, to express all the juice of an experience that still eludes hesitant comprehension - just as ripe, thick grapes piled up in the press seem, at times, to want to shrink from the force that embraces them. ... But even in those moments when words seem to jostle and flow, they don't jostle and flow at the drop of a hat. Each one of them has been weighed in passing, or even afterwards, to be carefully adjusted if it was found to be too light or too heavy. So this reflection-testimony-travel is not designed to be read quickly, in a day or a month, by a reader in a hurry to get to the final word. There are no 'final words' or 'conclusions' in *Harvest and Sowing*, any more than there are in my life or yours. There is a wine, aged for a lifetime in the barrels of my

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(\*) Sylvie and Catherine Chevalley are the widow and daughter of Claude Chevalley, the colleague and friend to whom the central part of *Récoltes et Semailles* (ReS III, "La Clef du Yin et du Yang") is dedicated. At several points in this reflection, I mention him and the role he played in my life's journey.

be. The last glass you drink won't be any better than the first or the hundredth. They are all 'the same', and they are all different. And if the first glass is spoiled, so is the whole barrel, so you might as well drink good water (if there is any) rather than bad wine.

But good wine isn't something you drink in a hurry, or at the drop of a hat.

# A walk through a work of art

*or*

## The Child and the Mother

January 1986

### 1. The magic of things.

When I was a kid, I loved going to school. We had the same teacher to teach us reading and writing, arithmetic, singing (he played a little violin to accompany us), or prehistoric man and the discovery of fire. I don't remember ever being bored at school at that time. There was the magic of numbers, and the magic of words, signs and sounds. There was also the magic of *rhyme*, in songs and little poems. Rhyme seemed to hold a mystery beyond words. And so it was, until one day someone explained to me that there was a very simple 'trick'; that rhyme is simply when you make two consecutive spoken movements end with the same syllable, which then, as if by magic, become *verses*. It was a revelation! For weeks and months on end, at home, where I could find people to talk to, I would have fun making up verses. At one point, I could only speak in rhyme. Fortunately, I got over that. But even today, on occasion, I still write poems - but I don't really go looking for rhyme any more, unless it comes from me.

At another time, an older friend, who was already at lycée, taught me negative numbers. It was another fun game, but it ran out of steam more quickly. And there was the crossword

- I spent days and weeks making them, more and more intertwined. This game combined the magic of form with the magic of signs and words. But that passion left me, apparently without a trace.

At lycée, first in Germany in the first year, then in France, I was a good student, without being the 'brilliant student'. I invested myself wholeheartedly in what interested me most, and tended to neglect what interested me less, without worrying too much about the assessment of the 'teacher' concerned. My first year at lycée in France, in 1940, I was interned with my mother in the concentration camp at Rieucros near Mende. It was wartime, and we were foreigners - 'undesirables', as they called them. But the camp administration kept a close eye on the kids in the camp, however undesirable they were. We came and went as we pleased. I was the oldest, and the only one to go to secondary school, at four or five years old.

Five kilometres away, snow or shine, with makeshift shoes that always took on water.

I still remember my first 'maths composition', when the teacher gave me a bad mark for demonstrating one of the 'three cases of equality of triangles'. My demonstration wasn't the one in the book, which he followed religiously. However, I knew perfectly well that my demonstration was no more or less convincing than the one in the book, the spirit of which I was following, with the endless traditional "we slide such and such a figure over such and such a figure". Clearly, this man who was teaching me didn't feel capable of judging by his own lights (in this case, the validity of a line of reasoning). He had to refer to an authority, in this case a book. It must have struck me, these words, for me to have remembered this little incident. Subsequently, and still today, I have had ample opportunity to see that such provisions are by no means the exception, but the almost universal rule. There is a lot to be said on this subject - a subject I touch on more than once, in one form or another, in Harvest and Sowing. But even today, whether I like it or not, I feel disconcerted every time I come across it again...

During the last years of the war, while my mother remained interned in the camp, I was in a "Secours Suisse" children's home for refugee children in Le Chambon sur Lignon. Most of us were Jewish, and when we were warned (by the local police) that there would be Gestapo raids, we went into hiding in the woods for a night or two, in small groups of two or three, without realising that our lives were at stake. The region was full of Jews hiding in the Cévennes, and many survived thanks to the solidarity of the local population.

What struck me most at the Collège Cévenol (where I was a pupil) was how little interest my fellow students took in what they were learning. As for me, I would devour the textbooks at the beginning of the school year, thinking that this time we were finally going to learn something *really* interesting; and the rest of the year I would use my time as best I could, while the planned curriculum was churned out inexorably, term after term. But we had some really nice teachers. The natural history teacher, Mr Friedel, was of remarkable human and intellectual quality. But, unable to 'crack down', he was heckled to death, to the point where towards the end of the year, it became impossible to keep up, his impotent voice drowned out by the general hullabaloo. That's why, maybe,

that I didn't become a biologist!

I spent a lot of my time, even during lessons (shhh...), doing maths problems. Soon the ones in the book weren't enough for me. Maybe because they tended to resemble each other a bit too much; but mostly, I think, because they fell out of the sky a bit too much, just like that, without saying where they came from or where they were going. These were the problems of the book, not *my* problems. And yet there was no shortage of really natural questions. For example, when the lengths  $a, b, c$  of the three sides of a triangle are known, the triangle is known (apart from its position), so there must be an explicit 'formula' to express, for example, the area of the triangle as a function of  $a, b, c$ . The same goes for a tetrahedron where we know the length of the six edges - what is its volume? I must have struggled with this one, but I eventually got the hang of it. In any case, when something 'stuck' with me, I didn't count the hours or days I spent on it, even if it meant forgetting everything else! (And that's how it is even now...)

What I found most unsatisfactory in our maths books was the absence of any serious definition of the notion of length (of a curve), area (of a surface) or volume (of a solid). I promised myself to fill this gap as soon as I could. I spent most of my time on it between 1945 and 1948, when I was a student at the University of Montpellier. I wasn't happy with the courses I was taking at university. Although I never said so myself, I must have had the impression that the teachers were just repeating their books, just like my first maths teacher at the lycée in Mende. So I only went to university from time to time, to keep up to date with the endless 'programme'. The books were good enough, but it was also clear that they didn't answer any of the questions I had. In fact, they didn't even *see them*, any more than my school books saw them. As long as they gave recipes for calculating lengths, areas and volumes, using simple, double or triple integrals (dimensions greater than three were cautiously avoided), the question of giving an intrinsic definition didn't seem to arise, either for my teachers or for the authors of the textbooks.

From my limited experience at the time, it might well seem that I was the only person in the world gifted with a curiosity for mathematical questions. At least that was my unspoken conviction during those years spent in intellectual solitude.

which didn't weigh on me (\*). To tell the truth, I don't think I ever thought about whether or not I was the only person in the world likely to be interested in what I was doing. My energy was sufficiently absorbed in meeting the challenge I had set myself: to develop a theory that fully satisfied me.

There was no doubt in my mind that I could not fail to get there, to get to the bottom of things, if only I took the trouble to scrutinise them, putting down in black and white what they were saying to me as I went along. The intuition of the *volume*, let's say, was irrefutable. It could only reflect a *reality*, elusive for the moment, but perfectly reliable. It was this reality that I simply had to grasp - a bit, perhaps, like the magical reality of 'rhyme' had been grasped and 'understood' one day.

When I started, at the age of seventeen and fresh out of high school, I thought it would only take a few weeks. I stuck with it for three years. I even found a way of missing an exam at the end of my second year at university - the one on spherical trigonometry (in the 'advanced astronomy' option, sic), because of a silly error in numerical calculation. (I was never very good at calculus, it has to be said, once I'd left secondary school. . . .) That's why I had to stay another third year in Montpellier to finish my bachelor's degree, instead of going to Paris straight away - the only place, I was assured, where I would have the opportunity to meet people in the know about what was considered important in maths. My informant, Mr Soula, also told me that the last problems in maths had been solved twenty or thirty years ago by a man called Lebesgue. He was said to have developed a theory of measurement and integration, which put an end to mathematics.

Mr Soula, my 'calculus diff' teacher, was a kind and sympathetic man.

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(\*) Between 1945 and 1948, I lived with my mother in a small hamlet about ten kilometres from Montpellier, Mairargues (by Vendargues), lost in the middle of the vineyards. (My father had disappeared in Auschwitz in 1942.) We lived meagrely on my meagre student grant. To make ends meet, I did the harvest every year, and after the harvest, I made grape wine, which I managed to sell as best I could (in contravention, it seems, of the legislation in force...) In addition, there was a garden which, without ever having to work it, provided us with an abundance of figs, spinach and even (towards the end) tomatoes, planted by a complaisant neighbour in the middle of a sea of splendid poppies. It was a good life - but sometimes just around the edges, when it was time to replace a pair of spectacle frames or a pair of shoes that were worn out to the bone. Luckily for my mother, who was weak and ill following her long stay in the camps, we were entitled to free medical assistance. We would never have been able to afford a doctor...

towards me. I don't think he convinced me for all that. There must already have been in me the prescience that mathematics is something unlimited in breadth and depth. Does the sea have an 'end point'? The fact remains that at no time was I tempted to go and find the book by this Lebesgue that Mr Soula had told me about, and that he must never have had in his hands either. In my mind, there was nothing in common between what a book might contain and the work *I* was doing, in *my own* way, to satisfy my curiosity about certain things that had intrigued me.

## 2. The importance of being alone.

When I finally made contact with the mathematical world in Paris, one or two years later, I ended up learning, among many other things, that the work I had done in my corner with the means at hand was (more or less) what was well known to 'everyone', under the name of 'Lebesgue measure and integral theory'. In the eyes of the two or three seniors to whom I spoke about this work (or even showed a manuscript), it was a bit as if I'd just wasted my time, rehashing what was already known. I don't remember being disappointed. At the time, the idea of getting 'credit', or even approval or simply the interest of others, for the work I was doing, must still have been foreign to me. Not to mention the fact that my energy was well and truly taken up with familiarising myself with a completely different environment and, above all, learning what was considered in Paris to be the mathematician's ABCs (\*).

And yet, looking back on those three years now, I realise that they were by no means wasted. Without even knowing it, I learnt in solitude what is the essence of being a mathematician - what no master can really teach. Without ever having had to tell myself, without having had to meet anyone with whom to share my thirst for understanding, I nevertheless knew, 'by gut feeling' I would say, that I was a mathematician.

someone who 'does' maths, in the full sense of the word - like one 'does' love. Mathematics had become for me a mistress who always welcomed my desire. Those years of solitude laid the foundation for a confidence that was never shaken - not by the discovery (when I arrived in Paris at the age of twenty) of the full extent of my ignorance and the immensity of what I had to learn; nor (more than twenty years later) by

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(\*) I give a short account of this rather rough transitional period in the first part of Harvest and Sowing (ReS I), in the section entitled "The welcome stranger" (n° 9).

the turbulent episodes of my departure without return from the world of mathematics; nor, in recent years, by the often rather crazy episodes of a certain 'burial' (anticipated and without blunders) of my person and my work, orchestrated by my closest compa- gnions of yesteryear...

To put it another way: in those crucial years, I learned to *be alone* (\*). By this I mean I want to approach the things I want to know by my own lights, rather than relying on the ideas and consensus, expressed or tacit, that would come to me from a more or less extensive group of which I would feel a member, or which for any other reason would be invested with authority for me. Mute consensuses had told me, both at school and at university, that there was no point in questioning the very notion of 'volume', which was presented as 'well known', 'self-evident', 'unproblematic'. I had ignored it, as a matter of course - just as Lebesgue, a few decades earlier, had had to ignore it. It is in this act of '*going beyond*', of being oneself in short and not simply the expression of the consensus that makes law, of not remaining enclosed within the imperative circle that they set for us - it is above all in this solitary act that '*creation*' is found. Everything else comes on top. Later, in this world of mathematicians that welcomed me, I had the opportunity to meet many people, both older and younger, more or less my age, who were obviously much more brilliant, much more 'gifted' than I was. I admired them for the ease with which they learned new concepts, as if they were playing games, and juggled with them as if they'd known them since the cradle - whereas I felt heavy and clumsy, picking my way laboriously, like a mole, through a shapeless m o u n d o f things that it was important (I was assured) for me to learn, and of which I felt incapable of grasping the ins and outs. In fact, I was in no way a brilliant student, passing prestigious competitions with flying colours, assimilating prohibitive grams.

Most of my brighter friends went on to become mathematicians.

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(\*) This formulation is somewhat improper. I never had to "learn to be alone", for the simple reason that I never *unlearned*, during my childhood, this innate ability which was in me at birth, as it is in everyone. But these three years of solitary work, in which I was able to give my best to myself, according to the spontaneously demanding criteria that were mine, confirmed and rested in me, in my relationship this time to mathematical work, a foundation of confidence and quiet assurance, which owed nothing to the consensus and fashions that are the law. I refer to this again in the note "*Racines et solitude*" (ReS IV, n° 1713, in particular p. 1080).

competent and renowned. However, looking back over thirty or thirty-five years, I can see that they have not left a truly profound mark on the mathematics of our time. They did things, sometimes beautiful things, in a ready-made context that they would never have thought of touching. Without knowing it, they remained prisoners of those invisible and imperious circles that delimit a Universe in a given environment and at a given time. To cross them, they would have had to rediscover within themselves the capacity that was theirs at birth, just as it was mine: the capacity to be alone.

Small children have no trouble being alone. They are solitary by nature, even if they don't mind the occasional company and know how to ask for Mum's totosse when it's time to drink. And he knows, without having to tell himself, that the pod is for him, and that he *knows how to* drink. But we often lose touch with our inner child. And we constantly miss out on the best, without deigning to see it... .

If in *Récoltes et Semailles* I am addressing someone other than myself, it is not an 'audience'. I am addressing you, the reader, as a *person*, and a person *alone*. It is to the one in you who knows how to be alone, to the child, that I would like to speak, and to no one else. I know that the child is often far away. He's seen it all, and he's seen it a long time ago. He's hidden himself away God knows where, and it's not easy, often, to get to him. You'd swear he'd been dead forever, that he never existed at all - and yet I'm sure he's out there somewhere, alive and well.

And I also know what the *sign is* that I am being heard. It's when, beyond all the differences of culture and destiny, what I say about myself and my life finds an echo and resonance in you; when you also find in it *your own life*, your own experience of yourself, in a light perhaps that you hadn't paid attention to before. It's not a question of 'identification' with something or someone far removed from you. But perhaps, in a small way, you are rediscovering your own life, what is *closest to* you, through the rediscovery that I am making of mine, in the pages of Harvest and Sowing and even in these pages that I am writing today.

### 3. The inner adventure - or myth and testimony.

Above all, Harvest and Sowing is a *reflexion* on myself and my life. By the same token, it is also a *testimony*, and this in two ways. It is a testimony to my *past*, on which the main weight of reflection falls. But at the same time it is also a

a testimony to the most immediate *present* - to the very moment when I am writing, and when the pages of Harvest and Sowing are being born over the hours, nights and days. These pages are the faithful witnesses of a long meditation on my life, as it has really unfolded (and is still unfolding at this very moment...).

These pages have no literary pretensions. They are a *document* about myself. I have only allowed myself to touch them (for occasional stylistic alterations, in particular) within very narrow limits (\*). If it has any pretension, it is only that of being true. And that's a lot.

This document is in no way an 'autobiography'. It doesn't tell you my date of birth (which would be of little use other than to draw up an astrological chart), or the names of my mother and father or what they did for a living, or the names of my wife and other women who were important in my life, or the names of the children born of these loves, and what they did with their lives. It's not that these things weren't important in my life, and remain important even now. But as this reflection on myself began and continued, at no time did I feel prompted to engage in even the slightest description of the things I come across here and there, still less to conscientiously line up names and figures. At no time did it seem to me that this could add anything to the purpose I was pursuing at the time (although in the few pages that precede this, I have been led, as if in spite of myself, to include perhaps more material details about my life than in the thousand pages that follow. ....) .

And if you ask me what this 'purpose' is that I'm pursuing for a thousand pages, I'll answer: it's to tell the story, and thereby *discover* the *inner adventure* that was and is my life. This narrative-testimony of an adventure continues at the same time on the two levels I have just mentioned. There is the exploration of an adventure in the past, its roots and origins in my childhood. And there is the continuation and renewal of that 'same' adventure, as I write Récoltes et Semailles, in spontaneous response to a violent challenge from the outside world.

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(\*) This means that any errors (material, perspective, etc.) are not corrected in the first draft, but are included in footnotes or in a later 'review' of the situation under examination.

(\*\*).

External events provide food for thought, but only insofar as they hint at and provoke a twist in the inner adventure, or help to shed light on it. And the burial and plundering of my mathematical work, which will be discussed at length, was just such a provocation. It provoked in me a mass outpouring of powerful egotistical reactions, and at the same time revealed to me the deep and ignored links that continue to bind me to the work that grew out of me.

It's true that the fact that I'm one of those who's 'good at maths' isn't necessarily a reason (and even less a good reason) for you to be interested in my particular 'adventure' - nor the fact that I've had problems with my colleagues, after changing environment and lifestyle. In fact, there's no shortage of colleagues and even friends who find it ridiculous to go public (as they say) with their 'states of mind'. What counts are the 'results'. The 'soul', that is to say, that part of us which *experiences* the 'production' of these 'results', or the repercussions of all kinds (both in the life of the 'producer' and in that of his fellow human beings), is the object of scorn, even open derision. This attitude is intended as an expression of 'modesty'. I see it as a sign of flight, and a strange disturbance, promoted by the very air we breathe. Of course I don't write for people who are struck by a kind of latent contempt for themselves that makes them disdain the best I have to offer. A contempt for what truly makes up *his own life*, and for what makes up mine: the superficial and profound, coarse and subtle movements that animate the psyche, this very '*soul*' that lives experience and reacts to it, that freezes or blossoms, that withdraws or learns...

The story of an inner adventure can only be told by the person living it, and by no one else. But even if the story is intended only for oneself, it rarely slips into the rut of constructing a *myth*, of which the narrator is the hero. Such a myth is born, not out of the creative imagination of a people and a culture, but out of the vanity of the person who does not dare to accept a humble reality, and who likes to substitute a construction, the work of his own mind. But a *true* account (if there is such a thing) of an adventure as it was really lived, is a precious thing. And this is not because of the prestige that (rightly or wrongly) surrounds the narrator, but simply because it *exists*, with its quality of truth. Such testimony is precious, whether it

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(\*\*) For details of this "violent interpellation", see "Letter", in particular sections 3 to 8.

comes from a man of notoriety or even fame, or from a small employee with no future and a family, or from a common criminal.

If such an account has any virtue for others, it is first and foremost that it brings them face to face with themselves, through this unvarnished account of someone else's experience. Or (to put it another way) to perhaps erase from them (if only for the time it takes to read it) the contempt in which they hold their *own adventure*, and the 'soul' that is its passenger and captain. ...

#### 4. The tableau de mœurs.

Talking about my past as a mathematician, and then discovering (as if unwillingly) the twists and turns of the gigantic Burial of my work, I was led, without having sought it, to paint a picture of a certain milieu and a certain era - an era marked by the breakdown of some of the values that gave meaning to human work. This is the 'tableau de mœurs' aspect, painted around a 'news item' that is undoubtedly unique in the annals of 'Science'. What I said earlier makes it quite clear, I think, that you won't find in Harvest and Sowing a 'file' on a certain unusual 'case', just to bring you up to speed quickly. A friend of mine who was looking for the file missed out on almost everything that makes up the substance and flesh of Harvest and Sowing.

As I explain in much greater detail in the Lettre, the 'investigation' (or 'tableau de mœurs') continues mainly in parts II and IV, 'L'Enterrement (1)

- ou la robe de l'Empereur de Chine" and "L'Enterrement (3) - ou les Quatre Opérations". Over the pages, I stubbornly unearth, one after the other, a multitude of juicy facts (to say the least), which I try as best I can to 'fit in' as I go along. Little by little, these facts come together in an overall picture that gradually emerges from the mists, in brighter and brighter colours, with sharper and sharper outlines. In these day-to-day notes, the 'raw facts' that have just emerged are inextricably mixed with personal reminiscences, and with comments and reflections of a psychological, philosophical and even (occasionally) mathematical nature. That's just the way it is, and there's nothing I can do about it!

Based on the work I've done, which has kept me on my toes for more than a year, putting together a file, in the style of 'investigative findings', should represent additional work of the order of a few hours or a few days, depending on how curious and demanding you are.

of the interested reader. There was a time when I did try to put it together, the famous file. That was when I started writing a note that was supposed to be called 'The Four Operations'(\*). But no, there was nothing I could do. I just couldn't do it! That's definitely not my style of expression, and in my old age less so than ever. And I now feel, with Harvest and Sowing, that I have done enough for the benefit of the 'mathematical community', to leave it to others (if there are any among my colleagues who feel concerned) to put together the necessary 'dossier'.

### 5. The heirs and the builder.

It's time for me to say a few words here about my mathematical work, which has taken and still takes (to my own surprise) an important place in my life. More than once in Harvest and Sowing I come back to this work - sometimes in a way that is clearly intelligible to everyone, and at other times in somewhat technical terms (\*). These latter passages will largely go 'over the head' not only of the 'layman', but even of the fellow mathematician who is more or less 'out of touch' with the maths it deals with. You can, of course, skip the passages that seem a little too 'advanced' for you. You can also skim through them, and perhaps catch a glimpse of the 'mysterious beauty' (as a non-mathematician friend wrote to me) of the world of mathematical things, emerging like so many 'strange, inaccessible islands' in the vast, shifting waters of reflection...

As I said earlier, most mathematicians tend to confine themselves to a conceptual framework, to a '*Universe*' that has been fixed once and for all - essentially, the one they found 'ready-made' when they studied. They are like the heirs of a big, beautiful house, with its living rooms and kitchens and workshops, and its cookware and all kinds of tools, with which there is, my goodness, plenty to cook and tinker with. How this house was gradually built up over the generations, and how and why certain tools were designed and fashioned (and not others. . . ), why the rooms are arranged and laid out in one way here and another there.

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(\*) The planned note ended up in Part IV (of the same name, "The Four Operations") of Harvest and Sowing, comprising 70 notes spanning well over four hundred pages.

(\*) In addition to mathematical overviews of my past work, there are also passages here and there containing also new mathematical developments. The longest is "The five pictures (crystals and  $\mathbb{Z}$ -Modules)" in ReS IV, note n° 171 (ix).

these are questions that these heirs would never dream of asking themselves. This is the 'Universe', the 'given' in which we have to live, full stop! Something that seems big (and most of us are far from having seen all its parts), but at the same time *familiar*, and above all: *unchanging*. When they're busy, it's to maintain and embellish a heritage: repair a wobbly piece of furniture, plaster a facade, sharpen a tool, or even sometimes, for the most enterprising, make a new piece of furniture from scratch in the workshop. And sometimes, when they put their minds to it, the piece of furniture is a thing of beauty, and the whole house looks better for it.

Even more rarely, one of them will think of making some modification to one of the tools in the storeroom, or even, under repeated and insistent pressure of need, of imagining and making a new one. In doing so, they will scarcely fail to apologise for what they feel is a kind of infringement of the piety owed to family tradition, which they feel they are upsetting with an unusual innovation.

In most rooms of the house, windows and shutters are carefully closed.

- no doubt for fear of a wind blowing in from elsewhere. And when the beautiful new furniture, one here and the other there, not to mention the offspring, start to clutter up rooms that have become narrow and invade even the corridors, none of these heirs will want to realise that their familiar, cosy Universe is starting to feel a little cramped around the edges. Rather than come to terms with this, some will prefer to squeeze in and wedge themselves as best they can, some between a Louis XV sideboard and a rattan rocking chair, some between a snotty toddler and an Egyptian sarcophagus, while others, in desperation, will climb as best they can over a crumbling heap of chairs and benches...

The little picture I have just painted is not specific to the world of mathematicians. It illustrates inveterate and immemorial conditioning, which can be found in all walks of life and in all spheres of human activity, and this (as far as I know) in all societies and at all times. I have already alluded to this, and I in no way claim to be free of it myself. As my testimony will show, the opposite is true. It just so happens that, at the relatively limited level of intellectual creative activity, I have been relatively unaffected (\*) by this conditioning, which we

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(\*) I see the main reason for this in a certain favourable climate that surrounded my childhood until the age of five. On this subject, see the note "Innocence" (ReS III, n° 107).

could call 'cultural blindness' - the inability to see (and move) outside the 'Universe' set by the surrounding culture.

As for me, I feel I belong to the line of mathematicians whose spontaneous vocation and joy is to constantly build new houses (\*\*). Along the way, they can't help inventing and shaping all the tools, utensils, furniture and instruments needed to build the house from the foundations to the ridge, to stock the future kitchens and workshops in abundance, and to set up the house so they can live in it and feel comfortable in it. However, once everything has been laid, right down to the last oak beam and stool, it's rare for the workman to linger long in these places, where every stone and every rafter bears the mark of the hand that worked and laid it. His place is not in the tranquillity of ready-made worlds, however welcoming and harmonious they may be - whether they have been arranged by his own hands, or those of his predecessors. Other tasks are already calling him to new sites, under the imperious impulse of needs that he is perhaps the only one to feel clearly, or (more often still) by anticipating needs that he is the only one to sense. Its place is in the open air. He is a friend of the wind and is not afraid to work alone, for months and years and, if need be, for a lifetime, unless a welcome relief comes to the rescue. He only has two hands like everyone else, of course - but two hands that always know what they have to do, that don't shy away from the biggest jobs or the most delicate ones, and that never tire of getting to know and reacquainting themselves with the countless things that are constantly calling on them to know them. Two hands is not much, perhaps, because the World is infinite. They will never exhaust it! And yet, two hands are a lot...

I'm not much of a history buff, but if I had to give the names of mathematicians in this lineage, Galois and Riemann (in the last century) and Hilbert (at the beginning of the present century) spontaneously come to mind. If I were to look for a representative among the elders who welcomed me into the mathematical world when I was starting out (\*), it is the name of Jean Leray that comes to mind above all others, even though my contacts with him have remained very sporadic (\*\*).

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(\*\*) This archetypal image of the "house" to be built resurfaces and is expressed for the first time in the note "Yin the Servant, and the new masters" (ReS III, n° 135).

(\*) I talk about these beginnings in the section "The welcome stranger" (ReS I, n° 9).

(\*\*) This does not prevent me from being (following H. Cartan and J. P. Serre) one of the main users and pro-

I have just sketched out two broad portraits: that of the 'homebody' mathematician who is content to maintain and embellish a heritage, and that of the pioneer-builder (\*), who cannot stop constantly crossing those 'invisible and imperious circles' that delimit a Universe (\*\*). We can also call them, by names that are a little exaggerated but suggestive, the "conservatives" and the "innovators". Both have their *raison d'être* and their role to play, in the same collective adventure continuing over generations, centuries and millennia. At a time when a science or an art is flourishing, there is no opposition or antagonism between these two temperaments (\*\*\*)� They are different, and they complement each other just as the dough and the leaven complement each other.

Between these two extreme types (though by no means opposed in nature), there is of course a whole range of temperaments in between. A 'homebody' who would never dream of leaving a familiar home, let alone going to the trouble of building another one who knows where, will not hesitate, however, when things start to get a bit cramped, to put his hand to the trowel to convert a cellar or an attic, to raise a floor, or even, if necessary, to add to the walls some new outbuilding of modest proportions.

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the driving force behind one of the great innovative notions introduced by Leray, that of the beam, which has been one of the essential tools throughout my work as a geometer. It also provided me with the key to extending the notion of (topological) space into that of topos, which will be discussed below.

Leray differs from the portrait I have drawn of the 'builder', it seems to me, in that he does not seem to be inclined to 'build houses from the foundations up'. Rather, he couldn't resist laying vast foundations in places no one else would have thought of, while leaving it to others to finish them and build on them, and, once the house was built, to move in (if only for a while)...

(\*) I have just, surreptitiously and 'on the sly', added two male-sounding adjectives (that of However, they express very different aspects of the impulse to discover, and of a more delicate nature than these names could possibly evoke. This is what will emerge from the rest of this walk and reflection, in the stage "Discovering the Mother - or the two sides" (n° 17).

(\*\*) At the same time, moreover, and without having intended it, he assigns to this ancient Universe (if not for itself, At least for its less mobile congeners) new limits, in new circles that are certainly wider, but just as invisible and just as imperious as those they have replaced.

(\*\*\*) This was particularly the case in the mathematical world, during the period (1948-1969) of which I have spoken. was a direct witness, when I myself was part of that world. After I left in 1970, there seems to have been a kind of wide-ranging reaction, a kind of 'consensus of disdain' for 'ideas' in general, and more particularly, for the great innovative ideas I had introduced.

tions (\*\*\*\*). He may not be a builder at heart, but he often looks with a sympathetic eye, or at least without secret concern or disapproval, at another who has shared the same dwelling with him, and who is now busy gathering beams and stones in some impossible camp, with the air of someone who already sees a palace there. ...

## 6. Viewpoints and vision.

But let me come back to myself and my work.

If I have excelled in the art of the mathematician, it is less through skill and perseverance in solving the problems bequeathed by my predecessors, than through that natural propensity in me which leads me to see *questions*, obviously crucial, which no one had seen, or to identify the '*right notions*' which were missing (without anyone often realising it, before the new notion appeared), as well as the '*right statements*' which no one had thought of. Quite often, notions and statements fit together so perfectly that there can be no doubt in my mind that they are correct (apart from a few alterations, at most) - and often then, when it's only a 'work in progress' intended for publication, I dispense with going any further, and taking the time to work out a demonstration which quite often, once the statement and its context are well seen, can no longer be anything more than a matter of 'craft', not to say routine. There are countless things that demand attention, and it is impossible to follow the call of each one to the end

! That doesn't alter the fact that the propositions and theorems I have duly proved in my written and published work number in the thousands, and I think I can say that, with very few exceptions, they have all become part of the common heritage of things commonly accepted as 'known' and commonly used in mathematics.

But even more than the discovery of new questions, notions and statements, it is towards the discovery of fertile *points of view*, constantly leading me to introduce, and to develop to a greater or lesser extent, entirely new *themes*, that my particular genius leads me. It seems to me that this is the most essential contribution I have made to the mathematics of my time. To tell the truth, these innumerable questions, notions and statements that I have just been talking about, do not seem to me to be the most essential contribution to the mathematics of my time.

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(\*\*\*\*) Most of my 'elders' (mentioned, for example, in 'Une dette bienvenue', Introduction, 10) fit this intermediate temperament. I am thinking in particular of Henri Cartan, Claude Chevalley, André Weil, Jean-Pierre Serre and Laurent Schwartz. With the possible exception of Weil, they all gave a 'sympathetic eye', without 'secret concern or disapproval', to the solitary adventures they saw me embarking on.

take on meaning for me only in the light of such a 'point of view' - or to put it better, they *emerge* spontaneously from it, with the force of evidence; in the same way that a light (even a diffuse one) that emerges in the dark of night seems to bring out of nothingness those more or less blurred or sharp outlines that it suddenly reveals to us. Without this light uniting them in a common beam, the ten or hundred or thousand questions, notions and statements would appear as a motley, amorphous heap of 'mental gadgets', isolated from one another - and not as parts of a *Whole* which, though perhaps invisible, still hiding in the folds of the night, is nonetheless clearly presaged.

The fertile point of view is the one that reveals to us, like so many living parts of the same Whole that encompasses them and gives them meaning, those burning questions that no one felt, and (as if in response perhaps to these questions) those so natural notions that no one had thought to draw out, and finally those statements that seem to flow naturally, and that no one certainly risked asking, as long as the questions that gave rise to them, and the notions that allow them to be formulated, had not yet appeared. Even more than what we call 'key theorems' in mathematics, it is the fertile points of view that are, in our art (\*), the most powerful tools of discovery - or rather, they are not tools, but the very *eyes* of the researcher who, passionately, wants to know the nature of mathematical things.

Thus, the fruitful point of view is none other than this 'eye' which both makes us *discover* and makes us *recognise the unity* in the multiplicity of what is discovered. And this unity is truly the very life and breath that connects and animates these multiple things.

But as its very name suggests, a 'point of view' in itself remains fragmentary. It reveals *one aspect* of a landscape or panorama, among a multiplicity of others that are equally valid, equally 'real'. It is by combining complementary points of view of the same reality, by multiplying our "eyes", that our gaze penetrates further into our knowledge of things. The richer and more complex the reality we wish to know, the more important it is to have several 'eyes' (\*\*) to grasp it in all its breadth and finesse.

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(\*) This is certainly not the case in 'our art' alone, but (it seems to me) in any work of discovery, at least when it is at the level of intellectual knowledge.

(\*\*) Every point of view leads to the development of its own *language*. Having several In mathematics at least, it's also a question of having several "eyes" or "points of view" from which to apprehend a situation.

And it sometimes happens that a cluster of converging points of view on the same vast landscape, by virtue of that in us which enables us to grasp the *One* through the many, gives shape to something new; something which transcends each of the partial perspectives, in the same way that a living being transcends each of its limbs and organs. This new thing can be called a *vision*. The vision unites the already known points of view that embody it, and reveals to us others hitherto ignored, just as the fruitful point of view makes us discover and apprehend as part of the same Whole, a multiplicity of new questions, notions and statements.

To put it another way: vision is to the points of view from which it appears to emerge and which it unites, just as clear, warm daylight is to the different components of the solar spectrum. A vast and profound vision is like an inexhaustible *source*, designed to inspire and enlighten the work not only of the person in whom it was born one day and who made himself its servant, but also of generations, fascinated perhaps (as he himself was) by the distant limits it gives us a glimpse of...

## 7. The "big idea" - or the trees and the forest.

The so-called 'productive' period of my mathematical activity, i.e. the period attested by publications in due form, stretches from 1950 to 1969, so over twenty years. And for twenty-five years, between 1945 (when I was seventeen) and 1969 (when I was nearly forty-two), I invested almost all my energy in mathematical research. An inordinate investment, to be sure. I paid for it with a long period of spiritual stagnation, with a gradual 'thickening', which I will have occasion to mention more than once in the pages of Harvest and Sowing. And yet, within the limited field of a purely intellectual activity, and through the blossoming and maturing of a vision restricted to the world of mathematical things alone, these were years of intense creativity.

During this long period of my life, almost all my time and energy was devoted to what we call '*work on parts*': the painstaking work of shaping, assembling and honing, required to build from scratch the houses that an inner voice (or demon...) was telling me to build, according to a master plan that it was whispering to me as the work progressed. Caught up in the tasks of the 'trade': those of stonemason, bricklayer, carpenter, even plumber, joiner and

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at least) to have *several different languages* at their disposal to understand it.

as a cabinetmaker - rarely did I take the time to note down in black and white, even if only in broad strokes, the master plan invisible to everyone (as it later appeared. . . ) except me, who over the days, months and years guided my hand with the surety of a sleepwalker (\*). It has to be said that the work on the pieces, in which I liked to put a loving care, was by no means made to displease me. What's more, the mathematical mode of expression that was taught and practised by my elders gave pre-eminence (to say the least) to the technical aspect of the work,

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(\*) The image of the "somnambulist" was inspired by the title of Koestler's remarkable book "Les somnambules" (Calman Lévy), which presents an "Essay on the history of conceptions of the Universe", from the origins of scientific thought to Newton. One of the aspects of this history that struck Koestler and that he highlights is the extent to which, often, the path from a certain point in our knowledge of the world to some other point that (logically and with hindsight) seems very close, takes sometimes the most academic detours, which seem to defy sound reason ; And yet, through these thousand and one detours that seem destined to lead them astray for ever, and with a 'sleepwalking certainty', men who set out in search of the 'keys' to the Universe stumble, as if by magic and often without even realising it, upon *other* 'keys' that they were far from foreseeing, and which nevertheless turn out to be 'the right ones'.

From what I have been able to observe around me, at the level of mathematical discovery, these far-reaching detours in the path of discovery are the work of some large-scale researchers, but by no means of all of them. This could be due to the fact that for the last two or three centuries, research in the natural sciences, and even more so in mathematics, has been freed from the imperative religious or metaphysical presuppositions of a given culture and era, which have been particularly powerful brakes on the development (for better or for worse) of a 'scientific' understanding of the Universe. It is true, however, that some of the most fundamental and obvious ideas and notions in mathematics (such as displacement, the group, the number zero, literal calculus, the coordinates of a point in space, the notion of a set, or that of a topological 'form', not to mention negative numbers and complex numbers) took thousands of years to appear. These are all eloquent signs of this inveterate 'block', deeply implanted in the psyche, against the conception of totally new ideas, even in cases where they are childishly simple and seem to impose themselves with the force of evidence, for generations, even millennia...

To return to my own work, I have the impression that in it the 'errors' (more numerous perhaps than in the case of most of my colleagues) are limited exclusively to points of detail, generally quickly spotted by myself. They are simple 'accidents along the way', of a purely 'local' nature and without any serious impact on the validity of the essential intuitions concerning the situation under examination. On the other hand, at the level of the ideas and the great guiding intuitions, it seems to me that my work is free of any 'misstep', however incredible that may seem. It's this never-failing ability to grasp at every moment, if not the ultimate *results of* an approach (which more often than not remain hidden from view), then at least the most fertile *directions* that offer themselves to lead me straight to the *essential* things - it's this ability that resurrected in me Koestler's image of the 'somnambulist'.

and did not encourage 'digressions' that would have dwelt on 'motivations'; or even those that would have pretended to conjure up out of the mists some image or vision that might have been inspiring, but which, because it had not yet been embodied in tangible constructions of wood, stone or pure, hard cement, was more akin to shreds of a dream than to the work of a diligent, conscientious craftsman.

In terms of quantity, my work during these years of intense productivity has resulted mainly in some twelve thousand pages of publications, in the form of articles, monographs or seminars (\*), and in hundreds, if not thousands, of new concepts, which have entered the common heritage, with the very names I gave them when I first identified them (\*\*). In the history of mathematics, I believe that I am the one who has introduced the greatest number of new notions into our science, and at the same time, the one who has been led, by this very fact, to invent the greatest number of new names, to express these notions with delicacy, and as suggestively as I could.

Of course, these 'quantitative' indications only give a rough idea of my work, and miss the real soul, life and vigour of it. As I wrote earlier, the best thing I have contributed to mathematics is the new '*points of view*' that I *first glimpsed*, and then patiently *identified* and developed to a greater or lesser extent. Like the notions I have just been talking about, these new points of view, introduced into a vast multiplicity of very different situations, are themselves almost innumerable.

There are, however, some points of view which are broader than others, and which in and of themselves both support and encompass a multitude of partial points of view, in a multitude of different particular situations. Such a point of view can rightly be called a "*big idea*". By virtue of its own fecundity, such an idea gives rise to a teeming progeny of ideas, all of which inherit its fecundity, but most (if not all) of which are less far-reaching than the mother idea.

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(\*) From the 1960s onwards, some of these publications were written in collaboration with colleagues (especially J. Dieudonné) and students.

(\*\*) The most imposing of these notions are reviewed in the Thematic Outline, and in the accompanying Commentary on History will be included in volume 4 of the Réflexions. Some of the names were suggested to me by friends or students, such as the term 'smooth morphism' (J. Dieudonné) or the panoply 'site, field, sheaf, link', developed in Jean Giraud's thesis.

As for *expressing* a great idea, 'saying' it, this is usually almost as delicate as its conception and slow gestation in the person who conceived it.

— or to put it more accurately, the laborious work of gestation and formation *is* precisely that which 'expresses' the idea: the work that consists of patiently clearing it, day after day, from the veils of mist that surround it at birth, to gradually give it tangible form, in a picture that grows richer, firmer and more refined over the weeks, months and years. Simply *naming* the idea, using some striking formula or more or less technical key words, can take a few lines or even a few pages.

— but few people, without already knowing it well, will be able to hear this "name" and recognise a face in it. And when the idea has reached full maturity, perhaps a hundred pages will suffice to express it, to the full satisfaction of the worker in whom it was born - just as it may be that ten thousand pages, long worked over and weighed up, will not suffice (\*).

And in either case, among those who, in order to make it their own, have taken note of the work that finally presents the idea in full bloom, like a spacious forest that has grown there on a deserted moor - it is a safe bet that many will see all these vigorous and slender trees and will use them (some to climb, some to pull out beams and planks, and some to light fires in their fireplaces...). But few will have been able to see the forest.... .

#### 8. Vision - or twelve themes for harmony.

Perhaps we can say that the 'big idea' is the point of view that not only proves to be new and fruitful, but introduces into science a new and vast *theme* that embodies it. And all science, when we understand it not as an instrument of power and domination, but as an adventure in the knowledge of our species through the ages, is not only a source of inspiration, but also a source of inspiration.

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(\*) When I left the mathematical scene in 1970, all my publications (many of them collaborative) on the central theme of *diagrams* must have amounted to some ten thousand pages. However, this represented only a modest part of the vast programme that I saw ahead of me concerning schemas. This programme was abandoned sine die as soon as I left, despite the fact that very little of what had already been developed and published to be made available to everyone became part of the common heritage of notions and results commonly used as 'well known'.

The part of my programme on the schematic theme and its extensions and ramifications, which I had completed by the time I left, represents in itself the most extensive work on foundations ever accomplished in the history of mathematics, and surely one of the most extensive in the history of science too.

other than this harmony, more or less vast and more or less rich from one era to the next, which unfolds over the course of generations and centuries, through the delicate counterpoint of all the themes that appear in turn, as if called from nothing, to join and intertwine within it.

Among the many new points of view that I have developed in mathematics, there are *twelve* that, with hindsight, I would call 'big ideas' (\*). To see my work as a mathematician, to 'feel' it, is to see and 'feel' at least some of these ideas, and the major themes they introduce, which form both the fabric and the soul of the work.

By necessity, some of these ideas are 'bigger' than others (which, by the same token, are 'smaller'). In other words, among these new themes, some are broader than others, and some plunge deeper into the heart of the mystery of things.

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(\*) Here, for the mathematician reader who may be curious, is a list of these twelve key ideas, or 'master themes' of my work (in chronological order of appearance):

1. Topological tensor products and nuclear spaces.
2. Continuous" and "discrete" duality (derived categories, "six operations").
3. Yoga Riemann-Roch-Grothendieck (K-theory, relation to intersection theory).
4. Schematics.
5. Topos.
6. Spread and A-adic cohomology.
7. Motifs and motivic Galois group ( $\otimes$ -Grothendieck categories).
8. Crystals and crystal cohomology, yoga "De Rham coefficients", "Hodge coefficients"...
9. "Topological algebra":  $\infty$ -fields, derivators; cohomological formalism of topos, as inspiration for a new homotopic algebra.
10. Moderate topology.
11. Yoga of Anabelian algebraic geometry, Galois-Teichmüller theory.
12. Schematic" or "arithmetic" viewpoint for regular polyhedra and regular configurations of all kinds.

Apart from the first of these themes, an important part of which is part of my thesis (1953) and was developed during my period of functional analysis between 1950 and 1955, the other eleven emerged during my period as a surveyor, from 1955 onwards.

mathematics (\*\*). There are three (and not the least in my view) which, having appeared only after my departure from the mathematical scene, are still in an embryonic state: 'officially' they do not even exist, since there is no publication in due form to serve as their birth certificate (\*). Of the nine themes that appeared before my departure, the last three, which I had left in full bloom, are still in their infancy today, for lack (after my departure) of loving hands to provide for these 'orphans', left to fend for themselves in a hostile world (\*\*). As for the other six themes, which reached full maturity during the two decades preceding my departure, we can say

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(\*\*) Among these themes, the *widest* in *scope* seems to me to be that of *topos*, which provides the idea of a synopsis of algebraic geometry, topology and arithmetic. The theme of *schemas* is the widest in terms of the *range of developments* to which it has already given rise. (On this subject, see the b. de p. note (\*) on page 20.) It is this theme which provides the framework 'par excellence' for eight of the other themes considered (i.e. all the others except themes 1, 5 and 19), at the same time as it provides the central notion for a fundamental renewal of algebraic geometry and of the algebraic-geometric language.

On the other hand, the first and last of the twelve themes seem to me to be of more modest dimensions than the others. However, as for the last one, which introduces a new perspective into the very old theme of regular polyhedra and regular configurations, I doubt that the life of a mathematician who devotes himself body and soul to it would be enough to exhaust it. As for the first of all these themes, that of topological tensor products, it played more the role of a new ready-to-use tool than that of a source of inspiration for further developments. This does not prevent me from still receiving, in recent years, sporadic echoes of more or less recent work, resolving (twenty or thirty years later) some of the questions that I had left in abeyance.

The most profound (in my view) of these twelve themes are that of *motifs*, and the closely related one of *Anabelian algebraic geometry* and *Galois-Teichmüller yoga*.

From the point of view of the *power of tools* that I have perfected and honed myself, and which have been in common use in various 'cutting-edge' research sectors over the last two decades, it is the '*schemas*' and '*spread and A-adic cohomology*' aspects that seem to me to be the most noteworthy. For a well-informed mathematician, I think that from now on there can hardly be any doubt that the schematics tool, like that of *A-adic cohomology* which stems from it, are among the few major achievements of the century, which have nourished and renewed our science over the last few generations.

(\*) The only 'semi-official' text in which these three themes are sketched out to any extent is *Esquisse d'un Pro-gramme*, written in January 1984 on the occasion of an application for secondment to the CNRS. This text (also referred to in Introduction 3, 'Boussole et Bagages') will in principle be included in volume 4 of *Réflexions*.

(\*\*) After the burial without fanfare of these three orphans, on the very eve of my Initially, two of them were exhumed with great fanfare and without any mention of the worker, one in 1981 and the other (given the unqualified success of the operation) the following year.

(with one or two reservations (\*\*\*)) that they had already become part of the common patriotism: among geometricians in particular, 'everyone' nowadays sings them without even knowing it (like Monsieur Jourdain wrote prose), all day long and all the time. They are part of the air we breathe when we 'do geometry', or when we do arithmetic, algebra or analysis that is even remotely 'geometric'.

These twelve major themes in my work are by no means isolated from one another. I see them as part of a *unity of spirit* and purpose that runs like a common, persistent background note through all my work, both 'written' and 'unwritten'. And as I write these lines, I seem to find the same note again - like a call! - through those three years of 'free', relentless and solitary work, at a time when I had not yet bothered to know whether there were any mathematicians in the world apart from myself, so caught was I then by the fascination of what was calling me...

This unity is not merely the mark of the same craftsman on the works that come out of his hands. These themes are linked together by innumerable connections, both loose and obvious, just as the different themes, each clearly recognisable, are linked together, unfolding and intertwining in a single, vast counterpoint - in a harmony that brings them together, carries them forward and gives each one a meaning, a movement and a fullness in which all the others participate. Each of the sub-themes seems to be born of this greater harmony and reborn anew moment by moment, rather than appearing as a 'sum' or 'result' of pre-existing constituent themes. And to tell the truth, I can't shake the feeling (no doubt absurd...) that, in a way, it is indeed this harmony, which has not yet appeared but which certainly already 'existed', somewhere in the obscure bosom of things yet to be born - that it is indeed this harmony which has in turn given rise to these themes which were only to take on their full meaning through it, and that it is also this harmony which was already calling out to me in a low, urgent voice, in those years of ardent solitude, at the end of adolescence...

The fact remains that these twelve master themes of my work all, as if by secret predestination, contribute to the same symphony - or, to use a different image, they embody so many different "points of view", all coming from different angles.

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(\*\*\*) The 'more or less' refers above all to the Grothendieckian yoga of duality (derived categories and six operations), and that of the topos. This will be discussed in detail (among other things) in Parts II and IV of Harvest and Sowing (Burial (1) and (3)).

all working towards the same broad *vision*.

This vision only began to emerge from the mists, to show recognisable outlines, around 1957, 58 - years of intense gestation (\*). Strangely perhaps, this vision was so close to me, so 'obvious', that until a year ago (\*), I hadn't even thought of giving it a name (although one of my passions has always been to *name* the things I discover, as a first means of apprehending them...) It's true that I couldn't point to a particular moment, which would have been experienced as the moment of the appearance of this vision, or which I could recognise as such with hindsight. A new vision is such a vast thing, that its appearance cannot doubtless be situated at a particular moment, but that it must penetrate and take possession progressively over many years, if not generations, of the person or persons who scrutinise and contemplate; as if new eyes had to be laboriously formed behind the familiar eyes that they are destined to replace little by little. And the

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(\*) 1957 was the year in which I came up with the '*Riemann-Roch*' theme (Grothendieck version) - which overnight made me a 'big star'. It was also the year of my mother's death, which marked a major turning point in my life. It was one of the most intensely creative years of my life, and not just in mathematical terms. For twelve years, all my energy had been invested in mathematics. That year, I had the feeling that I had pretty much 'come full circle' in terms of what mathematical work was, and that it might now be time to invest myself in something else. It was clearly a need for inner renewal that was surfacing for the first time in my life. I thought at the time about becoming a writer, and for several months I stopped all mathematical activity. In the end, I decided that I would at least put the mathematical work I was already doing in black and white, for a few months no doubt, or a year at the most... .

The time was not yet ripe, no doubt, for the big leap. The fact remains that once I had resumed my mathematical work, it was he who took me back. He didn't let me go for another twelve years!

The year that followed this interlude (1958) was perhaps the most fruitful of all in my life as a mathematician. It was in this year that the two central themes of the new geometry emerged, with the strong start of the *theory of schemes* (the subject of my talk at the International Congress of Mathematicians in Edinburgh in the summer of that year), and the appearance of the notion of '*site*', a provisional technical version of the crucial notion of *topos*. With the benefit of almost thirty years' hindsight, I can now say that this was really the year when the vision of the new geometry was born, in the wake of the two master tools of this geometry: diagrams (which represent a metamorphosis of the old notion of 'algebraic variety'), and *topos* (which represent an even more profound metamorphosis of the notion of space).

(\*) I first thought of giving a name to this vision in the reflection of 4 December 1984, in the sub-note (n° 136<sub>1</sub>) to the note "Yin the Servant (2) - or generosity" (ReS III, page 637).

The vision is also too vast for there to be any question of 'grasping' it, as one would grasp the first notion that appeared at the turn of the road. Which is probably why it is not surprising, in the end, that the thought of naming something so vast, so close and so diffuse, only emerged with hindsight, once it had reached full maturity.

To tell the truth, until two years ago my relationship with mathematics was limited (apart from the task of teaching it) to *doing* it - to following an impulse that kept pulling me *forward*, into an 'unknown' that kept attracting me. The idea would never have occurred to me to stop in my tracks, to pause even for a moment, to look back and see perhaps the path I had travelled, or even to situate a work that was no longer there (whether to situate it *in my life*, as something to which deep and long-ignored links continue to connect me; or to situate it in the collective adventure that is '*mathematics*'). Strangely enough, to bring me to finally 'put down' and re-acquaint myself with this half-forgotten work, or to even think of giving a *name* to the vision that was its soul, I suddenly found myself confronted with the reality of a Burial of gigantic proportions: the burial, through silence and derision, of both the vision and the vision itself.

of the worker in whom she was born...

#### 9. Form and structure - or the voice of things.

Without having planned it, this 'foreword' has ended up, one thing leading to another, becoming a sort of formal presentation of my work, intended (above all) for the non-mathematician reader. I've already got too far down the road to be able to go back any further, so all that's left for me to do is finish the 'presentations'! I would like to try as best I can to say at least a few words about the *substance* of these mirific 'big ideas' (or 'master themes') that I have hinted at in the preceding pages, and about the nature of this famous 'vision' into which these master ideas are supposed to converge. In the absence of any technical language, I will probably only be able to convey an extremely blurred image (if anything is indeed 'conveyed' . . . ) (\*).

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(\*) The fact that this image has to remain 'blurred' in no way prevents it from being faithful, and from actually restoring something of the essence of what is being looked at (in this case, my work). Conversely, no matter how sharp an image may be, it may well be distorted, and what's more, it may only include the incidental and miss the essential entirely. So, if you 'hang on' to what I have to say about my work (and surely then something of the image in me will 'get through'), you can flatter yourself that you've got a better grasp of what's essential in

Traditionally, we distinguish three types of 'qualities' or 'aspects' of things in the Universe, which are the subject of mathematical reflection: these are *number*(\*\*), *size* and *form*. They can also be called the '*arithmetic*' aspect, the '*metric*' (or '*analytic*') aspect, and the '*geometric*' aspect of things. In most situations studied in mathematics, these three aspects are present simultaneously and interact closely. However, more often than not, there is a marked predominance of one of the three. It seems to me that for most mathematicians, it is quite clear (for those who know them, or who are familiar with their work) what their basic temperament is, whether they are '*arithmeticians*', '*analysts*', or '*geometers*' - and this, even though they have many strings to their violin, and have worked in every register and pitch imaginable.

My first and solitary reflections, on the theory of measurement and integration, fall unambiguously under the heading of '*magnitude*' or '*analysis*'. And the same is true of the first of the new themes I introduced into mathematics (which seems to me to be of less vast dimensions than the other eleven). The fact that I entered mathematics through the '*medium*' of analysis seems to me to be due not to my particular temperament, but to what might be called a '*fortuitous circumstancemetric*' or '*analytical*' aspect of things. The year 1955 marked a crucial turning point in my mathematical work: the move from '*analysis*' to '*geometry*'. I still remember that striking impression (admittedly subjective), as if I were leaving the arid, stark steppes, to suddenly find myself in a kind of '*promised land*' of luxuriant riches, multiplying infinitely wherever the hand is pleased to rest, to pick or to dig.... . And this impression of overwhelming wealth, beyond all measure (\*), has only been confirmed and deepened.

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my work than any of my learned colleagues!

(\*\*) It is understood here that we are talking about "numbers" known as "natural integers" 0, 1, 2, 3 etc, or (at a pinch) numbers (such as fractional numbers) which can be expressed using these by operations of an elementary nature. These numbers do not lend themselves, like the '*real numbers*', to the measurement of a variable that is capable of continuous variation, such as the distance between two variable points on a straight line, in a plane or in space.

(\*) I used the combination of words "*overwhelming*, *beyond all measure*", to render as best I could the German expression "*überwältigend*", and its English equivalent "*overwhelming*". In the previous sentence, the (inadequate) expression "*striking impression*" is also to be understood with this nuance: when

over the years, right up to the present day.

In other words, if there's one thing in mathematics that has always fascinated me more than any other, it's neither 'number' nor 'size', nor 'size', but always *form*. And among the thousand-and-one faces that form chooses to reveal itself to us, the one that has fascinated me more than any other and continues to fascinate me is *the structure* hidden in mathematical things.

The structure of a thing is by no means something we can 'invent'. We can only patiently and humbly bring it to light - get to know it, '*discover*' it. If there is inventiveness in this work, and if we sometimes work as blacksmiths or tireless builders, it is by no means to 'shape' or 'build' 'structures'. They didn't wait for us to come into being, and to be exactly what they are! But it is to *express*, as faithfully as we can, these things that we are in the process of discovering and probing, and this structure that is reluctant to give itself up, that we are groping to identify, perhaps using a language that is still in its infancy. In this way, we are constantly having to '*invent*' *the language* capable of expressing in ever greater detail the intimate structure of the mathematical thing, and to 'construct' with the help of this language, as we go along and from scratch, the 'theories' that are supposed to account for what has been apprehended and seen. There is a continual, uninterrupted back-and-forth movement between *the apprehension* of things and the *expression* of what is apprehended, using a language that is refined and re-created as the work progresses, under the constant pressure of immediate need.

As the reader will no doubt have guessed, these 'theories', 'built from scratch', are none other than the '*beautiful houses*' mentioned earlier: those we inherit from our predecessors, and those we are led to build with our own hands, by calling upon and listening to things. And if I spoke earlier of the "inventiveness" (or imagination) of the builder or the blacksmith, I should add that what makes it the soul and the secret nerve is by no means the superbness of the person who says: "I want this, and not that!" and who takes pleasure in deciding as he pleases; like a poor architect who has his plans ready in his head, before having seen and felt a site, and having sounded out its possibilities and requirements. The quality of the researcher's inventiveness and imagination lies in the *quality of his*

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the impressions and feelings aroused in us by confrontation with uncommon splendour, grandeur or beauty suddenly overwhelm us, to the point where any attempt to express what we feel seems to have been dashed in advance.

*listening to the* voice of things. For the things of the Universe never tire of speaking for themselves and revealing themselves to those who care to listen. And the most beautiful house, the one in which the workman's love appears, is not the one that is bigger or higher than others. A beautiful house is one that faithfully reflects the hidden structure and beauty of things.

#### 10. The new geometry - or the marriage of number and size.

But here I am diverging again - I was proposing to speak of master themes, coming together in the same mother-vision, like so many rivers returning to the Sea whose children they are.... .

This vast unifying vision can be described as a *new geometry*. It's the kind of geometry that Kronecker dreamed of in the last century (\*). But the reality (which a bold dream sometimes makes us foresee or glimpse, and which it encourages us to discover...) always exceeds in richness and resonance even the most reckless or profound dream. Surely, for more than one of the aspects of this new geometry (if not for all of them), no one, even the day before it appeared, would have thought of it - the worker himself no more than anyone else.

We can say that "number" is capable of grasping the structure of "discontinuous" or "*discrete*" aggregates: systems, often finite, made up of "elements" or "objects" *isolated from* one another, so to speak, without any principle of "continuous passage" from one to another. "Magnitude", on the other hand, is the quality par excellence, capable of "*continuous variation*"; in this way, it is able to grasp continuous structures and phenomena: movements, spaces, "varieties" of all kinds, force fields, etc. In this way, arithmetic appears (roughly speaking)

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(\*) I only know about this 'Kronecker dream' from hearsay, when someone (perhaps it was John Tate) told me that I was in the process of making it come true. In the education I received from my elders, historical references were rare, and I was nourished, not by reading ancient or even contemporary authors, but above all by communicating, orally or through letters, with other mathematicians, starting with my elders. The main, perhaps even the only, external inspiration for the sudden and vigorous start of scheme theory in 1958 was Serre's paper, well known by its acronym FAC ('Faisceaux algébriques cohérents'), published a few years earlier. Apart from that, my main inspiration in the subsequent development of the theory was to be found to flow from itself, and to be renewed over the years, by the sole requirements of simplicity and internal coherence, in an effort to give an account in this new context, of what was 'well known' in algebraic geometry (and which I assimilated as it was transformed in my hands), and of what this 'known' made me sense.

as the *science of discrete structures*, and analysis as the *science of continuous structures*. As for geometry, it can be said that for more than two thousand years that it has existed as a science in the modern sense of the word, it has 'straddled' these two types of structure, the 'discrete' and the 'continuous' (\*). For a long time, moreover, there was no real 'divorce' between *two* geometries that would have been of different kinds, one discrete, the other continuous. Rather, there were two different points of view in the investigation of the *same* geometric figures: one emphasising the 'discrete' properties (and in particular, the numerical and combinatorial properties), the other the 'continuous' properties (such as the position in the surrounding space, or the 'magnitude' measured in terms of mutual distances of points, etc).

It was at the end of the last century that a divorce appeared, with the appearance and development of what was sometimes called "*abstract* (algebraic) *geometry*". Roughly speaking, this consisted of introducing, for each prime number  $p$ , a geometry (algebraic) "of characteristic  $p$ ", modelled on the (continuous) model of the (algebraic) geometry inherited from previous centuries, but in a context that appeared to be irreducibly "dis-continuous", "discrete". These new geometric objects have taken on increasing importance since the beginning of the century, particularly in view of their close relationship with arithmetic, the science par excellence of discrete structure. It would seem to be one of the guiding ideas in the work of André Weil (\*\*), perhaps even the main thrust of his work (which has remained more or less unspoken in his written work, as it should), that "the"

(\*) To tell the truth, traditionally it was the 'continuous' aspect that was the focus of the geometer's attention, while properties of a 'discrete' nature, and in particular numerical and combinatorial properties, were passed over in silence or treated under the leg. About ten years ago, I was amazed to discover the richness of the combinatorial theory of the icosahedron, even though this theme is not even mentioned (and probably not even seen) in Klein's classic book on the icosahedron. I see another striking sign of this neglect (two millennia old) by geometers of the discrete structures that are spontaneously introduced into geometry: it's that the notion of groups (of symmetries, in particular) only appeared in the last century, and that, what's more, it was first introduced (by Évariste Galois) in a context that was not then considered as belonging to 'geometry'. It is true that, even today, many algebraists have still not understood that Galois' theory is, in essence, a '*geometric*' vision, renewing our understanding of so-called 'arithmetical' phenomena...

(\*\*) André Weil, a French mathematician who emigrated to the United States, is one of the "founding members" of the

"The 'Bourbaki group', which will be discussed at length in the first part of *Récoltes et Semailles* (as well as Weil himself, occasionally).

(algebraic) geometry, and especially the 'discrete' geometries associated with the various prime numbers, were to provide the key to a vast renewal of arithmetic. It was in this spirit that, in 1949, he came up with the famous '*Weil conjectures*'. These were, in fact, absolutely astonishing conjectures, which, for these new discrete 'varieties' (or 'spaces'), opened up the possibility of certain types of constructions and arguments (\*) that until then had seemed conceivable only in the context of the only 'spaces' considered worthy of the name by analysts - namely, the so-called 'topological' spaces (where the notion of continuous variation applies).

The new geometry can be seen as, above all else, a *synthesis* between these two worlds, which until then had been adjoining and closely interdependent, yet separate: the '*arithmetical world*', in which live (so-called) 'spaces' without any principle of continuity, and the *world of continuous magnitude*, in which live 'spaces' in the proper sense of the term, accessible to the analyst's means and (for this very reason) accepted by him as worthy of living in the mathematical city. *In the new vision, these two previously separate worlds become one.*

The first embryo of this vision of an '*arithmetic geometry*' (as I propose to call this new geometry) is to be found in Weil's conjectures. In the development of some of my main themes (\*\*), these conjectures remained my main source of inspiration throughout the years between 1958 and 1969. Even before me, moreover, *Oscar Zariski* on the one hand, and *Jean-Pierre Serre* on the other, had developed certain "topological" methods for the no-faith-no-law spaces of "abstract" algebraic geometry, inspired by those that had previously been used for everyone else's "good-natured spaces" (\*\*\*)�.

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(\*) (For the benefit of the mathematician reader.) These are "constructions and arguments" related to the cohomological theory of differentiable or complex varieties, and in particular those involving the Lefschetz fixed point formula and Hodge theory.

(\*\*) These are the four "median" topics (n° 5 to 8), namely those of *topos*, *scalar cohomology* and *A-adic, patterns*, and (to a lesser extent) *crystals*. I developed these themes in turn between 1958 and 1966. (\*\*\*)(For the mathematician reader.) Zariski's main contribution in this direction seems to me to be the introduction of the 'Zariski topology' (which later became an essential tool for Serre in FAC), and his "In his hands, this became the theory of formal schemes, and the 'comparison theorems' between the formal and the algebraic (with, as a second source of inspiration, Serre's fundamental article GAGA). As for Serre's contribution to laque-

of arithmetic geometry; more, it's true, as starting points and *tools* (which I had to reshape more or less from scratch, for the needs of a much wider context), than as a source of inspiration that would have continued to nourish my dreams and projects, over the months and years. In any case, it was clear from the outset that, even reshaped, these tools fell far short of what was required to take even the very first steps in the direction of fantastic conjectures.

### 11. The magic fan - or innocence.

The two key ideas in the launch and development of the new geometry were that of *schema* and that of *topos*. Appearing more or less simultaneously and in close symbiosis with each other (\*), they were like a single *driving force* in the spectacular rise of the new geometry, and this from the very year of their appearance. To conclude this overview of my work, it remains for me to say a few words about at least these two ideas.

The notion of schema is the most natural, the most "obvious" imaginable, to encompass in a single notion the infinite series of notions of (algebraic) "variety" that we previously handled (*one* such notion for each prime number (\*). . . . ). What's more, one and the same "scheme" (or new-style "variety") gives rise, for *each* number pre-

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hat I'm referring to in the text is, of course, above all, his introduction, in abstract algebraic geometry, of the point of view of *bundles* (introduced by *Jean Leray* a dozen years earlier, in a completely different context), in that other fundamental article already cited, FAC ("Faisceaux algébriques cohérents").

In the light of these 'reminders', if I had to name the immediate 'ancestors' of the new geometrical vision, the names of *Oscar Zariski*, *André Weil*, *Jean Leray* and *Jean-Pierre Serre* immediately come to mind. Among them, Serre played a special role, because it was mainly through him that I became aware not only of his own ideas, but also of the ideas of Zariski, Weil and Leray, which played a part in the birth and development of the new geometry.

(\*) This 1958 start-up is discussed in the b. de p. (\*) on page 23. The notion of site or '*Grothendieck topology*' (a provisional version of *topos*) appeared in the immediate wake of the notion of schema. This in turn provided the new language of 'localisation' or 'descent', used at every step in the development of the schematic theme and tool. The more intrinsic and geometric notion of *topos*, which initially remained implicit over the next few years, began to emerge from 1963 onwards, with the development of étale cohomology, and gradually imposed itself on me as the most fundamental notion.

(\*) This series should also include the case  $p = \infty$ , corresponding to the algebraic varieties "of zero characteristic.

$p$ , to a well-defined "(algebraic) variety of characteristic  $p$ ". The collection of these different varieties of the different characteristics can then be visualised as a sort of "(infinite) fan of varieties" (one for each characteristic). The "schema" is this magical fan, which links together, like so many different "branches", its "avatars" or "incarnations" of all the possible characteristics. In this way, it provides an effective 'principle of passage' for linking together 'varieties' of geometries that had hitherto appeared more or less isolated, cut off from each other. Now they find themselves encompassed in a common 'geometry' and linked by it. This could be called *schematic geometry*, the first draft of the "arithmetic geometry" into which it was to blossom in the following years.

The very idea of a diagram is childishly simple - so simple, so humble, that no one before me had ever thought of bending so low. So 'silly', in fact, that for years, despite the obvious, many of my learned colleagues thought it was really 'not serious'! In fact, it took me months of hard, solitary work to convince myself, in my own corner, that it really did 'work' - that the new language, which was so silly and which I was incorrigibly naive enough to insist on trying out, was really adequate for grasping, in a new light and with a new finesse, and in a common framework from then on, some of the very first geometrical intuitions attached to the previous 'geometries of characteristic  $p$ '. It was the kind of exercise, judged silly and hopeless in advance by any 'well-informed' person, that I was probably the only one, among all my colleagues and friends, to ever have the idea of putting into my head, and even (moved by a secret demon...) to bring to a successful conclusion against all odds!

Rather than allowing myself to be distracted by the consensus around me about what is 'serious' and what is not, I simply *trusted*, as I had done in the past, the humble voice of things, and that part of me that knows how to listen. The reward was immediate and beyond all expectations. In the space of a few months, without even 'doing it on purpose', I had put my finger on some powerful and unsuspected tools. They enabled me not only to rediscover (as if playing) old results, reputed to be difficult, in a more penetrating light and to go beyond them, but also to finally tackle and solve problems of ' $p$ -characteristic geometry' which until then had seemed out of reach by all the means then known (\*).

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(\*) The account of this 'strong start' of schema theory is the subject of my talk at the

In our knowledge of the Universe (whether mathematical or otherwise), the renewing power within us is none other than *innocence*. It is the original innocence that we were all born with and which lies within each one of us, often the object of our contempt and our most secret fears. It alone unites the humility and boldness that allow us to penetrate to the heart of things, and that allow us to let things penetrate into us and become imbued with them.

This power is by no means the privilege of extraordinary 'gifts' - of (let's say) uncommon brain power to assimilate and handle, with dexterity and ease, an impressive mass of known facts, ideas and techniques. Gifts such as these are certainly precious, and certainly worthy of envy for anyone (like me) who was not blessed with them at birth, 'beyond measure'.

It is not these gifts, however, nor even the most ardent ambition, served by an unfailing will, that enable us to cross these "invisible and imperious circles" that enclose our Universe. Only innocence crosses them, without knowing or caring, in those moments when we find ourselves alone, listening to things, intensely absorbed in a child's game...

## 12. Topology - or surveying the mists.

As we have just seen, the innovative idea behind the 'schema' is that it enables us to link together the different 'geometries' associated with the different prime numbers (or different 'characteristics'). However, each of these geometries was still essentially 'discrete' or 'discontinuous' in nature, in contrast to the traditional geometry bequeathed by past centuries (and dating back to Euclid). The new ideas introduced by Zariski and Serre restored, to a certain extent, a 'dimension' of continuity to these geometries, inherited immediately by the 'schematic geometry' that had just appeared, in order to unite them. But as far as Weil's 'fantastic conjectures' were concerned, we were a long way off the mark. These 'Zariski topologies' were, from this point of view, so crude that it was almost as if we were still at the stage of 'discrete aggregates'. What was obviously missing was some new principle that would enable us to link these geometric objects

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International Congress of Mathematicians in Edinburgh, 1958. The text of this talk seems to me to be one of the best introductions from the point of view of diagrams, of such a nature (perhaps) as to motivate a geometer reader to familiarise himself or herself as best he or she can with the imposing (later) treatise "Elements of Algebraic Geometry", which sets out in a detailed manner (and without foregoing any technical details) the new foundations and techniques of algebraic geometry.

(or 'varieties', or 'schemes') to the usual (topological) 'spaces', or 'good spaces'; those, let's say, whose 'points' appear to be clearly *separated* from one another, whereas in the spaces-without-law-not introduced by Zariski, the points have an unfortunate tendency to clump together. ...

It was the appearance of such a decidedly 'new principle', and nothing less, that could bring about the 'marriage of number and size' or of the 'geometry of the discontinuous' with that of the 'continuous', of which Weil's conjectures gave us an initial premonition.

The notion of '*space*' is undoubtedly one of the oldest in mathematics. It is so fundamental to our 'geometric' understanding of the world that it has remained more or less unspoken for more than two millennia. It is only in the course of the last century that this notion has gradually come to detach itself from the tyrannical grip of immediate perception (of a single '*space*' surrounding us), and from its traditional ('Euclidean') theorisation, to acquire its own autonomy and dynamic. Today, it is one of the few concepts that is most universally and commonly used in mathematics, and is undoubtedly familiar to every mathematician without exception. A protean notion if ever there was one, with a hundred and thousand faces, depending on the type of structures that we incorporate into these spaces, from the richest of all (such as the venerable 'Euclidean' structures, or the 'affine' and 'projective' structures, or even the 'algebraic' structures of the 'varieties' of the same name, which generalise them and make them more flexible) to the simplest: those where any "quantitative" element of information whatsoever seems to have disappeared without return, and where all that remains is the qualitative quintessence of the notion of "*proximity*" or that of "*limit*" (\*), and the most elusive version of the intuition of *form* (known as "*topological*"). The most stripped-down of all these notions, the one that until now, over the past half-century, had served as a kind of vast common conceptual bosom to encompass all the others, was that of *topological space*. The study of these spaces is one of the most fascinating and lively branches of geometry: *topology*.

However elusive this structure of 'pure quality' embodied in a '*space*' (known as '*topological*') may seem at first sight, in the absence of any quantitative data (such as the distance between two points, for example) that would enable us to relate it to some kind of '*space*', it is impossible to say whether it is 'pure quality'.

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(\*) When I talk about the notion of 'limit', I'm thinking more of 'crossing the limit' than of 'frontier' (which is more familiar to non-mathematicians).

In the course of the last century, however, we have succeeded in finely defining these spaces within the tight, supple mesh of a language that has been carefully 'cut to size'. Better still, we have invented and fabricated from scratch sorts of 'metres' or 'toises' to serve all the same, against all odds, to attach sorts of 'measurements' (called 'topological invariants') to these sprawling 'spaces' which seemed to evade, like elusive mists, any attempt at measurement. It is true that most of these invariants, and the most essential ones, are more subtle in nature than a simple 'number' or 'magnitude' - rather, they are themselves more or less delicate mathematical structures, attached (by means of more or less sophisticated constructions) to the space under consideration. One of the oldest and most crucial of these invariants, introduced as long ago as the last century (by the Italian mathematician *Betti*), consists of the various 'groups' (or 'spaces') known as 'cohomology', associated with the space (\*). These are the groups that come into play (especially 'between

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(\*) In fact, the invariants introduced by Betti were *homology* invariants. *Cohomology* is a more or less equivalent 'dual' version, introduced much later. This aspect took precedence over the initial "homological" aspect, especially (no doubt) following the introduction, by Jean Leray, of the beam point of view, discussed below. From a technical point of view, it can be said that a large part of my work as a geometer consisted in identifying, and developing to a greater or lesser extent, the cohomological theories that were lacking for spaces and varieties of all kinds, and especially for 'algebraic varieties' and schemes. Along the way, I was also led to reinterpret the traditional homological invariants in cohomological terms, and thereby to see them in an entirely new light.

There are many other "topological invariants" that have been introduced by topologists, to define one type of property or another of topological spaces. Apart from the 'dimension' of a space, and the (co)homological invariants, the first other invariants are the 'homotopy groups'. I introduced another of these in 1957, the so-called Grothendieck group  $K(X)$ , which immediately became very popular, and whose importance (both in topology and arithmetic) continues to grow.

A host of new invariants, of a more subtle nature than the invariants currently known and used, but which I feel to be fundamental, are provided for in my programme of 'moderate topology' (a very brief outline of which can be found in the 'Outline of a Programme', to be published in volume 4 of *Reflections*). This programme is based on the notion of 'moderate theory' or 'moderate space', which constitutes, rather like that of topos, a (second) 'metamorphosis of the notion of space'. It is much more obvious (it seems to me) and less profound than the latter. I predict that its immediate repercussions on topology 'proper' will, however, be far more far-reaching, and that it will radically transform the 'profession' of topological geometer, through a profound transformation of the conceptual context in which he works (as was also the case in algebraic geometry with the introduction of the schema point of view). Incidentally, I have sent my "Esquisse" to several of my old friends and illustrious topologists, but it does not seem to have

Weil's conjectures, which are their profound 'raison d'être' and which (for me at least, having been 'thrown into the deep end' by Serre's explanations) give them their full meaning. But the possibility of associating such invariants with the 'abstract' algebraic varieties involved in these conjectures, in such a way as to meet the very precise desiderata required for the needs of that cause - that was a mere hope. I doubt that, apart from Serre and myself, anyone else (not even, and above all, André Weil himself! (\*)) really believed it...

Shortly before this, our conception of these cohomology invariants had been enriched and profoundly renewed by the work of *Jean Leray* (continued in captivity in Germany during the war, in the first half of the 1940s). The essential new idea was that of an (Abelian) *bundle* on a space, to which Leray associated a series of corresponding "cohomology groups" (with coefficients in this bundle). It was as if the good old standard 'cohomological metre' that had been available until now for 'surveying' a space had suddenly been multiplied into an unimaginably large multitude of new 'metres' of every conceivable size, shape and substance, each one intimately adapted to the space in question, and each one providing us with perfectly precise information about it, which only it can give us. This was the key idea behind a profound transformation in our approach to spaces of all kinds,

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to interest anyone...

(\*) Paradoxically, Weil had a tenacious, apparently visceral 'block' against cohomological formalism - even though it was largely his famous conjectures that inspired the development of the great cohomological theories in algebraic geometry from 1955 onwards (with Serre kicking things off with his fundamental article FAC, already mentioned in a previous footnote).

It seems to me that this 'block' is part of Weil's general aversion to 'big stuff', to anything resembling formalism (when this cannot be summed up in a few pages), or to any kind of interlocking 'construction'. He was by no means a 'builder', and it was clearly against his will that he was forced, in the thirties, to develop the first 'abstract' algebraic geometry foundations, which (given these provisions) turned out to be a veritable 'Procrustean bed' for the user.

I don't know whether he blamed me for going beyond that, and for investing myself in building the vast mansions that enabled the dreams of a Kronecker and his own to be embodied in a language and in delicate, effective tools. The fact remains that at no time did he say a word to me about the work he saw me doing, or the work that had already been done. Nor did I receive any response to *Récoltes et Semailles*, which I had sent him over three months ago, with a warm dedication in my hand.

and surely one of the most crucial ideas to emerge in this century. Thanks above all to the subsequent work of Jean-Pierre Serre, the first fruits of Leray's ideas, in the decade following their appearance, were an impressive revival in the theory of topological spaces (and in particular, of their so-called 'homotopy' invariants, closely linked to cohomology), and another revival, no less crucial, in so-called 'abstract' algebraic geometry (with Serre's fundamental article 'FAC', published in 1955). My own work in geometry, from 1955 onwards, was a continuation of Serre's work and, by the same token, of Leray's innovative ideas.

### 13. The topos - or the double bed.

The point of view and the language of beams introduced by Leray led us to look at 'spaces' and 'varieties' of all kinds in a new light. They did not, however, touch on the very notion of space itself, merely helping us to apprehend more finely, with new eyes, these traditional 'spaces' with which we are all already familiar. However, it turned out that this notion of space is inadequate to account for the most essential 'topological invariants' that express the 'form' of 'abstract' algebraic varieties (such as those to which Weil's conjectures apply), or even that of general 'schemes' (generalizing the old varieties). For the expected 'wedding' of 'number and size', it was like a decidedly narrow bed, where only one of the future spouses (i.e. the bride) could find a place to nestle, but never both at once! The 'new principle' that remained to be found, to consummate the marriage promised by auspicious fairies, was none other than this spacious 'bed' that the future spouses lacked, without anyone having noticed it until then...

This 'double bed' appeared (as if by magic wand...) with the idea of the *topos*. This idea encompasses, in a common topological intuition, both the traditional (topological) spaces, embodying the world of continuous magnitude, and the (so-called) 'spaces' (or 'varieties') of the unrepentantly abstract algebraic geometers, as well as innumerable other types of structure, which until then had seemed irremediably riveted to the 'arithmetical world' of 'discontinuous' or 'discrete' aggregates.

It was the point of view of the beams that was the silent and sure guide, the efficient (and by no means secret) key, leading without procrastination or detours to the bridal chamber with its vast marital bed. Such a vast bed indeed (like a vast, deep, peaceful river...),

that

"all the king's horses  
they could drink together..."

- as an old tune tells us, which I'm sure you must have sung yourself, or at least heard sung. And whoever was the first to sing it felt the secret beauty and peaceful force of the *topos* better than any of my learned students and friends of yesteryear...

The key was the same, both in the initial and provisional approach (via the very *com-mode*, but not intrinsic notion of 'site'), and in that of the *topos*. It is the idea of the *topos* that I would now like to try and describe.

Let us consider the set formed by *all the* beams in a given (topological) space, or, if you like, this prodigious arsenal formed by *all the* "metres" used to survey it (\*). We consider this "set" or "arsenal" as having its most obvious structure, which appears there, so to speak, "at a glance"; namely, a so-called "category" structure. (The non-mathematician reader should not be troubled by not knowing the technical meaning of this term. They won't need it for what follows). It is this sort of 'surveying superstructure', called the 'category of beams' (on the space under consideration), which will henceforth be considered as 'embodiment' what is most essential to space. This is quite legitimate (for 'mathematical common sense'), because it turns out that we can 'reconstitute' a topological space (\*\*) from scratch in terms of this associated 'category of beams' (or arsenal of surveying). (Verifying this is a simple exercise - once the question has been asked, of course. . . . ) This is all we need to be sure that (if it suits us for one reason or another) we can now 'forget' the initial space, and remember and use only the associated 'category' (or 'arsenal'), which will be considered the most adequate embodiment of the 'topological' (or 'spatial') structure we are trying to express.

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(\*) (For the benefit of the mathematician) In fact, we are talking here about bundles of *sets*, and not *abelian* bundles, introduced by Leray as the most general coefficients for forming "cohomology groups". I think I was the first person to work systematically with bundles of sets (from 1955, in my paper "A general theory of fibre spaces with structure sheaf" at the University of Kansas).

(\*\*) (For the mathematician) Strictly speaking, this is only true for "sober" spaces. However, these include almost all the spaces we commonly encounter, and in particular all the 'separate' spaces so dear to analysts.

As is so often the case in mathematics, we have succeeded here (thanks to the crucial idea of the 'fais- ceau', or 'cohomological metre') in expressing a certain notion (that of 'space' in this case) in terms of another (that of 'category'). Each time, the discovery of such a *translation* of one notion (expressing a certain type of situation) in terms of another (corresponding to another type of situation), enriches our understanding of both notions, through the unexpected confluence of specific intuitions relating to one or the other. Thus, a situation of a 'topological' nature (embodied by a given space) is here translated by a situation of an 'algebraic' nature (embodied by a 'category'); or, if you like, the 'continuum' embodied by space is 'translated' or 'expressed' by the category structure, of an 'algebraic' nature (and hitherto perceived as being of an essentially 'discontinuous' or 'discrete' nature).

But here there is more. The first of these notions, that of space, appeared to us as something of a 'maximal' notion - a notion that was already so general that it was hard to imagine how it could be further extended in a way that remained 'reasonable'. On the other hand, it turns out that on the other side of the mirror (\*), these 'categories' (or 'arsenals') that we come across, starting from topological spaces, are of a very special nature. They have a set of strongly typed properties (\*\*), which make them a kind of 'pastiche' of the simplest imaginable of them - the one obtained by starting from a space reduced to a single point. Having said that, a "new-style space" (or *topos*), generalising traditional topological spaces, will be described quite simply as a "category" which, without necessarily coming from an ordinary space, nevertheless possesses all those good properties (explicitly designated once and for all, of course) of such a "category of bundles".

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(\*) The 'mirror' referred to here, as in Alice in Wonderland, is the one that gives as an 'image' of a space, placed in front of it, the associated 'category', considered as a sort of 'double' of the space, 'on the other side of the mirror'...

(\*\*) (For the mathematician) These are properties that I have introduced into the theory of categories under the name of "exactness properties" (together with the modern categorical notion of general inductive and projective "limits"). See "On some points of homological algebra", *Tohoku math. journal*, 1957 (pp. 119-221).

So here's the new idea. Its appearance can be seen as a consequence of this observation, almost childish in truth, that what really counts in a topological space is not its 'points' or its subsets of points (\*), and the relations of proximity etc between them, but that it is the *bundles* on this space, and the *category* that they form. In short, all I've done is to take Leray's initial idea to its ultimate conclusion - and, having done that, *take the next step*.

Like the very idea of beams (due to Leray), or that of diagrams, like any 'big idea' that shakes up an inveterate view of things, the idea of topos is disconcerting because of its naturalness, its 'obviousness', its simplicity (bordering, one might say, on the naïve or the simplistic, or even the 'silly') - by that particular quality that so often makes us exclaim: "Oh, that's all it is!" with a tone of half-disappointment, half-envy; with, perhaps, the added undertone of 'eccentric', of 'not serious', which we often reserve for anything that baffles us with an excess of unexpected simplicity. Something that reminds us, perhaps, of the long-buried, long-denied days of our childhood...

#### 14. Mutation of the notion of space - or souffle and faith.

The notion of scheme constitutes a vast extension of the notion of 'algebraic variety', and as such it has completely renewed the algebraic geometry bequeathed by my de-vanciers. The concept of topos constitutes an unsuspected extension, or rather, *a metamorphosis of the notion of space*. In so doing, it holds out the promise of a similar renewal of topology, and beyond that, of geometry. Indeed, it has already played a crucial role in the development of the new geometry (especially through the A-adic and crystalline cohomological themes that emerged from it, and through them, in the demonstration of Weil's conjectures). Like its elder (and almost twin) sister, it possesses the following two complementary characteristics that are essential for any fertile generalisation.

Firstly, the new concept is *not too broad*, in the sense that in the new 'spaces' (called 'topos' instead, so as not to offend delicate ears (\*\*)), the most essential 'geometric' intuitions and constructions (\*), familiar from the good old spaces

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(\*) This means that you can build very "big" topos that have only one "point", or even no "points" at all!

(\*\*) The name "topos" has been chosen (in association with "topology", or "topological") to suggest the following

that it is "the object par excellence" to which topological intuition applies. Because of the rich cloud of mental images that this name elicits, it must be considered to be more or less the equivalent of the term 'space'.

of yesteryear, can be transposed in a more or less obvious way. In other words, for the new objects we have at our disposal the whole rich range of mental images and associations, concepts and at least some of the techniques that were previously restricted to old-style objects.

And secondly, the new notion is at the same time *broad enough* to encompass a host of situations which, until now, were not considered to give rise to intuitions of a 'topological-geometric' nature - intuitions, precisely, which in the past had been reserved for ordinary topological spaces (and for good reason).

The crucial thing here, from the point of view of Weil's conjectures, is that the new notion is indeed vast enough to allow us to associate with any "scheme" such a "generalised space" or "topos" (called the "*étale topos*" of the scheme under consideration). Certain 'cohomological invariants' of this topos (all the 'silly' ones!) then seemed to have a good chance of providing 'what we needed' to give full meaning to these conjectures, and (who knows!) perhaps to provide the means of proving them.

It is in these pages that I am writing that, for the first time in my life as a mathematician, I take the liberty of evoking (if only to myself) all the master themes and great guiding ideas in my mathematical work. This gives me a better appreciation of the place and scope of each of these themes, and of the 'points of view' that they embody, in the great geometric vision that unites them and from which they stem. It is through this work that the two innovative ideas central to the first and most powerful development of the new geometry have come to the fore: the idea of *schemas* and that of *topos*.

It is the second of these ideas, that of the topos, which now seems to me to be the more profound of the two. If, by any chance, towards the end of the fifties, I had *not* rolled up my sleeves and stubbornly developed, day after day, over twelve long years, a 'schematic tool' of perfect delicacy and power - it would seem almost unthinkable to me that, in the ten or twenty years that followed, anyone other than me would have been able to refrain from introducing at the end of the ends (albeit unwillingly) a 'schematic tool' of perfect delicacy and power.

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(topological), simply with greater emphasis on the 'topological' specificity of the notion. (Thus, there are "vector spaces", but no "vector topos" until further notice!) The two expressions must be kept together, each with its own specificity.

(\*) These "constructions" include, in particular, all the familiar "topological invariants", y including cohomological invariants. For the latter, I had done everything necessary in the article already quoted ("Tohoku" 1955), to be able to give them a meaning for any "topos".

dant...) the notion that was obviously needed, and to put up, as best we could, at least a few dilapidated 'prefab' shacks, in place of the spacious and comfortable residences that I was keen to assemble stone by stone and build with my own hands. On the other hand, I can't think of anyone else on the mathematical scene, over the past three decades, who could have had the naivety, or the innocence, to take (in my place) that *other* crucial step of all, introducing the idea of *topos* (or even that of '*sites*'), which is so childish. And, even supposing that this idea had already been graciously provided, and with it the timid promise it seemed to hold - I can't think of anyone else, either among my friends of yesteryear or among my students, who would have had the inspiration, and above all the *faith*, to bring this humble idea (\*) to fruition (so derisory in appearance, when the goal seemed infinitely distant... . ): from its first stammering beginnings, to the full maturity of the 'mastery of staggered cohomology', into which it eventually became incarnate in my hands, over the years that followed.

### 15. All the king's horses...

Yes, the river is deep, and vast and peaceful are the waters of my childhood, in a kingdom that I thought I had left long ago. All the king's horses could drink from them at ease and to their heart's content, without exhausting them! They come from the glaciers, burning like those distant snows, and they have the softness of the clay of the plains. I've just talked about one of these horses, which a child took for a drink and which drank its fill for a long time. And I've seen another one coming to drink for a while, following in the footsteps of the same kid, if that's what it is - but that one didn't last long. Someone must have chased him away. And that's about it. Yet I see countless herds of thirsty horses roaming the plains - and only this morning their whinnying dragged me out of bed at an ungodly hour, me being in my sixties and loving the peace and quiet. There was nothing I could do, I had to get up.

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(\*) (For the benefit of the mathematician reader.) When I speak of "bringing this humble idea to fruition", I mean the idea of étale cohomology as an approach to Weil's conjectures. It was inspired by this idea that I discovered the notion of site in 1958, and that this notion (or the closely related notion of *topos*), and the étale cohomological formalism, were developed between 1962 and 1966 under my impetus (with the assistance of a number of collaborators who will be mentioned later).

When I speak of 'breath' and 'faith', these are qualities of a 'non-technical' nature, which seem to me to be the essential qualities here. On another level, I could also add what I would call 'cohomological flair', that is to say the kind of flair that had developed in me for building cohomological theories. I thought I was passing it on to my cohomology students. Looking back seventeen years after my departure from the mathematical world, I can see that it has not been preserved in any of them.

It saddens me to see them as gaunt beasts, even though there is no shortage of good water or green pastures. But it's as if a malevolent spell has been cast over this land that I had known to be welcoming, and condemned access to these generous waters. Or perhaps it's a trick pulled by the local horse traders, to drive down prices, who knows? Or perhaps it's a country where there are no longer any children to lead the horses to water, and where the horses are thirsty for want of a boy who can find his way back to the river. ...

## 16. Motives - or the heart within the heart.

The theme of the topos grew out of that of the schematics, in the same year that the schematics appeared.

- but in scope it goes far beyond the mother theme. It is the theme of the topos, and not that of the diagrams, which is this 'bed', or this 'deep river', where geometry and algebra, topology and arithmetic, mathematical logic and the theory of categories, the world of the continuous and that of 'discontinuous' or 'discrete' structures come together. If the theme of schemas is like the *heart of* the new geometry, the theme of topos is its envelope, or *dwelling place*. It is the most far-reaching thing I have conceived, in order to grasp with finesse, through a single language rich in geometric resonances, an 'essence' common to situations that are as far apart as possible, coming from one region or another of the vast universe of mathematical things.

This theme of topos is very far from having enjoyed the same fortune as that of schemata. I have spoken on this subject on several occasions in *Récoltes et Semailles*, and this is not the place to dwell on the strange vicissitudes that have befallen this notion. However, two of the main themes of the new geometry are derived from that of the topos, two complementary 'co-homological theories', both designed to provide an approach to Weil's conjectures: the *étale* (or '*A-adic*') *theme*, and the *crystalline theme*. The former took shape in my hands in the form of the cohomological *A-adic* tool, which now appears to be one of the most powerful mathematical tools of the century. As for the crystalline theme, reduced to a quasi-oculus existence after my departure, it was finally exhumed (under pressure of necessity) in June 1981, in the limelight and under an assumed name, in circumstances even stranger than those surrounding the topos.

The *A-adic* cohomological tool was, as expected, the essential tool for establishing Weil's conjectures. I demonstrated a good number of them myself, and the last step was taken with mastery, three years after I left, by Pierre Deligne, the most brilliant of my

students.

"cohomologists".

In fact, around 1968, I came up with a stronger and, above all, more 'geometric' version of Weil's conjectures. These remained 'tainted' (if you can call it that!) by an apparently irreducible 'arithmetic' aspect, even though the very spirit of these conjectures is to express and grasp 'arithmetic' (or 'the discrete') through the mediation of 'geometry' (or 'continuity') (\*). In this sense, my version of the conjectures seems to me to be more 'faithful' than Weil's own to 'Weil's philosophy' - to that unwritten and rarely spoken philosophy which has perhaps been *the* main tacit motivation behind the extraordinary rise of geometry over the last four decades (\*\*). My re-formulation consisted, essentially, in extracting a sort of 'quintessence' of what was to remain valid, in the context of so-called 'abstract' algebraic varieties, of the classical 'Hodge theory', valid for 'ordinary' algebraic varieties (\*\*\*)<sup>1</sup>. I have called this new, entirely geometric, version of the famous conjectures "*standard conjectures*" (for algebraic cycles).

In my mind, this was a new step, after the development of the *A-adic* cohomological tool, in the direction of these conjectures. But at the same time, and above all, it was also one of the possible approaches to what still seems to me to be the most profound theme I have introduced into mathematics(\*): that of *motifs* (itself born of the '*A-adic* cohomological theme'). This theme is like the *heart* or soul, the most hidden part, the

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(\*) (For the mathematician) Weil's conjectures are subject to assumptions of an "arithmetical" nature, due in particular to the fact that the varieties under consideration must be defined over a *finite* field. From the point of view of cohomological formalism, this means that the *Frobenius endomorphism* associated with such a situation has a special place. In my approach, the crucial properties (of the "generalised index theorem" type) concern *any* algebraic correspondences, and do not make any arithmetical assumptions about a given base field.

(\*\*) However, after I left in 1970, there was a very clear reaction, which continued until the end of the 1970s.

The result is a situation of relative stagnation, which I have mentioned on more than one occasion in *Harvest and Sowing*.

(\*\*\*) "Ordinary" here means : "defined on the field of complexes". Hodge's theory (known as the "theory of intégrales harmoniques") was the most powerful cohomological theory known in the context of complex algebraic varieties.

(\*) This is the most profound theme, at least in the 'public' period of my mathematical activity. cian, between 1950 and 1969, that is, until I left the mathematical scene. I consider the theme of Anabelian algebraic geometry and the Galois-Teichmüller theory, developed from

best hidden from view, from the schematic theme, which is itself at the heart of the new vision. And the few key phenomena identified in the standard conjectures (\*\*) can be seen as forming a kind of ultimate quintessence of the motivic theme, as the vital "*souffle*" of this subtlest of all themes, of this "*heart within the heart*" of the new geometry.

Here's what it's all about. We have seen, for a given prime number  $p$ , how important it is (particularly in view of Weil's conjectures) to be able to construct "cohomological theories" for "(algebraic) varieties of characteristic  $p$ ". Now, the famous "*A-adic cohomological tool*" provides just such a theory, and even an *infinite number of different cohomological theories*, namely one associated with any prime number  $A$  different from the characteristic  $p$ . Here again, there is obviously a "theory that is missing", which would correspond to the case of an  $A$  equal to  $p$ . To fill this gap, I have deliberately devised yet another cohomological theory (to which reference has already been made), known as "*crystalline cohomology*". Moreover, in the important case where  $p$  is infinite, we have three other cohomological theories (\*\*\*) - and there is nothing to prove that we will not be led, sooner or later, to introduce yet more cohomological theories, with very similar formal properties. Contrary to the situation in ordinary topology, we are faced here with a bewildering abundance of different cohomological theories. We were left with the distinct impression that, in a sense that remained rather vague at first, all these theories should "come back to the same thing", that they "gave the same results" (\*\*\*\*). It was in order to express this intuition of 'kinship' between different cohomological theories that I de-

1977, as being of comparable depth,

(\*\*) (For the benefit of the geometer reader) These conjectures may need to be reformulated. For more detailed comments, see "Le tour des chantiers" (ReS IV note n° 178, p. 1215-1216) and the b. de p. note p. 769 in "Conviction et connaissance" (ReS III, note n° 162).

(\*\*\*) (For the mathematician reader) These theories correspond respectively to *cohomology* (defined by transcendental means, using a folding of the base field into the field of complexes), *Hodge cohomology* (defined by Serre) and *De Rham cohomology* (defined by me), the latter two dating back to the 1950s (and Betti's to the last century).

(\*\*\*\*) (For the mathematical reader) For example, if  $f$  is an endomorphism of the variety inducing an endomorphism of the cohomology space  $H^i(X)$ , its "characteristic polynomial" should have *integer* coefficients, and not depend on the particular cohomological theory chosen (for example *A-adic*, for  $A$  variable). The same applies to general algebraic correspondences, when  $X$  is assumed to be clean and smooth. The sad truth (and which gives an idea of the lamentable state of abandonment of the cohomological theory of algebraic varieties with characteristic  $p > 0$ , since I left) is that the thing is not

gagé la notion de "*motif*" associée à une variété algébrique. By this term, I mean to suggest that it is the "common motif" (or the "common *reason*") underlying this multitude of different cohomological invariants associated with that variety, with the help of the multitude of all possible cohomological theories a priori. These different cohomological theories would be like so many different thematic developments, each in its own 'tempo', 'key' and 'mode' ('major' or 'minor'), of the same 'basic motive' (called a '*motivic* cohomological theory'), which would at the same time be the most fundamental, or the 'finest', of all these different thematic 'incarnations' (i.e. of all these possible cohomological theories). Thus, the motif associated with an algebraic variety would constitute the 'ultimate' cohomological invariant, 'par excellence', from which all the others (associated with the different possible cohomological theories) would be deduced, like so many different musical 'incarnations', or 'realisations'. All the essential properties of *the cohomology* of the variety would already be "read" (or "heard") on the corresponding pattern, so that the familiar properties and structures on the particularised cohomological invariants (*A-adic* or crystalline, for example), would simply be the faithful reflection of the *internal* properties and structures *of the pattern* (\*).

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This has still not been proved, even in the special case where  $X$  is a smooth projective *surface* and  $i = 2$ . In fact, as far as I know, after I left, no one has yet deigned to take an interest in this crucial question, typical of those that appear to be subordinate to the standard conjectures. The decree of fashion is that the only endomorphism worthy of attention is the Frobenius endomorphism (which was treated separately by Deligne, using whatever means he could find...).

(\*) (For the mathematical reader) Another way of looking at the category of patterns over a *k-field*, is to visualise it as a kind of "abelian enveloping category" of the category of separate schemas of finite type over  $k$ . The pattern associated with such a scheme  $X$  (or "*motivic cohomology of  $X$* ", which we call  $H^*(X)$ )

thus appears as a kind of abelianised "avatar" of  $X$ . The crucial thing here is that, just as an algebraic variety  $X$  is susceptible to "continuous variation" (its isomorphy class therefore depends on continuous "parameters", or "modules"), the pattern associated with  $X$ , or more generally, a "variable" pattern, is also susceptible to continuous variation. This is an aspect of motivic cohomology, which is in striking contrast to what happens for all classical cohomological invariants, including *A-adic* invariants, with the sole exception of the Hodge cohomology of complex algebraic varieties.

This gives an idea of the extent to which the "motivic cohomology" is a finer invariant, encircling in a much tighter way the "arithmetic form" (if I dare use this expression) of  $X$ , than the traditional purely topological invariants. In my vision of patterns, these constitute a kind of very hidden and very delicate 'cord', linking the algebro-geometric properties of an algebraic variety to properties of an 'arithmetic' nature embodied by its pattern. The latter can be considered as an object of nature

Expressed in the non-technical language of a musical metaphor, this is the quintessence of an idea that is still childishly simple, yet delicate and daring at the same time. I developed this idea, alongside the fundamental tasks I considered more urgent, under the name of 'theory of motives' or 'philosophy (or 'yoga') of motives', throughout the years 1963-69. It is a theory of fascinating structural richness, much of which is still conjectural (\*).

I have spoken on several occasions in *Récoltes et Semailles* about this 'yoga of the motives', which is particularly close to my heart. This is not the place to go back over what I have said elsewhere. Suffice it to say that the 'standard conjectures' derive most naturally from this yoga of motives. At the same time, they provide a principle of approach for one of the possible formal constructions of the notion of motif.

These conjectures seemed to me, and still do, to be one of the two most fundamental questions in algebraic geometry. Neither this question, nor the other equally crucial one (known as the 'resolution of singularities') has yet been resolved. But whereas the second of these questions appears, today as it did a hundred years ago, as a prestigious and formidable question, the one that I had the honour of clearing up has been classified by the peremptory decrees of fashion (from the years following my departure from the mathematical scene, and just like the motivic theme itself (\*)) as amiable Grothendieckian hogwash. But then again

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"geometrical" in spirit, but where the "arithmetical" properties of geometry are, so to speak, "laid bare".

Thus, the motive seems to me to be the most profound "invariant of form" that we have yet been able to associate with an algebraic variety, apart from its "motivic fundamental group". For me, both invariants represent the "shadows" of a "type of motivic homotopy" which has yet to be described (and about which I say a few words in passing in the note "Le tour des chantiers - ou outils et vision" (ReS IV, n° 178, see chantier 5 (Motifs), and in particular page 1214)). It is this last object that seems to me to be the most perfect incarnation of the elusive intuition of the "arithmetic form" (or "motivic form") of a particular algebraic variety.

(\*) Over the years, I've explained my vision of the reasons for my decision to anyone who would listen, without taking the trouble to explain it.

I didn't bother to publish anything on the subject in black and white (not lacking other tasks in the service of all). This later enabled some of my pupils to plunder more at ease, under the watchful eye of all my old friends, who were well aware of the situation. (See b. de p. note below).

(\*) In fact, this theme was unearthed in 1982 (one year after the crystalline theme), under its original name this times (and in a restricted form, only in the case of a base body of zero characteristic), without the name of

I anticipate...

### 17. Discovering the Mother - or both sides.

To tell the truth, my reflections on Weil's conjectures themselves, with a view to establishing them, remained sporadic. The panorama that had begun to open up before me, and which I was trying to scrutinise and grasp, far exceeded in breadth and depth the hypothetical needs of a demonstration, and even anything that these famous conjectures had first been able to hint at. With the appearance of the schematic and *topos* themes, a new and unsuspected world had suddenly opened up. "Conjectures" certainly occupied a central place in it, rather like the capital of a vast empire or continent, with countless provinces, but most of which have only the most distant connections with this brilliant and prestigious place. Without ever having to admit it to myself, I knew that I was now the servant of a great task: to explore this immense and unknown world, to grasp its contours as far as its most distant borders; and also to travel in all directions and make an inventory of the nearest and most accessible provinces with tenacious and methodical care, and to draw up maps of scrupulous accuracy and precision, where the smallest hamlet and the smallest cottage would have its place...

It was this latter work in particular that absorbed most of my energy - a patient and vast work on the foundations that only I could see clearly and, above all, 'feel with my gut'. It took up by far the largest part of my time, between 1958 (the year in which the schematic and *topos* themes appeared in quick succession) and 1970 (the year I left the mathematical scene).

In fact, I often gnawed my teeth at being held back like that, as if by a tenacious and sticky weight, with these interminable tasks which (once I'd seen the essentials) were more akin to 'stewardship' for me, than a launch into the unknown. I constantly had to hold back this impulse to launch myself forward - that of the pioneer or explorer, off to discover and explore unknown and nameless worlds, constantly calling me to know them and name them. This impulse, and the energy I invested in it (as if by stealth, almost!), were constantly at a premium.

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the worker is pronounced. This is just one of many examples of a notion or theme that was buried as a Grothendieckian phantasmagoria in the aftermath of my departure, only to be exhumed one by one by some of my students over the next ten or fifteen years, with modest pride and (needless to say) without any mention of the worker... .

Yet I knew deep down that it was this energy, stolen (so to speak) from the energy I owed to my 'tasks', that was of the rarest and most delicate essence - that 'creation' in my work as a mathematician was above all to be found *there*: in this intense attention to apprehend, in the obscure, shapeless and clammy folds of a warm and inexhaustible nourishing matrix, the first traces of form and outline of what had not yet been born and which seemed to be calling me, to take shape and become incarnate and born. . . In the work of discovery, this intense attention, this ardent solicitude are an essential force, just like the warmth of the sun for the obscure gestation of seeds buried in the nourishing earth, and for their humble and miraculous blossoming in the light of day.

In my work as a mathematician, I see mainly these two forces or impulses at work, equally profound, but (it seems to me) different in nature. To evoke both, I have used the image of the *builder* and that of the *pioneer* or explorer. Placed side by side, both suddenly strike me as very 'yang', very 'masculine', even 'macho'! They have the haughty resonance of myth, or that of 'special occasions'. They are undoubtedly inspired by the remnants in me of my old 'heroic' vision of creative work, the super-yang vision. As they stand, they give a strongly tinted, not to say fixed, 'standing to attention' vision of a much more fluid, humble, 'simple' reality - a *living* reality.

In this male drive to 'build', which seems to be constantly pushing me towards new construction sites, I can also discern that of the *home-lover*: the person who is deeply attached to 'home'. First and foremost, it's '*his*' house, the house of his '*nearest and dearest*' - the place where he feels part of an intimate living entity. Only then, and as the circle of what is felt to be 'close' widens, is it also a 'home for all'. And in this impulse to 'make homes' (as one would 'make' love...) there is also, and above all, *tenderness*. There is the impulse to make *contact* with these materials that one shapes one by one, with loving care, and that one only really knows through this loving contact. And, once the walls are up and the beams and roof have been laid, there is the deep satisfaction of installing one room after another, and gradually seeing the harmonious order of the living house - beautiful, welcoming, good to live in - established among these rooms, bedrooms and storerooms. For *the house*, first and foremost and secretly in each of us, is also *the mother* - that which surrounds us and shelters us, both refuge and comfort; and perhaps (more

Even more profoundly, and even if we were in the process of building it from scratch, it is also what we ourselves came from, what sheltered and nurtured us in those forgotten times before our birth... It's also *the Giron*.

And the image that emerged spontaneously earlier, to go beyond the prestigious appellation of 'pioneer' and identify the more hidden reality it covered, was also stripped of any 'heroic' accent. Here again, it was the archetypal image of the maternal that appeared - that of the nurturing 'matrix' and its obscure and shapeless labours... .

These two impulses, which seemed to me to be 'of a different nature', are in the end closer than I would have thought. Both are in the nature of a "*contact impulse*", leading us to meet "*the Mother*": the One who embodies *both* what is close, "known", *and what is unknown*". To abandon myself to one or other of these impulses is to "*find the Mother*". It means renewing contact both with what is *close by*, with what is "more or less known", and with what is "*far away*", with what is "unknown" but at the same time sensed, on the verge of becoming known.

The difference here is one of tonality, of dosage, not of nature. When I 'build houses', it's the 'known' that dominates, and when I 'explore', it's the unknown. These two 'modes' of discovery, or to put it better, these two aspects of the same process or work, are indissolubly linked. They are both essential and complementary. In my mathematical work, I see a constant to-and-fro between these two modes of approach, or rather, between the moments (or periods) when one predominates, and those when the other predominates (\*). But it's also clear that at every moment, both modes are present. When I'm building, laying out, clearing away, cleaning up, ordering, it's the 'mode' or the 'yang' or 'masculine' 'side' of the work that sets the tone. When I'm groping my way through the elusive, the formless, the nameless, I'm following the 'ying' or 'feminine' side of my being.

There is no question of me minimising or denying either side of the story.

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(\*) What I say here about mathematical work is also true of the work of 'meditation' (which will be discussed throughout Harvest and Sowing). There is little doubt in my mind that this is something that appears in all work of discovery, including that of the artist (writer or poet, let's say). The two 'sides' I am describing here can also be seen as being, on the one hand, that of *expression* and its 'technical' demands, and on the other, that of *reception* (of perceptions and impressions of all kinds), which becomes *inspiration* through the effect of intense attention. Both are present at every moment of the work, and there is this constant to-and-fro between the 'times' when one predominates, and those when the other predominates.

of my nature, both essential - the 'masculine' that builds and begets, and the 'feminine' that conceives and shelters the slow, obscure gestations. I 'am' both.

- "yang" and "yin", "man" and "woman". But I also know that the most delicate essence, the most delicate in the creative processes, is to be found on the 'yin', 'feminine' side - the humble, obscure and often poor-looking side.

I think it's this side of work that has always held the most powerful fascination for me. The prevailing consensus, however, encouraged me to invest most of my energy in the other side, the side that is embodied and affirmed in tangible, not to say finished and completed 'products' - products with clear-cut contours, attesting to their reality with the clarity of carved stone. ...

With hindsight, I can see how this consensus weighed on me, and also how I 'bore the brunt' - flexibly! The 'design' or 'exploration' part of my work was kept to a minimum, right up until the moment I left. And yet, in this retrospective look at my work as a mathematician, it is strikingly clear that the essence and the power of this work lies in this side, which is nowadays neglected, if not the object of derision or condescending disdain: that of '*ideas*', or even that of '*dreams*', by no means that of '*results*'. In these pages, I have tried to identify the most essential contribution I have made to the mathematics of my time, by looking at the forest rather than the trees - I have seen, not a collection of 'great theorems', but a lively range of fertile ideas (\*), all contributing to the same vast vision.

## 18. The child and the mother.

When this 'foreword' began to turn into a walk through my work

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(\*) It's not that there is a lack of what might be called 'great theorems' in my work, including theorems that solve questions posed by others that no one before me had been able to solve (I review some of them in the b. de p.(\*\*\*)) on page 554, in the note "La mer qui monte..." (The rising sea...). (ReS III, n° 122). But, as I pointed out at the start of this "walk" (in the "Points of view and vision" stage, n° 6), for me these theorems only take on their full meaning in the nurturing context of a major theme, initiated by one of these "fertilised ideas". Their demonstration then follows, as if from a spring and without effort, from the very nature, from the 'depth' of the theme that carries them - just as the waves of the river seem to be born gently from the very depth of its waters, without rupture and without effort. I express myself in a very similar way, but with other images, in the above-mentioned note "The rising sea..." .

As a mathematician, with my little talk about 'heirs' (good-natured) and 'builders' (incorrigible), a *name* also began to emerge for this missed foreword: it would be 'The child and the builder'. In the days that followed, it became increasingly clear that 'the child' and 'the builder' were one and the same character. So the name became, more simply, 'L'enfant bâtitseur'. A name, I must say, that was not lacking in allure, and one that had everything to please me!

But reflection reveals that this haughty 'builder', or (more modestly) the child-who-played-at-making-houses, was just one face of the famous child-who-played, who had *two*. There's also the child who likes to explore things, to go poking around in the sand or in the muddy, nameless mud, in the most impossible and bizarre places... No doubt to give the impression (if only to myself...), I began by introducing him under the flamboyant name of 'pioneer', followed by the more down-to-earth but still prestigious 'explorer'. It made you wonder, between the 'builder' and the 'pioneer-explorer', which was the more masculine, the more alluring of the two! Heads or tails?

And then, on closer inspection, our intrepid 'pioneer' turns out to be a *girl* (whom I had liked to dress as a boy) - a sister of the ponds, the rain, the mists and the night, silent and almost invisible as she fades into the shadows - the one we always forget (if we don't pretend to laugh at her. . . ). And I too found a way, for days and days, to forget her - to forget her doubly, I might add: I had only wanted to see the boy at first (the one who plays at making houses...) - and even when I couldn't help seeing *the other one*, I still saw her as a boy, too...

As for the beautiful name for my walk, well, it just doesn't hold up any more. It's an all-in-yang, macho, boxy name. To keep it straight, you'd have to include *the other one* too. But, strangely enough, '*the other*' doesn't really have a *name*. The only one that fits at all is 'explorer', but that's still a boy's name, nothing to do with it. Language is a bitch here, trapping us without us even realising it, obviously in cahoots with age-old prejudices.

Perhaps we could get away with "L'enfant-qui-bâtit et l'enfant-qui-explore". Leaving it unsaid that one is a "boy" and the other a "girl", and that it is one and the same boy-girl child who, in building, explores, and in exploring, builds. . . But yesterday, in addition to the double

The yin-yang relationship between what contemplates and explores, and what names and constructs, had given rise to yet another aspect of things.

The Universe, the World, even the Cosmos, are basically foreign and very distant things. They do not really concern us. It is not towards *them* that our deepest desire for knowledge draws us. What attracts us is their *Incarnation*, tangible and immediate, the closest, the most "carnal", charged with deep resonance and rich in mystery - the One who merges with the origins of our being in the flesh, as with those of our species - and the One who has always waited for us, silent and ready to welcome us, "at the other end of the road". It is from *Her*, the Mother, from Her who gave birth to us as she gave birth to the World, that the impulse arises and that the paths of desire take flight.

- and it is towards *Her* that they carry us, towards *Her* that they dart, to return unceasingly and sink into Her.

And so, at the bend in the path of an unexpected 'walk', I unexpectedly come across a parable that was familiar to me, and that I had somewhat forgotten - the parable of *the Child and the Mother*. It can be seen as a parable for "*Life, in search of itself*". Or, at the more humble level of individual existence, a parable for "*Being, in search of things*".

It's a parable, and it's also the expression of an ancestral experience, deeply rooted in the psyche - the most powerful of the original symbols that nourish the deepest creative layers. I believe I recognise in it, expressed in the immemorial language of archetypal images, the very breath of creative power in man, animating his flesh and spirit, in its humblest and most ephemeral manifestations, as well as its most dazzling and enduring ones.

This "breath", like the carnal image that embodies it, is the most humble thing in the world. It is also the most fragile thing, the most ignored by everyone and the most despised...

And the story of the vicissitudes of this soufflé in the course of your existence is none other than *your* adventure, the "adventure of knowledge" in *your* life. The wordless parable that expresses it is that of the child and the Mother.

You are the child, born of the Mother, sheltered in Her, nourished by Her power. And the child rises from the Mother, the All-Proximate, the Well-Known - to meet the Mother, the Unlimited, forever Unknown and full of mystery...

## Epilogue: the Invisible Circles

### 19. Death is my cradle (or three little ones for a dying man).

Until the appearance of the *topos* point of view towards the end of the 1950s, the evolution of the notion of space seems to me to have been essentially '*continuous*'. It seems to have continued smoothly, starting with the Euclidean theorisation of the space that surrounds us, and the geometry bequeathed to us by the Greeks, focusing on the study of certain 'figures' (straight lines, planes, circles, triangles, etc.) living in this space. Admittedly, there have been profound changes in the way the mathematician or 'natural philosopher' conceives of 'space' (\*). But these changes all seem to me to be in the nature of an essential '*continuity*' - they never presented the mathematician, attached (like everyone else) to familiar mental images, with a sudden *disorientation*. They were like the changes, profound perhaps but gradual, that take place over the years in a person we have known since childhood, and whose evolution we have followed from the first steps to adulthood and full maturity. Changes that are imperceptible in some long periods of calm, and perhaps tumultuous in others. But even in the most intense periods of growth or maturation, and even if we had lost sight of him for months or even years, there could never be the slightest doubt, the slightest hesitation: it was still him, a well known and familiar being, that we found again, albeit with changed features.

I think it's fair to say that, by the middle of this century, this familiar figure had already aged considerably - like a man who had finally become exhausted and worn out, overwhelmed by an influx of new tasks for which he was in no way prepared. Perhaps he had even died a natural death, without anyone bothering to take note of it.

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(\*) My initial intention in writing the Epilogue had been to include a very brief sketch of some of these 'profound changes', and to bring out the 'essential continuity' that I see in them. I've decided against it, so as not to make this Promenade, which is already much longer than planned, too long! I intend to come back to it in the Historical Comments in volume 4 of 'Reflections', this time for a mathematician reader (which totally changes the task of exposition).

"Everyone" was still pretending to be busy in the house of a living person, so that it was almost as if he were still very much alive indeed.

So you can judge the unfortunate effect, for the regulars of the house, when in place of the venerable old man frozen, straight and stiff in his armchair, there suddenly appears a vigorous kid, no taller than three apples, who claims in passing, without laughing and as a matter of course, that Monsieur Espace (and you can even drop the 'Monsieur', at your leisure. . .) is him! If only he looked like he had family traits, a natural child perhaps, who knows... but not at all! From the looks of it, there was nothing to remind us of the old Father Espace whom we had known so well (or thought we had known...), and of whom we were quite sure, in any case (and that was the least of it...) that he was eternal....

*This is* the famous 'mutation of the notion of space'. That's what I must have 'seen', as a matter of course, from at least the early sixties, without ever having had the opportunity to formulate it before this very moment when I'm writing these lines. And suddenly I see with a new clarity, by the mere virtue of this pictorial evocation and the swarm of associations it immediately provokes: the traditional notion of 'space', just like the closely related notion of 'variety' (of all kinds, and in particular that of 'algebraic variety'), had become so old by the time I came around that it was as if they were dead...(\*). And I could say that it was with the sudden appearance of the point of view of *diagrams* (and its progeny (\*), plus ten thousand pages of foundations to

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(\*) This statement (which will seem peremptory to some) should be taken with a 'grain of salt'. It is no more or less valid than the assertion (which I take up again below) that the 'Newtonian model' of mechanics (terrestrial or celestial) was 'moribund' at the beginning of this century, when Einstein came to the rescue. It's a fact that even today, in most of the 'current' situations in physics, the Newtonian model is perfectly adequate, and it would be madness (given the margin of error allowed in the measurements made) to go looking for relativistic models. Similarly, in many mathematical situations, the old familiar notions of 'space' and 'variety' remain perfectly adequate, without going looking for nilpotent elements, topos or 'moderate structures'. But in both cases, for an increasing number of contexts involved in cutting-edge research, the old conceptual frameworks have become inadequate to express even the most 'common' situations.

(\*) (For the benefit of the mathematician) Among these 'offspring', I include formal diagrams, "multiplicities" of all kinds (and in particular, schematic or formal multiplicities), and finally the so-called "rigid-analytic" spaces (introduced by Tate, following a "master plan" provided by me, inspired by the new notion of topos, as well as that of formal schema). This list is by no means exhaustive...

the key), then that of the *topos*, that a situation of crisis-which-doesn't-say-its-name was finally resolved.

In the image from earlier, it's not *a* kid from somewhere else that we should be talking about, as the product of a sudden mutation, but *two*. Two kids, moreover, who have an unmistakable 'family resemblance' to each other, even if they bear little resemblance to the late old man. And if you look closely, you could say that the Schémas toddler is like a 'family link' between the late Père Espace (aka Variétés-en-tous-genres) and the Topos toddler (\*\*).

## 20. A look at the neighbours opposite.

The situation seems to me to be very similar to the one that arose at the beginning of this century, with the appearance of Einstein's theory of relativity. There was an even more glaring conceptual cul-de-sac in the form of a sudden *contradiction that* seemed unresolvable. Fittingly, the new idea that would bring order out of chaos was a childishly simple one. The remarkable thing (and in keeping with a highly repetitive scenario. . . ) was that, of all the brilliant, eminent, prestigious people who were suddenly on their toes, trying to 'save the furniture', no one had thought of this idea. It had to be an unknown young man, fresh (if that's possible) from the benches of student lecture theatres, who came (perhaps a little embarrassed by his own audacity...) to explain to his illustrious elders what had to be done to 'save the phenomena': all they had to do was separate space from time (\*\*\*)! Technically, everything was in place for this idea to take off and be accepted. And it is to the credit of Einstein's elders that they were able to embrace the new idea without too much mortification. It's a sign that it was still a great time...

From a mathematical point of view, Einstein's new idea was trivial. From the

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(\*\*) In addition to these two toddlers, we should also add a third, younger one, who appeared in less favourable times: this is the *moderate Espace* marmot. As I have pointed out elsewhere, he did not have the right to a birth certificate, and it is in total illegality that I have nevertheless included him among the twelve 'master themes' that I have had the honour of introducing into mathematics.

(\*\*\*) That's a bit short, of course, as a description of Einstein's idea. From a technical point of view, we needed

demonstrate what structure to put on the new space-time (although this was already 'in the air', with Maxwell's theory and Lorentz's ideas). The essential step here was not technical, but '*philosophical*

In terms of our conception of *physical space*, on the other hand, it was a profound change, and a sudden 'change of scenery'. The first mutation of its kind since the mathematical model of physical space devised by Euclid 2400 years ago, and taken up unchanged for the needs of mechanics by all physicists and astronomers since antiquity (including Newton), to describe terrestrial and stellar mechanical phenomena.

Einstein's initial idea has subsequently been developed into a more subtle, richer and more flexible mathematical model, drawing on the rich arsenal of mathematical concepts that already existed (\*). With the "theory of generalised relativity", this idea was expanded into a vast *vision* of the physical world, embracing in a single view the subatomic world of the infinitely small, the solar system, the Milky Way and distant galaxies, and the path of electromagnetic waves in a space-time curved at every point by the matter within it (\*\*). This is the second and last time in the history of cosmology and physics (following Newton's first great synthesis three centuries ago) that a vast unifying vision has appeared, in the language of a mathematical model, of all the physical phenomena in the Universe.

This Einsteinian vision of the physical Universe has in turn been overwhelmed by events. The "set of physical phenomena" we are trying to account for has had time to expand since the beginning of the century! A multitude of physical theories have appeared, each one trying, with varying degrees of success, to account for a limited number of facts in the immense muddle of all the 'observed facts'. And we're still waiting for the daring youngster who will playfully find the new key (if there is one...), the dream 'cake-model' that will 'work' to save all the phenomena at once. ... (\*)

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(\*) This mainly concerns the notion of "Riemannian variety", and tensor calculus on such a variety.

(\*\*) One of the most striking features that distinguishes this model from the Euclidean (or Newtonian) model of space and time, and also from Einstein's very first model ("special relativity"), is that the *overall topological form* of space-time remains undetermined, instead of being imperatively prescribed by the very nature of the model. The question of what this global form is seems to me (as a mathematician) to be one of the most fascinating in cosmology.

(\*) Such a hypothetical theory, which would manage to "unify" and reconcile the multitude of partial theories that have been mentioned. I have the feeling that the fundamental reflection that is waiting to be undertaken will have to take place on two different levels.

1° ) A "philosophical" reflection on the very notion of a "mathematical model" for a portion of reality. Since the success of Newtonian theory, it has become a tacit axiom for physicists that *there is* a mathematical model (or even a single model, or '*the*' model) for expressing reality.

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This consensus, which has been the law for more than two centuries, is like a kind of fossil vestige of the living vision of Pythagoras that "Everything is number". This consensus, which has been the law for more than two centuries, is a kind of fossil vestige of Pythagoras's vivid vision that 'All is number'. Perhaps this is the new 'invisible circle', which has replaced the old metaphysical circles to limit the physicist's Universe (at a time when the race of 'natural philosophers' seems definitively extinct, superseded by that of computers...).

However, if you care to stop and think about it for even a moment, it is clear that there is nothing obvious about the validity of this consensus. There are even very serious philosophical reasons to doubt it a priori, or at least to set very strict limits on its validity. This would be the perfect time to subject this axiom to close criticism, and perhaps even to 'demonstrate', beyond any possible doubt, that it is unfounded: that there is *no* single rigorous mathematical model that accounts for all the so-called 'physical' phenomena that have been identified to date. Once the very notion of a 'mathematical model' has been satisfactorily defined, and the 'validity' of such a model has been established (within the limits of the 'margins of error' allowed in the measurements made), the question of a 'unitary theory' or at least that of an 'optimum model' (in a sense yet to be specified) will finally be clearly posed. At the same time, we will undoubtedly have a clearer idea of the degree of arbitrariness attached (by necessity, perhaps) for choosing such a model.

2° ) It is only *after* such reflection, it seems to me, that the 'technical' question of identifying an explicit model, more satisfactory than its predecessors, takes on its full meaning. This would be the moment, perhaps, to free ourselves from a second tacit axiom of the physicist, which goes back to antiquity and is deeply rooted in our very mode of perception of space: that of the *continuous nature* of space and time (or of space-time), of the 'place' where 'physical phenomena' take place.

Fifteen or twenty years ago, while leafing through the modest volume constituting Riemann's complete works, I was struck by a remark he made 'in passing'. In it, he remarked that the ultimate structure of space might well be 'discrete', and that the 'continuous' representations we make of it might constitute a simplification (excessive, perhaps, in the long run...) of a more complex reality; that for the human mind, 'the continuous' was easier to grasp than 'the discontinuous', and that it therefore serves us as an 'approximation' for apprehending the discontinuous. This is a remark of surprising penetration coming from a mathematician, at a time when the Euclidean model of physical space had never yet been called into question; in a strictly logical sense, it is rather the discontinuous that has traditionally served as a technical approach to the continuous.

Developments in mathematics over the last few decades have shown a much closer symbiosis between continuous and discontinuous structures than was imagined in the first half of this century. The fact remains that to find a 'satisfactory' model (or, if need be, a set of such models, 'connected' as satisfactorily as possible... . ), whether it be 'continuous', 'discrete' or of a 'mixed' nature - such a task will undoubtedly require a great deal of conceptual imagination, and a consummate flair for apprehending and uncovering mathematical structures of a new type. This kind of imagination or 'flair' seems to me to be a rare thing, not only among physicists (where Einstein and Schrödinger seem to have been among the rare exceptions), but even among mathematicians (and here I am speaking with full knowledge of the facts).

The comparison between my contribution to the mathematics of my time, and Einstein's contribution to physics, came to mind for two reasons: both works were accomplished through a *change in our conception of 'space'* (in the mathematical sense in one case, in the physical sense in the other); and both take the form of a *unifying vision*, embracing a vast multitude of phenomena and situations that had hitherto appeared separate from one another. I see an obvious *kinship of spirit* between his work (\*) and mine.

This similarity does not seem to me to be contradicted by any obvious difference in '*substance*'. As I suggested earlier, the Einsteinian mutation concerns the notion of physical space, whereas Einstein drew on the arsenal of mathematical notions already known, without ever needing to expand or even overturn it. His contribution consisted in identifying, from among the mathematical structures known at the time, those that were best suited to serving as 'models' of the world of physical phenomena, in place of the moribund model (\*\*) bequeathed by his predecessors. In this sense, his work was indeed that of a *physicist*, and beyond that, that of a '*philosopher of nature*', as Newton and his contemporaries understood it. This '*philosophical*' dimension is absent from my mathematical work, where I have never had to ask myself questions about the possible relationships between the '*ideal*' conceptual constructions that take place in the Universe of mathematical things and the phenomena that take place in the physical Universe (or even the events that take place in the psyche). My work has been that of a *mathematician*, deliberately turning away from the question of '*applications*' (to other sciences), or the '*motivations*' and psychic roots of my work. A mathematician, moreover, driven by his very particular genius to constantly expand the arsenal of notions at the very basis of his art. So it was that, without even realising it, I was led, as if by play, to overturn the most fundamental of notions, the notion of the '*fundamental*'.

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To sum up, I predict that the expected renewal (if it is still to come...) will come more from a mathematician at heart, well informed about the major problems of physics, than from a physicist. But above all, it will require a man with the '*philosophical openness*' to grasp the crux of the problem. This is not a technical problem at all, but a fundamental problem of the '*philosophy of nature*'.

(\*) I make no claim to be familiar with Einstein's work. In fact, I haven't read any of his work, and only know his ideas by hearsay and very roughly. However, I have the impression that I can make out "the forest", even though I have never had to make the effort to look at any of its trees... ...

(\*\*) For comments on the term "*moribund*", see a previous footnote (note (\*)).  
page 55).

most fundamental of all for the geometer: that of *space* (and that of 'variety'), i.e. our conception of the very '*place*' where geometric beings live.

The new notion of space (as a kind of 'generalised space', but where the points that are supposed to form 'space' have more or less disappeared) bears no resemblance in substance to the notion introduced by Einstein into physics (which is by no means confusing for the mathematician). On the other hand, the comparison is with *quantum mechanics*, discovered by *Schrödinger*(\*). In this new mechanics, the traditional 'material point' disappears, to be replaced by a sort of 'probabilistic cloud', more or less dense from one region of ambient space to another, depending on the 'probability' that the point is in that region. From this new perspective, we can clearly sense a more profound 'mutation' in our way of conceiving mechanical phenomena than that embodied in Einstein's model - a mutation that does not simply consist of replacing a mathematical model that is a little narrow around the edges with a similar one that is wider or better fitted. This time, the new model bears so little resemblance to the good old traditional models that even the mathematician who is a great specialist in mechanics must have felt suddenly out of place, even lost (or outraged...). For a mathematician, switching from Newton's mechanics to Einstein's must be a bit like switching from the good old Provençal dialect to the latest Parisian slang. On the other hand, switching to quantum mechanics, I imagine, is like switching from French to Chinese.

And these 'probabilistic clouds', replacing the reassuring material particles of yesteryear, remind me strangely of the elusive 'open neighbourhoods' that populate the *topos*, like evanescent ghosts, to surround imaginary 'points', to which a recalcitrant imagination continues to cling against all odds... .

## 21. "The unique - or the gift of solitude.

This brief excursion to the 'neighbours across the street', the physicists, may serve as a point of reference for a reader who (like most people) knows nothing of the world of mathematicians, but who has surely heard of Einstein and his famous 'fourth dimension', or even of quantum mechanics. After all, even if it wasn't planned

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(\*) I understand from various sources that there have been three 'revolutions' or major upheavals in physics this century: Einstein's theory, the discovery of radioactivity by the Curies, and the introduction of quantum mechanics by Schrödinger.

inventors that their discoveries would lead to the Hiroshima, and later to atomic bombs, both military and (supposedly) 'peaceful', the fact is that discoveries in physics have a tangible and almost immediate impact on the human world in general. The impact of mathematical discoveries, especially in so-called 'pure' mathematics (i.e. with no motivation in terms of 'applications'), is less direct and certainly more difficult to pin down. I'm not aware, for example, that my contributions to mathematics have been 'used' for anything, let's say for building any kind of machine. I don't deserve any credit for that, that's for sure, but it still reassures me. As soon as there are applications, you can be sure that it's the military (and after them, the police) who are the first to get hold of them - and when it comes to industry (even so-called 'peaceful' industry), it's not always that much better...

Certainly for my own benefit, or for that of a mathematician reader, it would be better to try to situate my work by means of 'reference points' in the history of mathematics itself, rather than looking for analogies elsewhere. I've been thinking about this over the last few days, within the limits of my rather vague knowledge of the history in question (\*). Already during the 'Promenade', I had the opportunity to evoke a 'lineage' of mathematicians, of a temperament in which I recognise myself: Galois, Riemann, Hilbert. If I were better informed about the history of my art, there's a good chance I'd find a way to extend this lineage further back in time, or perhaps to interject a few other names that I know little about other than hearsay. The thing that struck me is that I don't recall knowing, even if only by allusion from friends or colleagues better versed in history than myself, of a mathematician other than myself who contributed a multiplicity of innovative ideas, not more or less disjointed from one another, but as part of a vast unifying vision (as was the case for Newton and Einstein in physics and cosmology, and for Darwin and Pasteur in biology). I know of only two 'moments' in the history of mathematics when a vast new vision was born.

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(\*) Ever since I was a kid, I've never been too keen on history (or geography, for that matter). (In the fifth part of *Récoltes et Semailles* (written only in part), I have the opportunity 'in passing' to detect what seems to me to be the deepest reason for this partial 'block' against history - a block that I believe has been shrinking in recent years). The mathematical education received by my elders, in the 'Bourbach circle', did not help matters - occasional historical references were more than rare.

scale. One of these moments was the birth of mathematics as a science in the sense we understand it today, 2,500 years ago in ancient Greece. The other was, above all, the birth of infinitesimal and integral calculus in the seventeenth century, a period marked by the names of Newton, Leibnitz, Descartes and others. As far as I know, the vision born at either of these moments was not the work of a single individual, but the collective work of an era.

Of course, between the time of Pythagoras and Euclid and the beginning of the seventeenth century, mathematics had time to change its face, and likewise between the time of the 'Calculus of the infinitesimally small' created by the mathematicians of the seventeenth century and the middle of the present nineteenth century. But as far as I know, the profound changes that took place during these two periods, one of more than two thousand years and the other of three centuries, never materialised or condensed into a new vision expressed in a given work (\*), in a way similar to what happened in physics and cosmology, with the great syntheses of Newton and then Einstein, at two crucial moments in their history.

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(\*) Hours after writing these lines, I was struck by the fact that I had not thought here of the vast synthesis of contemporary mathematics that N. Bourbaki's (collective) treatise endeavours to present (the Bourbaki group will be discussed at length again in the first part of Harvest and Sowing). It seems to me that there are two reasons for this.

On the one hand, this synthesis is limited to a sort of 'tidying up' of a vast collection of ideas and results already known, without adding any new ideas of its own. If there is a new idea, it would be that of a precise mathematical definition of the notion of 'structure', which has proved to be a valuable guiding thread throughout the treatise. But this idea seems to me to be more akin to that of an intelligent and imaginative lexicographer, than to an element in the renewal of a language, giving a renewed apprehension of reality (in this case, that of mathematical things).

On the other hand, from the 1950s onwards, the idea of structure was overtaken by events, with the sudden influx of 'categorical' methods into some of the most dynamic parts of mathematics, such as topology and algebraic geometry. (For example, the notion of 'topos' refuses to fit into the 'Bourbachian bag' of structures, which is decidedly narrow at the edges!) In deciding, admittedly with full knowledge of the facts, not to embark on this 'galley', Bourbaki thereby abandoned his initial ambition, which was to provide *the* foundations and *the* basic language for the whole of contemporary mathematics.

He did, however, establish a language and, at the same time, a certain *style of* writing and approach to mathematics. This style was originally a (very partial) reflection of a certain *spirit*, a living and direct legacy of Hilbert. Over the course of the fifties and sixties, this style came to dominate - for better and (above all) for worse. In the last twenty years or so, it has become a rigid '*canon*' of purely cosmetic '*rigour*', whose original spirit seems to have disappeared without a trace.

It would seem that, as the servant of a vast unifying vision born within me, I am 'one of a kind' in the history of mathematics from its origins to the present day. I'm sorry if I sound like I'm trying to be more singular than I ought to be! To my own relief, however, I think I can discern a sort of potential (and providential!) *brother*. *I have* already had occasion to mention him, as the first in the line of my 'brothers in temperament': he is *Évariste Galois*. In his short and dazzling life (\*), I think I can discern the beginnings of a great vision - that of the 'marriage of number and size', in a new geometric vision. Elsewhere in *Récoltes et Semailles* (\*\*), I describe how, two years ago, this sudden intuition appeared in me: that in the mathematical work that at the time held the most powerful fascination for me, I was in the process of 'taking up the legacy of Galois'. This intuition, rarely mentioned since, has nevertheless had time to mature in silence. The retrospective reflection on my work that I have been pursuing for the last three years will surely have contributed to this. The most direct link that I now recognise with a mathematician of the past is the one that connects me with Évariste Galois. Rightly or wrongly, it seems to me that the vision I have developed over fifteen years of my life, and which has continued to mature within me and to be enriched over the sixteen years since I left the mathematical scene - that this vision is also the one that Galois could not have prevented himself from developing (\*\*\*)<sup>1</sup>, had he been around in my place, and without an early death brutally cutting short his magnificent impetus.

There is another reason, surely, that contributes to my feeling of an 'essential kinship' - a kinship that cannot be reduced to a mere 'mathematical temperament', or to the outstanding aspects of a work. Between his life and mine, I also feel a kinship of destinies. Admittedly, Galois died stupidly, at the age of twenty-one, while I am going on sixty, and determined to live to a ripe old age. But that doesn't stop Évariste Galois from being, during his lifetime, just like me a century and a half later, a

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(\*) Évariste Galois (1811-1832) died in a duel at the age of twenty-one. There are, I believe, several biographies of him. As a young man, I read a fictionalised biography written by the physicist Infeld, which really struck me at the time.

(\*\*) See "L'héritage de Galois" (ReS I, section 7).

(\*\*\*) I am convinced that a Galois would have gone much further than I did. On the one hand because of his exceptional gifts (which I did not share). On the other hand, because it is probable that he would not, like me, have allowed most of his energy to be distracted by endless tasks of meticulously shaping, as we go along, what is already more or less acquired... .

"marginal" in the official mathematical world. In the case of Galois, it might seem to a superficial observer that this marginality was 'accidental', that he had simply not had time to 'make his mark' with his innovative ideas and his work. In my case, my marginality, during the first three years of my life as a mathematician, was due to my ignorance (deliberate perhaps...) of the very existence of a world of mathematicians, with which I would have to confront myself; and since my departure from the mathematical scene, sixteen years ago, it has been the consequence of a deliberate choice. It is this choice, no doubt, that has provoked in retaliation an 'unwavering collective will' to erase from mathematics all trace of my name, and with it the vision of which I had made myself the servant.

But beyond these accidental differences, I believe I can discern a common cause for this 'marginality', which I feel is essential. I do not see this cause in historical circumstances, nor in particularities of 'temperament' or 'character' (which are undoubtedly as different from him to me as they can be from one person to another), and even less certainly in 'gifts' (obviously prodigious in Galois, and comparatively modest in me). If there is indeed an 'essential kinship', I see it at a much more humble, much more elementary level.

I have felt such a kinship on a few rare occasions in my life. It is also how I feel 'close' to yet another mathematician, who was my elder brother: *Claude Chevalley* (\*). The link I mean is that of a certain 'naivety', or 'innocence', of which I have had occasion to speak. It's expressed in a propensity (often unappreciated by those around us) to look at things through one's own eyes, rather than through patented glasses graciously offered by some larger or smaller human group invested with authority for one reason or another.

This "propensity", or inner attitude, is not the privilege of maturity, but of childhood. It is a gift received at birth, along with life - a gift that is both humble and formidable. It's a gift that's often buried deep down, but which some people have managed to preserve to some extent, or perhaps rediscover... .

It can also be called *the gift of solitude*.

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(\*) I mention Claude Chevalley here and there in *Récoltes et Semailles*, and more particularly in the section "Rencontre avec Claude Chevalley - ou liberté et bons sentiments" (ReS I section 11), and in the note "Un adieu à Claude Chevalley" (ReS III, note n° 100).

# A letter

May 1985

## 1. The thousand-page letter.

The text I am sending you here, typed and printed in a limited number of copies by my university, is neither a separate edition nor a preprint. Its name, Récoltes et Semailles, makes that clear enough. I'm sending it to you as I would send a long letter - a very personal letter at that. If I am sending it to you, instead of being content for you to read it one day (if you have the curiosity) in some volume on sale in bookshops (if there is a publisher foolish enough to take the plunge. . . ), it is because I am addressing it to you more than to others. More than once I've thought of you as I've written this letter - i t m u s t b e said that I've been writing it for more than a year, putting all my heart and soul into it. It's a gift I'm giving you, and I've taken great care in writing it to give you the best I have to offer (at any given moment). I don't know if the gift will be received - your reply (or lack of reply...) will let me know.... .

Along with you, I'm sending Harvest and Sowing to all my colleagues, friends and (ex-)students in the mathematical world, to whom I've been closely linked at some point, or who feature in my thinking in one way or another, by name or not. Chances are you'll be there, and if you read with your heart and not just with your eyes and head, you'll surely recognise yourself even where you're not named. I'm also sending Harvest and Sowing to a few other friends, scientific or otherwise.

This 'letter of introduction' that you are now reading, which announces and introduces you to a 'thousand-page letter' (to begin with...), will also serve as a Foreword. The Foreword has not yet been written at the time of writing. Récoltes et Semailles consists of five parts (not counting an introduction with 'drawers'). I am sending you parts I (Fatuity and Renewal), II (Burial (1) - or the Robe of the Chinese Emperor), and IV (Burial (3) - or the Four Operations (\*)). These are the ones that I felt particularly concerned you. Part III (The Burial (2) - or the Key to Yin and Yang) is undoubtedly the most personal part of my account, and at the same time the one that most concerns me.

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(\*) I would like to single out those colleagues who feature in my reflections in one capacity or another, but whom I do not know personally. I am simply sending them 'The Four Operations' (which concerns them more particularly), together with 'fascicule 0' consisting of this letter and the Introduction to Harvest and Sowing (plus the detailed table of contents of all the first four parts).

time which, even more than the others, seems to me to have a 'universal' value, beyond the particular circumstances surrounding its birth. I refer to this part here and there in Part IV (The Four Operations), which can nevertheless be read independently, and even (to a large extent) independently of the three preceding parts (\*). If reading what I've sent you here prompts you to reply (as I hope it will), and if it makes you want to read the missing part as well, please let me know. I'll be happy to send it to you, as long as your reply makes me feel that your interest goes beyond superficial curiosity.

## 2. Récoltes et Semailles (a lightning retrospective) is born.

In this pre-letter, I would now like to tell you in a few pages (if I can) what Récoltes et Semailles is about - to tell you in a more detailed way than the subtitle alone suggests: 'Reflections and testimony on a mathematician's past' (mine, as you may have guessed...). There are many things in Récoltes et Semailles, and some people will no doubt see many different things in it: a *journey* to discover a past; a *meditation* on existence; a *portrait of the customs* of a milieu and an era (or a portrait of the insidious and implacable slide from one era to another. . . ); an investigation (almost a detective story); an account of the past and the present. ); an *investigation* (almost detective-like at times, at others verging on a cloak-and-dagger novel in the underbelly of the mathematical megalopolis...); a vast *mathematical rambling* (which will sow many a seed...); a practical treatise on applied psychoanalysis (or, as the case may be, a book of '*psychoanalysis-fiction*'); a panegyric of *self-knowledge*; '*My Confessions*'; an intimate *diary*; a *psychology of discovery and creation*; an *indictment* (merciless, as it should be...), or even a *settling of scores* in 'the beautiful mathematical world' (and without giving away any prizes...). What's certain is that I never got bored writing it, and I learnt a lot and saw a lot. If your important tasks leave you free to read it, I'd be surprised if you got bored reading me. Unless you force yourself, who knows.... .

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(\*) Generally speaking, you will see that each 'section' (in Fatuity and Renewal) or each 'note' (in any of the next three parts of Harvest and Sowing) has its own unity and autonomy. It can be read independently of the rest, just as we can find interest and pleasure in looking at a hand, a foot, a finger or a toe or any other large or small part of the whole body, without forgetting that it is part of a Whole, and that it is this Whole alone (which remains unsaid) that gives it its full meaning.

Clearly, it's not just for mathematicians. It's also true that in some respects it's aimed more at mathematicians than others. In this pre-letter to the 'Harvest and Sowing Letter', I would like to summarise and highlight what may be of particular interest to you as a mathematician. The most natural way of doing this will be to tell you how I came, one thing leading to another, to write these four or five 'paving stones' in quick succession.

As you know, I left the mathematical 'big world' in 1970, following a case of military funding in my home institution (IHES). After a few years of anti-militarist and ecological activism, 'cultural revolution' style, which you have no doubt heard about here and there, I practically disappeared from circulation, lost in a provincial university God knows where. Rumour has it that I spend my time looking after sheep and drilling wells. The truth is that, apart from many other occupations, I bravely went, like everyone else, to do my lectures at the university (that was my little original livelihood, and it still is today). Occasionally, for a few days, or even a few weeks or a few months, I'd even do a bit of maths with a bit of zinc - I've got boxes full of my scribbles, which I'm probably the only one who can decipher. But it was about things that were very different, at least at first sight, from what I had done in the past. Between 1955 and 1970, my favourite subject had been cohomology, and more particularly, the cohomology of varieties of all kinds (algebraic, in particular). I felt I'd done enough in that direction for others to manage without me, and while I was doing maths, it was time to change discs...

In 1976 a new passion appeared in my life, as strong as my mathematical passion had once been, and moreover closely related to it. It was a passion for what I called 'meditation' (since things need names). This name, like any other name, is bound to give rise to innumerable misunderstandings. As in mathematics, this is a work of discovery. I have written about it here and there in *Récoltes et Semailles*. The fact remains that, obviously, there was enough there to keep me busy for the rest of my life. And more than once, in fact, I thought that mathematics was a thing of the past and that from now on I was only going to concern myself with more serious things - that I was going to 'meditate'.

However, I finally came to the conclusion (four years ago) that my passion for mathematics had not been extinguished for all that. And even, without really knowing how and to my own

Surprisingly, I, who (for nearly fifteen years) never thought I'd publish a line of maths in my life, suddenly found myself embarking on the writing of a book on maths that was clearly never-ending and was going to have volumes and volumes; and while I was at it, I was going to throw what I thought I had to say about maths into an (infinite?) series of books to be called 'Mathematical Reflections', and that would be the end of it.

It was two years ago, spring 1983. At the time I was too busy writing (volume 1 of) '*À la Poursuite des Champs*', which was also to be volume 1 of '*Réflexions*' (mathematics), to wonder what was happening to me. Nine months later, as it should be, this first volume was finished, in other words, all that was left to do was write the introduction, reread the whole thing, make annotations - and go to print...

The volume in question is still not finished - it hasn't moved a muscle in a year and a half. The introduction still to be written has passed the twelve hundred (typed) page mark, so when it's actually finished there will be fourteen hundred. You will have guessed that this 'introduction' is none other than Harvest and Sowing. At last count, it's supposed to make up volumes 1 and 2 plus part of volume 3 of the planned 'series'. As a result, the series is changing its name to '*Réflexions*' (for short, not necessarily for mathematics). The rest of volume 3 will consist mainly of mathematical texts, which are now more burning issues for me than the *Poursuite des Champs*. The latter will be published next year, with annotations, indexes and, of course, an introduction...

End of Act One!

### 3. The death of the boss - derelict building sites.

It's time, I feel, to give some explanations: why I left so abruptly a world in which, apparently, I had felt at ease for more than twenty years of my life; why I had the strange idea of 'coming back' (like a revenant...) when I had been very well dispensed with for those fifteen years; and finally why an introduction to a mathematical work of six or seven hundred pages has ended up being twelve (or fourteen) hundred. And it's here too, when I get to the heart of the matter, that I'm probably going to upset you (sorry!), or even anger you. Because there's no doubt that, like me once upon a time, you like to see the world of which you are a part, where you have your place, your name and all that, in '*rosé*'. I know what it's like... And now it's going to squeak a bit...

Here and there in *Récoltes et Semailles* I talk about the episode of my departure, without going into too much detail.

stop. This 'departure' appears rather as a major caesura in my life as a mathematician - it is in relation to this 'point' that the events of my life as a mathematician are constantly situated, as 'before' and 'after'. It took a powerful *shock* to tear me away from an environment in which I was firmly rooted, and from a 'trajectory' that had been mapped out for me. This shock came when, in an environment with which I was strongly identified, I came face to face with a certain form of corruption (\*) that until then I had chosen to turn a blind eye to (by simply refraining from participating in it). Looking back, I realise that beyond the event, there was a deeper force at work inside me. It was a tremendous *need for inner renewal*. Such a renewal could not be achieved and sustained in the tepid atmosphere of a scientific incubator in a prestigious institution. Behind me lay twenty years of intense mathematical creativity and inordinate mathematical investment - and, at the same time, twenty long years of spiritual stagnation, in a 'vacuum'... . Without realising it, I was suffocating - what I needed was fresh air! My providential 'departure' marked the sudden end of a long stagnation, and a first step towards balancing the deep forces in my being, bent and screwed into a state of intense, frozen imbalance... . This departure was truly a *new beginning* - the first step on a new journey...

As I said, this did not extinguish my passion for mathematics. It found expression in reflections that remained sporadic, in paths that were quite different from those I had mapped out for myself 'before'. As for the *work* I was leaving behind, the work 'before', both the work published in black and white and the work, perhaps more essential, that had not yet found its way into writing or published text - it could well seem, and indeed it seemed to me, that it had become detached from me. Before last year, with *Récoltes et Semailles* (Harvest and Sowing), the idea had never occurred to me to 'put down' even a little on the scattered echoes that came back to me, here and there. I was well aware that everything I had done in maths, and more particularly in my 'geometrical' period from 1955 to 1970, were things that *had to* be done - and the things I had seen or glimpsed were things that *had to* appear, that *had to be* brought out into the open. And also, that the work that I had done, and the work that I had done

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(\*) This refers to the unreserved collaboration, led by the establishment, of all scientists in all countries with the military, as a convenient source of funding, prestige and power. This question is barely touched on in passing, once or twice, in *Récoltes et Semailles*, for example in the note "Le respect" of 2 April last (n° 179, pages 1221-1223).

I had put all my strength and all my love into it. I had put all my strength and all my love into it, and (so it seemed to me) it was now autonomous - a living, vigorous thing - that no longer needed me to mother it. From that point of view, I left with perfect peace of mind. I had no doubt that the written and unwritten things I was leaving behind were in good hands, who would see to it that they unfolded, grew and multiplied according to their own nature as living, vigorous things.

During these fifteen years of intense mathematical work, a vast *unifying vision* had blossomed, matured and grown within me, embodied in a few very simple *key ideas*. The vision was that of an 'arithmetic geometry', a synthesis of topology, geometry (algebraic and analytic) and arithmetic, the first embryo of which I found in Weil's conjectures. She was my main source of inspiration in those years, which for me were above all those in which I drew out the key ideas of this new geometry, and in which I fashioned some of its main tools. This vision and these key ideas have become second nature to me. (And after having ceased all contact with them for nearly fifteen years, I can see today that this 'second nature' is still alive in me!) For me, they were so simple, and so obvious, that it went without saying that 'everyone' had assimilated them and made them their own, along with me. It's only recently, in these last few months, that I've realised that neither the vision, nor these few 'key ideas' that had been my constant guide, are written out in full in any published text, except between the lines. And, above all, that this vision that I thought I was communicating, and these key ideas that underpin it, are still ignored by everyone today, twenty years after they reached full maturity. It is I, the explorer and servant of these things that I had the privilege of discovering, who am also the only one in whom they are still alive.

One tool or another that I had fashioned is used here and there to 'crack' a supposedly difficult problem, like breaking into a safe. The tool is apparently solid. However, I know it has a 'strength' other than that of a pair of pliers. It is part of a Whole, just as a limb is part of the body - a Whole from which it springs, which gives it meaning and from which it draws strength and life. You can use a bone (if it's big) to fracture a skull, that's a given. But that's not its real function, its *raison d'être*. And I see these scattered tools that have been seized upon by some and others, a bit like bones, carefully

skinned and cleaned, that they would have torn from a body - from a living body that they would pretend to ignore...

What I am saying here in carefully considered terms, after a long period of reflection, must have dawned on me gradually and diffusely, over the years, at the level of the unformulated that is still trying to take shape in conscious thought and images, and in clearly articulated speech. I had decided that this past, in essence, no longer concerned me. The echoes that reached me from afar, filtered as they were, were nevertheless eloquent, if I dwelt on them just a little. I had thought I was just another worker, busying myself on five or six busy 'building sites' (\*) - a more experienced worker perhaps, the older one who had once worked alone on these very premises for many years, before a welcome change came along; the older one, yes, but basically no different from the others. And now, with him gone, it was like a bricklaying business that had declared bankruptcy following the unexpected death of the boss: overnight, in other words, the sites were deserted. The 'workers' left, each taking under his arm the odds and ends he thought he could use at home. The cash was gone, and there was no longer any reason for him to carry on working...

Once again, this is a formulation that emerged from a process of reflection and investigation that lasted more than a year. But surely it was something that I had already perceived 'somewhere', from the very first years after my departure. Leaving aside Deligne's work on the absolute values of Frobenius eigenvalues (the 'prestige question', as I've come to understand it recently...) - when, from time to time, I'd run into one of my old friends, with whom I'd worked on the same projects, and I'd ask him 'so what...', it was always the same eloquent gesture, arms in the air as if begging for mercy.... Clearly, everyone was busy with more important things than the ones I cared about - and clearly, too, while everyone was busy looking busy and important, not much was being done. The essential had disappeared - a *unity* that gave meaning to the partial tasks, and a *warmth* too, I think. What was left was a scattering of tasks detached from the whole, each person in his own corner covering his little hoard, or making it grow.

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(\*) I wrote about these deserted 'building sites', and finally reviewed them, in the series of notes entitled 'Les chantiers désolés' (n° s 176 à 178), published three months ago. A year earlier, and before the discovery of L'Enterrement, I had already mentioned them, in the first note in which I got back in touch with my work and its fate, in the note 'My orphans' (no.° 46).

as best we could.

Even though I would have liked to defend myself against it, it pained me, of course, to realise that everything had come to a screeching halt; to no longer hear about motives, topos, the six operations, De Rham's coefficients, Hodge's coefficients, or the 'mysterious functor' that was supposed to link together, in a single fan, around De Rham's coefficients, the *A-adic* coefficients for all prime numbers, nor the crystals (except to learn that they are still at the same point), nor the "standard conjectures" and others that I had identified and which obviously represented crucial questions. Even the vast work on the foundations begun with the Elements of Algebraic Geometry (with Dieudonné's tireless assistance), which it would have been almost enough to continue on the momentum already gained, was left to one side: everyone was content to settle into the walls and furniture that someone else had patiently assembled, mounted and bricked up. With the worker gone, it would never have occurred to anyone else to roll up their sleeves and get their hands on a trowel to build the many buildings still to be constructed, *houses* fit for living in, for themselves and for everyone else...

Once again, I couldn't help but follow up with images that were fully conscious, that had emerged and surfaced by virtue of reflection. But there's no doubt in my mind that these images must already have been present in one form or another, in the deepest layers of my being. I must have already sensed the insidious reality of a *Burial* of my work as well as my person, which suddenly imposed itself on me, with irrefutable force and with this very name, 'The Burial', on 19 April last year. On a conscious level, however, I would hardly have thought of taking offence, or even of being distressed. After all, whether or not he was a 'close friend' of yesteryear was entirely up to the individual, and what he chose to do with his time was up to him. If what had once seemed to motivate or inspire him no longer did, that was his business, not mine. If the same thing seemed to be happening, in perfect harmony, to all my ex-students without exception, that was still a matter for each of them separately and I had other things to worry about than finding out what meaning it might have, full stop! As for the things I'd left behind, to which a deep and unknown link continued to connect me - even though they were visibly abandoned on these desolate building sites - I knew full well that they weren't the kind of things that fear the 'ravages of time' or the fluctuations of fashion. If they hadn't yet become part of our common heritage (as it had seemed to me a while back), they wouldn't be able to

to put down roots there sooner or later, in ten years or a hundred, it didn't really matter...

#### 4. A funeral breeze... .

And yet, although throughout these years I have been happy to evade the diffuse perception of a large-scale En- terrement, it has not failed to stubbornly remind me of it, in other and less innocuous ways than that of a simple disaffection for a work. I gradually came to realise, though I can't really say how, that a number of notions that were part of the forgotten vision had not only fallen into disuse, but had become the object of condescending disdain in a certain "beau monde". Such was the case, in particular, of the crucial unifying notion of *topos*, at the very heart of the new geometry - the very notion that provides the common geometric intuition for topology, algebraic geometry and arithmetic - the very notion that enabled me to develop both the stale and *A-adic* cohomological tools, and the key ideas (more or less forgotten since, it is true. . . ) of crystalline cohomology. To tell the truth, it was my very name which, over the years, had insidiously and mysteriously become the object of derision - like a synonym for endless mud-slinging (such as that about the famous '*topos*', or the '*motifs*' he was raving about that nobody had ever seen. . . . ), of splitting hairs over a thousand pages, and of gigantic chatter about what, in any case, everyone had already known all along and without having waited for him... A bit in those tones, but in a muted, implied way, with all the delicacy that is appropriate '*among people of high flight and exquisite company*'.

In the course of my reflections in *Récoltes et Semailles*, I think I have put my finger on the deep forces at work in some people, behind the air of derision and condescension towards a work whose scope, life and breath escape them. I also discovered (apart from the particular traits of my person that have marked my work and my destiny) the secret '*catalyst*' that prompted these forces to manifest themselves in the form of casual contempt for the eloquent signs of an intact creativity; the Grand Official at the Funeral, in short, in this Funeral hushed by derision and contempt. Strangely enough, he was also the one, of all people, who was closest to me - the only one, too, who one day assimilated and made his own a certain vision, full of life and intense strength. But I anticipate...

To tell the truth, these '*whiffs of discreet derision*' that came back to me here and there did not really mean anything.

didn't affect me too much. Until three or four years ago, they remained somewhat anonymous. I certainly saw them as an unfortunate sign of the times, but they didn't really call me into question, and they didn't cause me any anxiety or worry. One thing that did affect me more directly, however, were the signs of distance from myself that came here and there from a good number of my old friends in the mathematical world, friends to whom (notwithstanding my departure from a world we once shared) I continued to feel linked by bonds of sympathy, in addition to those created by a common passion and a certain shared past. Here again, although each time I was saddened by this, I didn't dwell on it, and it never occurred to me (as far as I can remember) to make a connection between these three series of signs: the abandoned building sites (and the forgotten vision), the 'wind of derision', and the distancing of many of those who had been friends. I wrote to all of them, and received no reply. It was not uncommon, moreover, for letters I wrote to former friends or students about things that were close to my heart to go unanswered. New times, new customs - what could I do? I simply refrained from writing to them again. And yet (if you're one of them) this letter I'm writing will be the exception - a word offered to you once again - it's up to you to see whether you welcome it this time, or close yourself off to it once again...

If I'm not mistaken, the first signs of some old friends distancing themselves from me date back to 1976. That was also the year when another 'series' of signs began to appear, which I'll have to talk about before coming back to Harvest and Sowing. To put it better, these last two series of signs appeared at the same time. As I write, it seems to me that they are in fact indissociable, that they are in fact two different aspects or 'faces' of the same reality, bursting into the field of my own experience in that year. As far as the aspect I was about to talk about was concerned, it was a systematic, discreet and unanswerable 'refusal', reserved by a 'flawless consensus' (\*) for the few post-1970 students and assimilates who,

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(\*) This "flawless consensus" is mentioned sporadically here and there in *Fatuité et Renouvellement*, and eventually becomes the subject of a detailed testimony and reflection in the following part, *L'Enterrement* (1), with the "Cortège X" or "Le Fourgon Funèbre", made up of the "coffin notes" (n° s 93-96) and the note "Le Fossoyeur - ou la Congrégation toute entière". The latter closes this part of *Récoltes et Semailles*, and at the same time constitutes a first culmination of this 'second breath' of reflection.

in their work, their working style and their inspiration, clearly bore the mark of my influence. It was perhaps also on this occasion that, for the first time, I perceived this 'breath of discreet derision' which, through them, was aimed at a certain *style* and *approach* to mathematics - a style and vision which (according to a consensus which had apparently already become universal in the mathematical establishment) *had no place*.

Here again, it was something clearly perceived at an unconscious level. It even came to my conscious attention that same year, after the same aberrant scenario (illustrating the impossibility of getting an obviously brilliant thesis published) had been repeated five times in a row, with the burlesque obstinacy of a circus gag. Looking back on it now, I realise that a certain reality was 'beckoning' me at the time with a benevolent insistence, while I pretended to turn a deaf ear: "Hey, look you big dodo, pay a bit of attention to what's going on right under your nose, it concerns you but yes... . !!". I shook my head a bit, looked around (for a moment), half bewildered and half distracted: "ah yes, well, that's a bit strange, it looks like someone's got it in for someone, something that must have gone really wrong, and with such a perfect ensemble, it's scarcely believable!"

It was so unbelievable that I was quick to forget both the gag and the circus. It's true that I had plenty of other interesting things to do. That didn't stop the circus from coming back to my good memory in the years that followed - no longer in the tones of the gag now, but in those of a secret delight in humiliating, or that of a punch in the face; except that we're among distinguished people here and the punch takes more distinguished forms too, of course, but just as effective, left to the inventiveness of the distinguished people in question...

The episode that I felt like being 'punched in the face' (by someone else) happened in October 1981 (\*). That time, and for the first time since the insistent signs of a new spirit had been reaching me, I was hit - more strongly, no doubt, than if it had hit me instead of someone else, whom I had a fondness for. He was a bit of a pupil, and what's more he was a remarkably gifted mathematician who had just done some great things - but that's a detail, after all. Which was not a

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(\*) This episode is recounted in the note "Cercueil 3 - ou les jacobiniennes un peu trop relatives" (n° 95), in particular pages 404-406.

The detail, on the other hand, is that three of my 'former' pupils were directly involved in an act that was received by the person concerned (and not without reason) as a humiliation and an affront. Two other of my former pupils had already had occasion to treat him with condescension, like well-to-do people sending a dawdler for a walk (\*\*). Yet another pupil was to follow suit three years later (again in the 'punch in the face' style) - but of course I didn't know that at the time. What appealed to me then was more than enough. It was as if my past as a mathematician, never examined, suddenly taunted me with a hideous sneer, in the person of five of my students who had become important, powerful and disdainful figures...

It would have been the perfect time to ask, to probe the meaning of what was suddenly so violently challenging me. But somewhere inside me it had been decided (without ever having to be said...) that this past 'before' didn't really concern me any more, that there was no point in me dwelling on it; that if it seemed to be calling out to me now in a voice that I recognised only too well - that of the time of contempt - it was definitely wrong. And yet, for days, perhaps weeks, I was racked with anxiety, without even acknowledging it. (It was only last year, when I wrote *Récoltes et Semailles*, which brought me back to this episode, that I finally became aware of this anguish, which had been taken under control as soon as it appeared). Instead of taking stock of it and probing its meaning, I became agitated, writing 'the right letters' left and right. The people concerned even took the trouble to reply to me - evasive letters, of course, that didn't get to the bottom of anything. Eventually the waves subsided and everything returned to normal. I didn't have to think about it again until last year. This time, however, it remained like a wound, or rather like a painful splinter that we avoid touching; a splinter that *maintains* this wound that is just waiting to close...

It was surely the most painful and distressing experience I have had in my life as a mathematician - when I saw (without actually consenting to *take note* of what my eyes were seeing) 'one of my former students or companions whom I loved, taking pleasure in discreetly crushing another whom I love and in whom he recognises me'. It left a stronger impression on me than the crazy discoveries I made last year, which (to a superficial observer) may seem quite incredible... It's true that this experience brought several others into resonance,

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(\*\*) This is mentioned in passing in the note quoted in the previous footnote.

in the same vein but less violently, and which at the time were a little 'lost'. This reminds me, too, that 1981 was also the year of a drastic change in my relationship with the only one of my former students with whom I remained in regular contact after I left, and the one who for some fifteen years had been a 'privileged interlocutor' for me in mathematical terms. That was the year when 'the signs of disdain' that had been appearing for some years (\*) 'suddenly became so brutal' that I ceased all mathematical communication with him. This was a few months before the fist-pumping episode of the day. With hindsight, the coincidence seems striking, but I don't think I made the slightest connection at the time. It was stored in separate 'pigeonholes'; pigeonholes that someone, incidentally, had said were weren't really of any consequence - the case was made!

And it reminds me, too, that in June of that same year, 1981, a certain brilliant *colloquium* had already taken place, memorable in more ways than one - a colloquium that will have well deserved to go down in history (or in what remains of it. . . ) under the indelible name of 'Colloque Pervers'. I met him (or rather, he fell on me!) on 2 May last year, two weeks after discovering (on 19 April) L'Enterrement en chair et en os - and I realised straight away that I'd just stumbled upon '*l'Apothéose*'. The apotheosis of an enterment, certainly, but also an *apotheosis of contempt* for what, for more than two thousand years since our science began, has been the tacit and immutable foundation of the mathematician's ethic: namely, that elementary rule of not presenting as one's own ideas and results taken from another. And as I take note of this remarkable coincidence in time, between two events that may seem very different in nature and scope, I am struck by the revelation here of the profound and obvious link between *respect for the individual* and respect for the elementary ethical rules of an art or science, which make its practice something other than a 'free-for-all', and of the group of those who are known to excel in it and who set the tone, something other than an unscrupulous 'mafia'. But then again, I'm getting ahead of myself...

## 5. The journey.

I think I've just about covered the background to my 'return to maths' and, one thing leading to another, to the writing of *Récoltes et Semailles*. It was at the end of March last year, in the very last section of *Fatuité et Renouvellement* ('Le poids d'un passé' (n° 50)),

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(\*) This episode is mentioned in the note "Two turning points" (n° 66).

that I finally began to wonder about the reasons for and the meaning of this unexpected return. As for the 'reasons', the strongest of them all was surely the impression, diffuse and imperious at the same time, that these strong and vigorous things, which I had once thought I was entrusting to loving hands - 'it is in a tomb, cut off from the blessings of the wind, rain and sun that they have languished these fifteen years since I lost sight of them' (\*). I had to understand, little by little and without ever having thought of telling myself before today, that it would be none other than me who would finally blow up those worm-eaten boards, holding prisoner living things made, not to rot in closed coffins, but to blossom in the open air. And these airs of false compunction and insidious derision around these padded and plethoric coffins (in the image of the deceased, no doubt...), must also have "ended up awakening in me a fighting spirit that had become somewhat dormant over the last ten years", and "the desire to throw myself into the fray...". (\*\*).

So it was that, two years ago, what was initially intended as a quick survey, lasting a few days or a few weeks at most, of one of these 'projects' that had been left to one side, became a major mathematical serial in  $N$  volumes, part of the famous new series of 'Réflexions' ('mathematics', pending the removal of that useless qualifier). As soon as I knew that I was writing a mathematical work for publication, I also knew that, in addition to a more or less customary 'mathematical' introduction, I was going to add another 'introduction' of a more personal nature. I felt it was important for me to explain my 'return', which was in no way a return to an *environment*, but simply a 'return' to intense mathematical in- vestment and the publication of mathematical texts written by me for an indefinite period. I also wanted to explain the spirit in which I was now writing about maths, which was very different in some respects from the spirit of my writings before I left - the 'logbook' spirit of a voyage of discovery. Not to mention that there were other things on my mind, no doubt related to these, but which I felt were even more essential. It was clear to me that I was going to take my time to say what I had to say. These things, still vague, were inseparable for me from the meaning of the volumes I was about to write, and the 'Reflections' into which they were to be inserted. There was no question of slipping them in there on the sly, as if to excuse myself.

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(\*) Quoted from the note "La mélodie au tombeau - ou la suffisance" (n° 167), page 826. (\*\*)  
See "Le poids d'un passé" (section n° 50), especially p. 137.

to abuse the precious time of a reader in a hurry. If there were things in 'À la Poursuite des champs' that were good for him and for everyone to know, they were precisely those that I reserved to say in this introduction. If twenty or thirty pages weren't enough to say them, I'd put in forty or even fifty, never mind - not to mention the fact that I wasn't forcing anyone to read me...

And so Harvest and Sowing was born. I wrote the first pages of the planned introduction in June 1983, at a low point in the writing of the first volume of The Pursuit of the Fields. Then I started again in February last year, when my volume had been practically finished for several months (\*). I was counting on this introduction to be an opportunity to clarify a couple of things that were still a little hazy in my mind. But I had no idea that it was going to be, like the volume I had just written, a *voyage of discovery*; a voyage into a world even richer and wider than the one I was preparing to explore, in the volume I had written and in those that were to follow. As the days, weeks and months went by, without really realising what was happening, I continued on this new journey, discovering a certain past (stubbornly eluded for more than three decades...), and of myself and the links that bind me to that past; the discovery also of some of those who were close to me in the mathematical world, and whom I have known so badly; and finally, in the process and as an added bonus, a journey of mathematical discovery, when for the first time in fifteen or twenty years (\*), I took the time to revisit some of the questions that I had left burning when I left. All in all, I can say that these are *three* closely intertwined journeys of discovery that I am pursuing in the pages of Harvest and Sowing. And none of the three is completed with the final full stop, on page twelve hundred and something. The echoes that my account will gather (including the echo of silence) will be part of the 'continuation' of the journey. As for its 'end', this journey will surely be

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(\*) In the meantime I had spent a good month thinking about the 'structural surface' for a system of pseudo-straight lines, obtained in terms of the set of all possible 'relative positions' of a pseudo-straight line with respect to such a system. I also wrote 'The Outline of a Programme', which will be included in volume 3 of Reflections.

(\*) In the fifties and sixties, I often repressed my urge to go in search of such juicy, burning issues, busy as I was with interminable fundamental tasks that no one would have been able or willing to pursue in my place, and that no one after I left had the heart to continue either...

is one of those that never comes to an end - not even, perhaps, on the day we die...

And here I am, back where I started: telling you in advance, if I can, 'what Harvest and Sowing is all about'. But it's also true that, without even looking for it, the previous pages have already told you more or less what it's all about. Perhaps it will be more interesting to continue in the same vein and *tell the story*, rather than 'announcing' it.

June 1985

#### 6. The shadow side - or creation and contempt.

The preceding pages were written during a brief 'lull' last month. In the meantime, I've finally finished putting the finishing touches to the 'Four Operations' (the fourth part of Harvest and Sowing) - all that's left is to finish this letter or 'pre-letter' (which is also looking prohibitively large...) so that everything is finally ready for typing and duplication. I couldn't believe it when I said I was almost a year and a half away from finishing these famous notes!

When I set about writing this rather unusual 'introduction' to a mathematical work in February last year (and the year before that, in June), there were (I think) three main things I wanted to say. First of all, I wanted to explain my intentions in returning to mathematical activity, and the spirit in which I had written the first volume of '*À la Poursuite des Champs*' (which I had just declared finished), and the spirit in which I intended to pursue an even wider journey of mathematical exploration and discovery, with the '*Réflexions*'. From now on, it would no longer be a matter of meticulously laying the foundations for some new mathematical universe in the making. Rather, they would be 'logbooks', in which the work would continue from day to day, without hiding anything about it and as it *really* goes on, with its failures and blunders, its insistent backtracking and also its sudden leaps forward - a work drawn forward irresistibly day after day (and notwithstanding innumerable incidents and unforeseen events), as if by an invisible thread - by some elusive, tenacious and sure vision. It's a work that often involves trial and error, especially in those 'sensitive moments' when some as yet nameless and faceless intuition emerges, barely perceptible; or at the start of some new journey, in the call and pursuit of some first ideas and intuitions, often elusive and reluctant to let themselves be caught in the net.

of language, when it is precisely the language needed to capture them delicately that is often still lacking. It is this kind of language, above all else, that needs to be condensed out of an apparent nothingness of impalpable mists. What is still only sensed, before it is even glimpsed, let alone 'seen' and touched with the finger, gradually emerges from the imponderable, emerges from its cloak of shadow and mist to take on form and flesh and weight...

It's this part of the work, which may look shabby, not to say (on many occasions) messy, that is also the most delicate and essential part - the part where, truly, something *new* emerges, as a result of intense attention, concern and respect for this fragile, infinitely delicate thing about to be born. This is the creative part of all - that of conception and slow gestation in the warm darkness of the womb, from the invisible original double gamete, becoming in- form an embryo and transforming itself over the days and months, through obscure and intense work, invisible and without appearance, into a new being in flesh and blood.

This is also the "dark", "yin" or "*feminine*" part of the work of discovery. The complementary aspect, the 'light' or 'yang' or '*masculine*' part, would be more akin to working with a hammer or sledgehammer, a well-sharpened chisel or a wedge of good hardened steel (tools that are already ready for use, and whose effectiveness has already been proven...) Both aspects have their *raison d'être* and their function, in inseparable symbiosis with each other.

- Or, to put it better, they are *the wife* and *husband* of the indissoluble couple of the two original cosmic forces, whose ceaselessly renewed embrace constantly resurrects the obscure creative labours of conception, gestation and birth - the birth of *the child*, of the new thing.

The second thing I felt the need to say, in my famous personal and 'philosophical' 'introduction' to a mathematical text, was precisely about the nature of creative work. For years I had been aware that this nature was generally ignored, obscured by all kinds of clichés and by ancestral fears and pressures. I discovered just how true this is only afterwards, gradually, over the course of days and months, throughout the reflection and 'investigation' that went into Harvest and Sowing. It was at the very start of this reflection, in the few pages dated June 1983, that I was first seized by the significance of this seemingly insignificant, yet stupefying fact, if only one

If you dwell on it for a moment, you will notice that this 'most creative' part of the work of discovery that I have just been talking about is *practically nowhere to be found* in the texts or speeches that are supposed to present such work (or at least its most tangible fruits); whether they be textbooks and other teaching texts, or original articles and dissertations, or oral lectures and seminar presentations, and so on. It would seem that for thousands of years, since the very origins of mathematics and the other arts and sciences, there has been a kind of 'conspiracy of silence' surrounding the '*unmentionable labours*' that precede the emergence of any new idea, large or small, that renews our knowledge of a part of this world, in perpetual creation, in which we live.

To put it bluntly, it would seem that the repression of knowledge of this aspect or this stage, the most crucial of all in any work of discovery (and in creative work in general), is so effective, so internalised by the very people who know such work first-hand, that you would often swear that even they have eradicated all trace of it from their conscious memory. A bit like a woman in an excessively puritanical society who has eradicated from her memory, in relation to each of the children she makes it her duty to wipe clean and wipe their noses, the moment of the (reluctantly undergone) embrace that made them conceive, the long months of pregnancy (experienced as an inconvenience), and the long hours of childbirth (endured as an unpleasant ordeal, followed at last by delivery).

This comparison may seem outrageous, and indeed it may be, if I apply it to what I remember today of the spirit I experienced in the mathematical milieu to which I myself belonged, even twenty years ago. But in the course of my reflections on Harvest and Sowing I have come to realise, and in a striking way especially in these last few months (with the writing of the 'Four Operations'), that since my departure from the mathematical scene there has been an astonishing *deterioration* in the spirit which today prevails in the circles I had known, and (it seems to me, to a large extent at least) in the mathematical world in general (\*). It is even possible, both because of my very particular mathematical personality and because of the conditions surrounding my departure, that it acted as a kind of

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(\*) This deterioration is by no means confined to the 'mathematical world'. It can also be seen in scientific life as a whole, and even beyond that, in the contemporary world on a planetary scale. A starting point for an observation and reflection along these lines can be found in the note entitled 'Muscle and guts', which opens the discussion on yin and yang (note no.° 106).

a catalyst in an evolution that was already taking place (\*\*) - an evolution of which I saw nothing at the time (nor did any of my colleagues and friends, with the possible exception of Claude Chevalley). The aspect of this degradation that I am thinking of most here (which is just *one* aspect among many (\*\*\*)) is the *tacit contempt*, if not unequivocal derision, of anything (in mathematics, in this case) that is not akin to the pure work of hammer on anvil or chisel - the contempt for the most delicate (and often least apparent) creative processes; of everything that is *in-spiration, dream, vision* (however powerful and fertile they may be), and even (ultimately) of any *idea*, however clearly conceived and formulated : of everything that is not written and *published* in black and white, in the form of pure and hard statements, indexed and indexed, ripe for the 'data banks' engulfed in the inexhaustible memories of our mega-computers.

There has been (to borrow an expression from C. L. Siegel (\*)) an extraordinary '*flattening*', a '*narrowing*' of mathematical thought, stripped of an essential dimension, of all its 'shadow side', the 'feminine' side. It is true that, as a result of an ancestral tradition, this side of the work of discovery remained largely hidden, and no one (as it were) ever *spoke of* it - but the living contact with the deep sources of the dream, which feed the great visions and the great designs, had never yet (as far as I know) been lost. It would seem that we have already entered an *era of drying up*, where this source has not dried up, but where access to it has been cut off.

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(\*\*) This is the development examined in the note cited in the previous b. de p. note. Links between this and the Burial (of my person and my work) appear and are examined in the notes "Les Obsèques du Yin (yang enterre yin (4))", "La circonstance providentielle - ou l'Apothéose", "Le désaveu (1) - ou le rappel", "Le désaveu (2) - ou la métamorphose" (n° s 124, 151, 152, 153). See also the more recent notes (in ReS IV) "Les détails inutiles" (n° 171(v), part (c) "Des choses qui ressemblent à rien - ou le dessèchement") and "L'album de famille" (n° 173, part c. "Celui entre tous - ou l'acquiescement").

(\*\*\*) The aspect that is most often the focus of attention in Harvest and Sowing, and more particularly - the two 'investigation' parts (RS II or 'The robe of the Chinese Emperor', and RS IV or 'The Four Operations'), and perhaps the one that most 'astonished' me, was the degradation of the ethics of the profession, expressed in the shameless plundering, debunking and scheming practised by some of the most prestigious and brilliant mathematicians of the day, and this (to a very large extent) in full view of everyone. For some other more delicate aspects, directly related to this one, I refer you to the note already quoted (n° 173 part c.) "Des choses qui ressemblent à rien - ou le dessèchement".

(\*) This expression is quoted and commented on in the note just quoted in the previous note by b. de p.

condemned by the indisputable verdict of general contempt and the reprisals of derision.

We are approaching the time, it seems, when not only will the *memory of* any work close to the source, of "feminine" work (ridiculed as "muddy", "flabby", "inconsistent" - or at the opposite end of the spectrum as "trivialities", "childishness", "bombast"...) be eradicated in everyone, but when this very work and its fruits will also be extirpated: the work where new notions and visions are conceived, elaborated and born. It will also be the time when the exercise of our art will be reduced to arid and futile displays of cerebral 'weights and dumbbells', to one-upmanship to 'crack' the problems in the competition ('of proverbial difficulty') - the time of a feverish and sterile 'supermacho' hypertrophy, taking over from more than three centuries of creative renewal.

## 7. Respect and fortitude.

But again I digress, anticipating what the reflection has taught me. My starting point was twofold, clearly present in me even before I began this project

The first was to make a 'declaration of intent', and the second (intimately linked to it, as has just become clear) was to express myself on the nature of creative work. There was, however, a third purpose, less clearly present at the conscious level, but responding to a deeper and more essential need. It was prompted by these sometimes disconcerting 'interpellations', coming to me from my past as a mathematician through the voices of those who had been my students or my friends (or at least, of a good number of them). On an epidermal level, this need translated into a desire to 'get it off my chest', to tell a few 'unpleasant truths'. But at a deeper level, there was surely the need to finally *come to terms* with a certain past that I had chosen to avoid until then. It was from this need, above all, that *Récoltes et Semailles* was born. This long reflection was my 'response', day by day, to this impulse for knowledge within me, and to the constantly renewed challenge that came to me from the outside world, from the 'mathematical world' that I had left with no spirit of return. Apart from the very first pages of 'Fatuity and Renewal', those that form the first two chapters ('Work and Discovery' and 'The Dream and the Dreamer'), and from the chapter that follows 'Birth of Fear' (p. 18), with a 'testimony' that was by no means part of the programme, it was this need to get to know my past and to come to terms with it fully that (I believe) was the main force at work in writing *Harvest and Sowing*.

The challenge that had come to me from the world of mathematicians, and which came back to me with renewed force throughout Harvest and Sowing (and above all, during the 'investigation' pursued in Parts II and IV), had from the outset taken on the mask of smugness, if not disdain ('delicately measured'), derision or contempt, whether towards me (sometimes) or (above all) towards those who had dared to take inspiration from me (without suspecting, of course, what was in store for them) and who were 'classified' as having ties with me, by some tacit and implacable decree. And here again I see the 'obvious' and 'profound' link between *respect* (or lack of respect) for the person of others; respect for the act of creation and for some of its most delicate and essential fruits; and finally respect for the most obvious rules of scientific ethics: those rooted in a basic respect for oneself and for others, and which I would be tempted to call the '*rules of decency*' in the practice of our art. These are all aspects, surely, of a basic and essential '*self-respect*'. If I try to sum up in one pithy phrase what Harvest and Sowing has taught me about a certain world of mine, a world with which I identified for more than twenty years of my life, I would say: it's a world that has *lost respect* (\*).

This was something that had already been strongly felt, if not formulated, in the preceding years. It was only confirmed and clarified, always in unexpected and sometimes astonishing ways, throughout Harvest and Sowing. It is clearly apparent from the very moment when a general, "philosophical" reflection suddenly becomes a personal testimony (in the section entitled "The Welcome Stranger" (no.° 9, p. 18), which opens the aforementioned chapter on "The Birth of Fear").

Yet this perception does not appear in the tone of bitter or acerbic recrimination, but (through the internal logic of the writing and the different attitude it provokes) in that of a *question*: what was my own part in this degradation, in this loss of respect that I see today? This is the main question that runs through the first part of Récoltes et Semailles, right up to the moment when it is finally resolved.

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(\*) Here again, this is a formulation which applies not only to a certain limited milieu, where I have had ample opportunity to see the matter up close, but it seems to me to sum up a certain degradation in the contemporary world as a whole (Compare with the b. de p. note (\*) on page L 19). In the more limited context of an 'investigation' continued in Récoltes et Semailles, this formulation appears in the note of 2 April last, 'Le respect' (n° 179).

I've come to a clear and unequivocal conclusion (\*\*). Previously, this degradation had seemed to me to 'fall from the sky' suddenly, inexplicably and all the more outrageously, intolerably. In the course of reflection, I discovered that it had continued insidiously, undetected by anyone around him or in himself, throughout the fifties and sixties, *including in my own person*.

The realisation of this humble fact, surely quite obvious and without appearance, marked a first crucial turning point in the testimony, and an immediate qualitative change (\*\*\*)�. This was the first essential thing I had to learn about my past as a mathematician and about myself. This awareness of my *share of responsibility* for the general deterioration (an awareness that was more or less acute depending on the moment of reflection) remained as a background note and a reminder throughout Harvest and Sowing. This was especially true at times when my reflections took on the form of an investigation into the disgraces and iniquities of an era. Together with the desire to understand, and the curiosity that drives and drives forward all true work of discovery, it is this humble knowledge (often forgotten along the way and resurfacing in spite of everything, where we least expected it...) that has kept my account from ever veering (I think) into sterile recrimination about the ingratitude of the world, or even into 'settling of scores' with some of those who had been my students or friends (or both).

This lack of complacency about myself has also given me that inner calm, or fortitude, which has protected me from the traps of complacency towards others, or even those of false 'discretion'. Whatever I felt I had to say, at one time or another, whether about myself, or about one of my colleagues, ex-students or friends, or about an environment, or about an era, I said it, without ever having to shake my reticence. As for the latter, it was enough each time that I examined them carefully for them to vanish without a trace.

#### 8. "My nearest and dearest" - or connivance.

It is not my intention in this letter to review all the 'high points' (or all the 'sensitive moments') in the writing of Récoltes et Semailles, or in any of the other books in the series.

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(\*\*) In the sections "La mathématique sportive" and "Fini le manège" (n° s 40, 41).

(\*\*\*) From the next day, the testimony deepened into a meditation on myself, and retained this particular quality over the following weeks, until the end of this "first breath" of Harvest and Sowing (with the section "The weight of a past", n° 50).

its stages (\*). Suffice it to say that there have been, in this work, four clearly marked major stages or four "breaths" - like the *sighs* of a breath, or like the successive *waves* in a train of waves that have arisen, I don't know how, from these vast mute masses, motionless and moving, boundless and nameless, from an unknown and bottomless sea that is "me", or rather, from a sea infinitely vaster and deeper than this "me" that it carries and nourishes. These 'breaths' or 'waves' have materialised in the four parts of Récoltes et Semailles now written. Each wave came without my calling it or planning it in the slightest, and at no time could I have said where it would take me or when it would end. And when it had ended and a new wave had already taken its place, for a while I thought I was still at the end of a journey (which would also be the end of Harvest and Sowing!), even though I was already being lifted and carried towards another breath of the same vast movement. It's only with hindsight that this movement becomes clear and that a *structure is* unequivocally revealed in what had been experienced as an act and a movement.

And this movement certainly didn't end with my (very provisional!) final point in Harvest and Sowing, nor will it end with the final point of this letter to you, which is one of the 'times' of this movement. And it was not born on a day in June 1983, or in February 1984, when I sat down at my typewriter to write (or rewrite) a certain introduction to a certain mathematical work. It was born (or rather, re-born...) nine years ago, on a certain day that I still remember (when so many things from my distant or near past have sunk into oblivion...), the day when meditation appeared in my life. . . .

But once again I digress, letting myself be carried away (and carried away...) by the images and associations born of the moment, instead of wisely sticking to the thread of a 'purpose', of the planned. My intention today was to follow up with an account, however succinct, of the 'discovery of the Burial' last April, at a time when a fortnight ago I thought I'd finished Harvest and Sowing - and how, in the space of just three or four weeks, discoveries came tumbling down on me, some bigger and more unbelievable than the others - so big and so crazy that for months on end I still had no idea what I'd discovered.

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(\*) You will find a short retrospective of the first three parts of Harvest and Sowing in the two groups of notes "Evening fruits" (n° s 179-182) and "Discovery of a past" (n° 183-186).

had the greatest difficulty 'to believe the testimony of my healthy faculties', to free myself from an insidious *incredulity in the face of the evidence* (\*). This secret and tenacious incredulity only finally dissipated last October (six months after the discovery of 'L'Enterrement dans toute sa splendeur'), following a visit to my home by my friend and former (admittedly occult) student Pierre Deligne (\*\*). For the first time, I came face to face with L'Enterrement, no longer through the medium of *texts* telling me (in eloquent terms, to be sure!) about the debunking, pillage and massacre of a work, and the burial (in the person of the absent master) of a certain style and a certain approach to mathematics - but this time in a direct and tangible way, with familiar features and a well-known voice, with affable and ingenuous intonations. The Burial was there before me at last, 'in the flesh', under those busy and harmless features that I now recognised, but which for the first time I was looking at with new eyes, a new attention. Here, then, was unfolding before me the man who, in the course of my reflections over the previous months, had revealed himself as the Grand Officiant at my solemn funeral, as the 'Priest in Chasuble' as well as the main architect and the main 'beneficiary' of an unprecedented 'operation', the hidden heir to a work that had been left to be mocked and plundered.... .

This encounter took place at the beginning of the 'third wave' in Récoltes et Semailles, when I had just embarked on the long meditation on yin and yang, in pursuit of an elusive and tenacious association of ideas. At the time, this short episode only left the trace of an echo of a few lines, in passing. But it marked an important moment, the fruits of which would only become clear months later.

There was a second such moment of confrontation at 'L'Enterrement en chair et en os'. It was just ten days ago, and once again, at the last minute, it reignited an investigation that had been going on and on. This time it was a simple phone call to Jean-Pierre Serre (\*). This 'off the cuff' conversation confirmed in a striking way, and beyond all expectations, what (just a few days before) I had just explained to myself at length (\*\*), and almost unwillingly, about the role played by

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(\*) I try to express this difficulty, using the story "The robe of the Chinese Emperor", in the note of the same name (no.° 77<sup>¶</sup> ), and come back to it again in the note "Duty done - or the moment of truth" (no.° 163).

(\*\*) I give an account of this visit in the note I have just quoted (in the previous b. de p. note).

(\*) This conversation is the subject of part e. ("L'Enterrement - ou la pente naturelle") of the note "L'album de famille" (n° 173).

(\*\*) In part c. - ("The one among all - or acquiescence") of the same note (n° 173).

It's all about a 'secret acquiescence' in him to what was happening 'right under his nose', without him pretending to see or feel anything.

Here again, as is only right and proper, the conversation was all 'cool' and friendly, and obviously these friendly dispositions towards me in Serre are also all sincere and genuine. That doesn't alter the fact that this time I was able to really *see*, or 'touch' I would have liked to write, this 'acquiescence' that I had just come to admit to myself; 'secret' no doubt (as I had written earlier) but above all *eager*, as I was then able to see without any possibility of doubt. An eager and unreserved acquiescence, so that what needs to be buried can be buried, and so that, wherever it proves desirable and whatever the *means*, a real and undesirable paternity (which Serre knows at first hand) can be replaced by a fake and welcome paternity...(\*\*\*) This was a striking confirmation of an intuition that had already appeared a year earlier, when I wrote (\*):

"Seen in this light (\*\*), the principal official Deligne appears no longer as the person who has fashioned a fashion in the image of the profound forces that determine his own life and actions, but rather as the designated *instrument* (by virtue of his role as "legitimate heir" (\*\*)) of an unfailingly coherent *collective will*, committed to the impossible task of erasing both my name and my personal style from contemporary mathematics."

If Deligne appeared to me at the time as the designated 'instrument' (as well as the first and main 'beneficiary') of a 'collective will that was unfailingly coherent', Serre now appears to me as *the embodiment* of that same collective will, and as the *guarantor* of its unreserved acquiescence; an acquiescence to all the shenanigans and the 'unquestioning' wills of the people.

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(\*\*\*) This is more or less a quotation from the note "Le Fossoyeur - ou la Congrégation toute entière" (n° 97, page 417).

(\*) This quotation is taken from the same note (see previous footnote), on the same page 417.

(\*\*) "In the light" of the deliberate intention, just mentioned, to eliminate "undesirable" (or even "intolerable", to use the expression used in the note quoted) paternities at all costs.

(\*\*\*) This role of Deligne's "heir" is a role that is both hidden (not a single line of Deligne's work has been published) and a role that can be played by the public.

There is no way he could have learned anything from me), and at the same time clearly felt and accepted by everyone. This is one of the typical aspects of Deligne's double game and of his particular 'style', that he was able to play this ambiguity to masterly effect, cashing in on the advantages of this tacit role of heir, while at the same time disowning the deceased master and taking the lead in large-scale burial operations.

This is true even of countless swindles and even of vast 'operations' of collective mystification and shameless appropriation, as long as they contribute to this 'impossible task' with regard to my modest and deceased person, or with regard to some other (\*\*\*\*\*) who has dared to claim to be me and to pretend, against all odds, to be 'Grothendieck's successor'.

It is one of the paradoxical and disconcerting aspects, among many others in L'Enterrement, that it is the work above all, not to say exclusively, of those who had been my friends or my students, in a world where I had never known any enemies. It is for this reason above all, I believe, that Harvest and Sowing concerns you more than anyone else, and that this letter I am writing to you is intended as a *challenge* in its own right. For if you are a mathematician, and if you are one of those who were my students, or who were my friends, you are undoubtedly no stranger to the Burial, whether by actions or connivance, and if only by your silence towards me, about something that is taking place on your doorstep. And if (extraordinarily) you accept my humble words and the testimony they bear to you, rather than remaining locked behind your closed doors and sending away these unwelcome messengers, you will then perhaps learn that what has been buried by everyone and with your participation (active or by tacit acquiescence) is not only the work of another, the fruit and living testimony of my love affair with mathematics; but that at an even more secret level than this burial (which never says its name...) and at a deeper level, it is the work of another, the fruit and living testimony of my love affair with mathematics....) and more profoundly, it is a living and essential part of your own being, of your original power to know, to love and to create, that you were pleased to bury with your own hands in the person of another.

Of all my students, Deligne had a very special place, which I will expand on at length in the course of this reflection (\*). He was by far the 'closest', and also the only one (pupil or not) to have assimilated intimately and made his own (\*\*) a vast vision that was

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(\*\*\*\*\*) I am thinking here of *Zoghman Mebkhout*, mentioned for the first time in the Introduction, 6 ("L'Enterrement"), then in the note "Mes orphelins" (n° 46), and in the notes (written later, after the discovery of L'Enterrement) "Echec d'un enseignement (2) - ou création et fatuité" and "Un sentiment d'injustice et d'impuissance" (n° s 44<sup>✉</sup> , 44<sup>✉✉</sup> ). I discover the iniquitous process of concealment and appropriation of Mebkhout's pioneering work in the eleven notes that make up Cortège VII de l'Enterrement, "Le Col- loque - ou faisceaux de Mebkhout et Perversité" (n° s 75-80). A more detailed investigation and account of this (fourth and final) 'operation' forms the most extensive part of the investigation 'The Four Operations', under the appropriate title '*The Apotheosis*' (notes n° s 171(i) to 171 ).<sup>4</sup>

(\*) See especially, on this subject, the group of seventeen notes "Mon ami Pierre" (n° s 60-71) in RS II.

had been born and bred in me long before we met. And of all my friends who shared with me a common passion for mathematics, it was Serre, who had at the same time been something of an elder, who was the closest (and also by far), as the one (in particular) who for a decade had played in my work a unique role of 'detonator' for some of my major investments, and for most of the major ideas that inspired my mathematical thinking during the fifties and sixties, up to the moment of my departure. This very special relationship that both of them had with me is not unrelated, of course, to their exceptional resources, which ensured them an equally exceptional influence on the mathematicians of their generation and those that followed. Apart from these points in common, the temperaments and ways of Serre and Deligne seem to me to be as dissimilar as it is possible to be, and in many ways poles apart.

Be that as it may, if there have been mathematicians who, in one way or another, have been 'close' to me and my work (and, what is more, known as such), it is Serre and Deligne: one, an elder and a source of inspiration in my work during a crucial period in the gestation of a vision; the other, the most gifted of my students, for whom I was in turn (and have remained, Burial or not...) his main (and secret...) source of inspiration (\*). . . ) his main (and secret. . . ) source of inspiration (\*). If a Burial was set in motion in the aftermath of my departure (which became a 'death' in due form), and materialised in an interminable procession of 'operations' large and small in the service of the same end, this could only have happened with the combined and closely interdependent con-cours of the one and the other, of the ex-senior and the ex-pupil (see, ex-'disciple') : one taking the discreet and effective lead, while at the same time rallying some of my students (\*\*) who were keen to massacre the *Father* (in the grotesque and derisory guise of a plethoric and bombastic *Supernana*); and the other giving a 'green light' to the project.

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(\*\*) This "vast vision", which Deligne had indeed "intimately assimilated and made his own", had exerted a powerful fascination on him, and continued to fascinate him in spite of himself, while at the same time an imperious force drove him to destroy it, to shatter its fundamental unity and seize the scattered pieces. In this way, his hidden antagonism towards a disowned and 'deceased' master is the expression of a division in his being, which profoundly marked his work after my departure - a work that fell far short of the quite prodigious resources I had known him to have.

(\*) See previous b. de p. note on this subject.

(\*\*) These are exactly the five other students who chose cohomology of varieties as their main theme (like Deligne).

unreservedly, unconditionally and without limit to the continuation of the (four) operations (of slaughter, carnage, butchering and sharing of an inexhaustible corpse...).

### 9. Stripping.

As I've already hinted at, I had to overcome considerable internal resistance, or rather to overcome it through patient, meticulous and tenacious work, in order to succeed in separating myself from certain familiar, solidly based images of considerable inertia, which for decades had taken the place of a direct and nuanced perception of reality - in this case, that of a certain mathematical world, to which I continue to be linked by a past and a body of work. One of the most deeply rooted of these images, or preconceived ideas, is that it seems out of the question for a scientist of international renown, or even a man who is considered a great mathematician, to be able to afford (if only on an exceptional basis, and even less so as a habit...) if he refrains (again out of old habit) from dipping his hand in it himself, let him nevertheless welcome with open arms such operations (defying all sense of decency, at times) set up by another, and where, for one reason or another, he finds his profit. This inertia of the mind has been such for me, and that was less than two months ago, at the end of a long process of reflection that had already lasted a whole year, that I came to glimpse timidly that Serre might also have had something to do with this Burial - something that now seems obvious to me, even independently of the eloquent conversation I had with him recently. As with all the members of the 'Bourbaki milieu' that had welcomed me so kindly in my early days, and particularly in his case, there was for me a kind of unspoken 'taboo' around his person. He represented the very embodiment of a certain 'elegance' - an elegance that was by no means limited to form, but also included rigour and scrupulous probity. Before I discovered L'Enterrement on 19 April last year, it would never have occurred to me, even in a dream, that any of my students would be capable of dishonesty in the exercise of their profession, whether towards me or anyone else; and it was for the most brilliant of them, the one who had been closest to me, that such a supposition would have seemed the most aberrant! And yet, from the moment I left and throughout the years that followed, right up to the present day, I have had ample opportunity to make the most of this opportunity.

sion to realise just how divided his relationship with me was. More than once, too, I saw him use (for the sheer pleasure of it, it seemed) the power to discourage and humiliate, when the occasion was right. Each time I was deeply affected (more, no doubt, than I would have liked to admit to myself...). These were quite eloquent signs of a deep-seated disturbance, which (I had also had ample opportunity to observe) was by no means confined to him alone, even in the most limited circle of those who had been my pupils. Such a disturbance, through the loss of respect for the person of others, is no less flagrant and no less profound than that which manifests itself in what is called 'professional dishonesty'. Nevertheless, the discovery of such dishonesty came as a complete surprise and shock to me.

In the weeks that followed this breathtaking revelation, followed by a whole 'cascade' of others of the same kind, I gradually came to realise that a certain amount of scheming among some of my students (\*) had already begun in the years leading up to my departure. This was particularly obvious in the case of the most brilliant of them - the one who, after I left, set the tone and (as I wrote earlier) 'took the discreet and effective lead'. With the benefit of almost twenty years' hindsight, this shenanigans now seem obvious to me - it was 'plain to see'. While I chose to turn a blind eye to what was going on, all in pursuit of the 'white whale' in a world 'where all is order and beauty' (as I liked to imagine it), I realise today that I was unable to assume the responsibility that fell to me at the time, with regard to pupils learning from me a profession that I love; a profession which is more than just a skill, or the development of a certain 'flair', by indulging brilliant pupils whom I was pleased (by tacit decree) to treat as 'beings apart' and above suspicion, I contributed my share (\*\*) to the corruption (unprecedented, it seems to me) which I see spreading today in a world and among people who were dear to me.

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(\*) See previous b. de p. note.

(\*\*) This "contribution" appears in particular in the note "L'être à part" (n° 67<sup>✉</sup>), as well as in the two notes "L'ascension" and "L'ambiguité" (n° s 63<sup>✉</sup>, 63<sup>✉✉</sup>), and again (in a slightly different light) at the end of the note "L'éviction" (n° 169<sub>1</sub>). Another type of "contribution" appears in "Fatuity and Renewal", with attitudes of fatuity towards less brilliantly gifted young mathematicians. This awareness of a share of the responsibility for a general decline culminates in the section entitled "La mathématique sportive" (n° 40).

Admittedly, in view of their immense inertia, it took intense and sustained work to separate myself from what we usually call 'illusions' (not without a hint of regret... ), which I would rather call ready-made ideas about myself, about an environment with which I had once identified, about people I loved and perhaps still love - to 'shed' these ideas, or rather, to *let them detach themselves from me*. It's been hard work, yes, but never a struggle - work that has brought me, among many other valuable things, moments of sadness at times, but never a moment of regret or bitterness. Bitterness is one of the ways of evading knowledge, of evading the message of an experience; of maintaining oneself in a certain tenacious illusion about oneself, at the cost of another 'illusion' (in negative, as it were) about the world and about others.

It's without bitterness or regret that I see these ready-made ideas that had been 'dear' to me, out of old habit and because they'd been there 'forever', detached from me one by one, like so many cumbersome, even crushing, weights. They had certainly become second nature to me. But this 'second nature' is not 'me'. Separating myself from them piece by piece is not a wrench, or even a frustration, for someone who would see himself stripped of things that are precious to him. The 'stripping' of which I speak comes as the reward and fruit of *labour*. Its sign is an immediate and beneficial relief, a welcome *liberation*.

#### 10. Four waves in one movement.

As you'd expect, this letter is not at all what I had planned when I set out to write it. The main thing I wanted to do in it was to give a little 'rundown' on the funeral: here's what happened in broad outline, you may or may not believe me (I found it hard to believe myself. . . ), but that's what happened. ), but that's what it is, unmistakable, even, whether you like it or not, published in black and white in such and such a periodical or book, on such and such a date, on such and such a page, all you have to do is look - besides, everything is broken down in detail in *Récoltes et Semailles*; see '*Quatre Opérations*' such notes - take them or leave them! And if you prefer not to read me, others will do it for you... . In the end, none of this happened - and yet this letter is already at the thirty-page mark, although I had planned on five or six pages in all. Unintentionally, these are the essential things I've been led to tell you, as the pages go by, while this 'bag' that I've been so impatient to empty (right there in plain sight, on the first few pages!), it still hasn't been unpacked! It doesn't even tickle my fancy any more!

dissipated along the way. I realised that this was not the place. . .

To tell the truth, Part IV of Harvest and Sowing (and the longest of all), called 'Burial (3)' or 'The Four Operations', is the result of a 'note' originally intended as a 'little primer', just to sum up the broad outlines of what was revealed to me in last year's surprise (and whirlwind) investigation, continued in Part II ('Burial (1)', or 'The robe of the Chinese Emperor'). I thought it would be a 'note' of five or ten pages, no more. In the end, one thing led to another, and the investigation went on for nearly four hundred pages - almost double the amount I was supposed to summarise or assess! As a result, the little piece of information in question is still missing, even though six hundred pages of Harvest and Sowing are devoted to the investigation into the Burial. It's a bit silly, it's true. But there will always be time to add it in a third part to the Introduction (which is no more than ten or twenty pages long), before I hand over my notes to a printer.

The five parts of Récoltes et Semailles (the last of which is not yet finished, and probably won't be for a few months) represent an alternation of (three) waves of 'meditation' and (two) waves of 'investigation'. It's like a shortened reflection of my life over the last nine years, which has also consisted of alternating 'waves' arising from the two passions that now dominate my life, the passion for meditation and the passion for mathematics. And to tell the truth, the two parts (or 'waves') of Harvest and Sowing that I've just called 'investigation' are precisely those that arose directly from my roots in my past as a mathematician, driven by the mathematical passion in me and by the egotistical attachments that took root in it.

The first wave, 'Fatuity and Renewal', is an initial encounter with my past as a mathematician, leading to a meditation on my present, which I have just discovered is rooted in that past. Without it having been the least bit premeditated, this part certainly sets the 'basic tone' for the whole of the rest of Récoltes et Semailles. It is like an inner preparation, providential and indispensable, for the discovery of 'L'Enterrement dans toute sa splendeur' (Burial in all its splendour) which follows it closely in the second wave, 'L'Enterrement (1) - ou la robe de l'Empereur de Chine' (Burial (1) - or the robe of the Chinese Emperor). More than an 'investigation', in fact, this is the story of this day-to-day *discovery*, of its impact on my being, of my efforts to face up to what was tumbling down on me without warning, to manage to situate the unbelievable in terms of my experience, of what ended up becoming familiar to me, the ren-

to make it intelligible as best we can. This movement led to a first provisional outcome, in the note "The Gravedigger - or the whole Congregation" (n° 97), a first attempt to discern an explanation and a *meaning* in something which, for years already and now more acutely than ever, had taken on the appearance of a formidable challenge to common sense!

This same second movement also led to an 'episode of illness' (\*), forcing me to take absolute rest and putting an end to all intellectual activity for more than three months. This was at a time when I thought I was once again on the verge of completing Harvest and Sowing (apart from a few final 'housekeeping' tasks). When I returned to normal activity towards the end of September last year, and was about to put the finishing touches to my notes that had been left in shambles, I still thought I had two or three final notes to add, including one about the 'health incident' I'd just been through. In fact, week after week and month after month, another thousand pages were added - more than double what had already been written - and this time it's quite clear that I still haven't finished (\*)! In fact, this long interruption, during which I had practically lost contact with a substance that was hot (and even burning!) when I left it, practically forced me to return to this substance with new eyes, if I didn't want to limit myself to foolishly 'wrapping up' the last part of a 'programme' with which I had lost living contact.

Thus was born the third wave in the vast movement that is Récoltes et Se-mailles - a long 'wave-meditation' on the theme of yin and yang, the 'dark' and 'light' sides of the dynamics of things and of human existence. Stemming from a desire for a deeper understanding of the profound forces at work in the Burial, this meditation nevertheless acquires its own autonomy and unity from the outset, and focuses from the outset on what is most universal, as well as on what is most intimately personal. It was in the course of this meditation that I discovered this thing (which is actually quite obvious, if you ask me), that in my spontaneous approach to the discovery of things, whether in mathematics or elsewhere, the 'basic tone' is 'yin', 'feminine'; and also that the 'basic tone' is 'yin', 'feminine'.

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(\*) This episode is the subject of two notes, "The incident - or body and mind" and "The trap - or ease and exhaustion" (n° s 98, 99), which open "Cortège XI" entitled "The deceased (still not dead)".

(\*) "Still not finished" - if only because there is still a part V to come, which is not yet finished. completed at the time of writing.

and above all, that, contrary to what happens most often, I have remained faithful to this original nature within me (\*\*), without ever bending or correcting it to conform to the dominant values in vogue in the surrounding environment. This discovery seemed to me at first to be a simple curiosity. It is only gradually, however, that it reveals itself as an essential key to an understanding of L'Enterrement. Moreover - and this is something that seems to me of even greater significance - I now see very clearly and without any residue of the slightest doubt this: that if, with intellectual gifts that are by no means exceptional, I have nonetheless constantly been able to give my full measure in my mathematical work, and to produce a work and a vision that are vast, powerful and fertile, it is to nothing other than this fidelity that I owe it, to this absence of any concern to conform to standards, thanks to which I abandon myself with total confidence to the original impulse for knowledge, without cutting it down or amputating anything that gives it its strength and finesse and its undivided nature.

However, it is not creativity and its sources that are the focus of attention in this meditation "Burial (2) - or The Key to Yin and Yang", but rather "conflict", the state in which creativity is blocked or creative energy is dispersed by the clash of antagonistic (usually occult) forces in the psyche. The aspects of *violence*, of (seemingly) 'gratuitous' violence, 'for its own sake', had disconcerted me more than once in Burial, and brought back a host of similar experiences. The experience of this violence was in my life like "the hard, irreducible core of the experience of conflict". Never before had I confronted the formidable mystery of the very existence and universality of this violence in human existence in general, and in my own in particular. It is this mystery that is the focus of attention throughout the second half (the 'yin' or 'decline' side) of the meditation on yin and yang. It is during this part of the meditation that a deeper vision of the meaning of the Burial, and of the forces that are expressed in it, gradually emerges. This is also the part of Harvesting and Sowing that was the most fruitful, it seems to me, in terms of knowledge of

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(\*\*) This 'fidelity to my original nature' was by no means total. For a long time, it was confined to my mathematical work, while everywhere else, and particularly in my relationships with others, I followed the general trend of valuing and giving primacy to the traits in me that were felt to be 'virile', and repressing the 'feminine' traits. This is discussed in some detail in the group of notes entitled 'The story of a life: a cycle in three movements' (n° 107-110), which practically opens the Key to Yin and Yang.

by bringing me into contact with sensitive issues and situations, and by making me feel this very 'sensitive' character, which until last year had remained elusive.

Once I'd finished this interminable 'digression' on yin and yang, I was still left, more or less, with my 'two or three notes' to write (plus one or two others, at most, one of which already had its ready-made name 'The Four Operations'...), to finish with Harvest and Sowing. We know the rest: these "last few notes" ended up being the longest part of *Récoltes et semailles*, at nearly five hundred pages. So this is the "fourth wave" of the movement. It is also the third and final part of *L'Enterrement*, and I have given it the name '*Les Quatre Opérations*', which is also the name of the group of notes ('*Les quatre opérations (sur une dépouille)*') that forms the heart of this fourth breath of reflection. This, in *Récoltes et Semailles*, is the 'investigation' part in the strictest sense of the term - with the added twist, however, that this investigation is not limited to the purely 'technical' aspect, to the 'detective' aspect in short, but that the reflection here is driven above all, as everywhere else in *Récoltes et Semailles*, by the desire to know and understand. The tone is more 'muscular' than in the first part of *Burial*, where I was still rubbing my eyes and wondering if I was dreaming or what! That said, the facts uncovered in the course of the pages are often very timely, illustrating many things that had only been touched on here and there, without being embodied in precise and striking examples. It is also in this part that the mathematical digressions take on an important role, stimulated by renewed contact (by the necessities of the investigation) with a substance that for fifteen years I had lost sight of. There are also, at the other end of the spectrum, first-hand accounts of the misadventures of my friend Zoghman Mebkhou (to whom this part is dedicated), at the hands of a high-flying and unscrupulous 'mafia', which he had not dreamt of when he embarked on the (admittedly fascinating, and seemingly innocuous) subject of the cohomology of varieties of all kinds. For a brief guide through the intricate maze of notes, sub-notes, sub-sub-notes... of this whole 'investigation' section, I refer you to the table of contents (notes 167<sup>✉</sup> to 1767), and to the first of the notes in the package, 'Le détective - ou la vie en rose' (n° 167<sup>✉</sup>). I would like to point out, however, that this note, dated 22 April, was then somewhat 'overtaken by events', since, from one twist to another, this investigation, which I then thought had been (practically) brought to a conclusion, continued on its merry way for another two months.

This fourth breath lasted more than four months in a row, from mid-February to the end of June. It was in this part of the reflection in particular, through meticulous and obstinate 'work on parts', that I gradually established, over the days and pages, a concrete, tangible contact with the reality of L'Enterrement; that I managed to 'familiarise' myself with it, in short, to some extent, notwithstanding the visceral reactions of rejection that it had aroused (and continues to arouse) in me, standing in the way of a true acquaintance. This long reflection began with a retrospective on Deligne's visit (already mentioned in this letter), and ended with a 'last minute' reflection on my relationship with Serre and on Serre's role in L'Enterrement (\*). It was to have tacitly put Serre 'off the hook', in favour of that 'taboo' I have already mentioned, which now seems to me perhaps the most serious flaw left in my understanding of the Burial, until last month - and it's this 'last-minute' reflection that now seems to me to be the most important thing that this 'fourth breath' of Harvested and Sown has given me, for a less tenuous, more fleshed-out apprehension of Burial and the forces that express themselves in it.

#### 11. Movement and structure.

I think I've covered the most important things I wanted to say to you about Harvest and Sowing, so that you already know 'what it's about'. I'm sure I've said more than enough to enable you to judge whether or not you consider that the letter of (more than) a thousand pages that follows 'concerns' you - and, consequently, whether or not you're going to continue reading. If the answer is 'yes', I think it would be useful to add a few more explanations (of a practical nature, in particular) about the *form* of Harvest and Sowing.

This form is the reflection and expression of a certain *spirit*, which I've tried to convey.

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(\*) In parts c., d. e. of the note "L'album de famille" (n° 173), the last of which is dated 18 June (exactly ten days ago). There is only one note or part of a note with a later date (namely, "Five theses for a massacre - or filial piety", n° 176<sub>7</sub>, dated the following day, 19 June). You will note that in this fourth part of Récoltes et Semailles, or "investigation part", unlike the others, the notes often follow each other in a logical rather than chronological order. For example, the last two notes of the Burial (forming the final 'De Profundis') are dated 7 April, two and a half months before the note I have just quoted. I would point out, however, that apart from the 'investigation' part of the Burial itself (3) (notes n° s 167<sup>2</sup> -176<sub>7</sub> ), forming the 'fifth part' of the funeral ceremony (of which the Key of Yin and Yang is the second), the notes follow each other in the order in which they were written, with rare exceptions.

in the preceding pages. Compared with my previous publications, if there is one new quality that appears in *Récoltes et Semailles*, and also in '*À la Poursuite des Champs*' from which it springs, it is undoubtedly *spontaneity*. Admittedly, there are common threads and major questions that give coherence and unity to the whole reflection. However, this process continues from day to day, with no pre-established 'programme' or 'plan', and no question of me ever setting out in advance 'what needed to be demonstrated'. My aim is not to demonstrate, but to *discover*, to penetrate further into an unknown substance, to condense what is still only sensed, suspected or glimpsed. I can say, without any exaggeration really, that in this work, there has not been a single day or night of reflection that has taken place in the field of the 'foreseen', in terms of the ideas, images, associations that were present when I sat down in front of the blank sheet of paper, to obstinately pursue a tenacious 'thread', or to take up another that had just appeared. Each time, what appears in the reflection is *different from* what I would have been able to predict, had I ventured to try and describe in advance as best I could what I thought I saw before me. More often than not, reflection takes paths that are entirely unforeseen at the outset, leading to new and equally unforeseen landscapes. But even if it sticks to a more or less planned itinerary, what the journey reveals to me as the hours go by is as different from the image I had when I set off as a real landscape, with its play of cool shadows and warm light, its delicate perspective changing with the hiker's footsteps, and its countless sounds and nameless scents carried by a breeze that makes the grasses dance and the trees sing... . - that such a living, elusive landscape is different from a postcard, however beautiful and successful, however 'just' it may be.

It is the reflection carried out in one go, over the course of a day or a night, that constitutes the undivided unit, the living, individual cell, as it were, in the whole of the reflection (*Harvest and Sowing*, in this case). It is to each of these units (or these 'notes' (\*), forming a melody...) what the body of a living organism is to each of its individual parts.

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(\*) Originally, when I wrote *Fatuité et Renouvellement*, the name 'note' was synonymous with 'annotation', playing the role of a footnote. For reasons of typographical convenience, I preferred to leave these annotations to the end of the text (notes 1 to 44, pages 141 and 171). One of the reasons for this was that some of these 'notes' or 'annotations' extend over one or more pages, and become longer even than the text they are supposed to comment on. As for the undivided 'units' of the 'first draft' of the reflection, for want of a better name I called them 'sections' (less off-putting than 'paragraphs'!).

This situation, and the structure of the text, changes with the next part, which was initially called

individual cells of infinite diversity, each fulfilling a place and a function that belongs to it alone.

Sometimes, however, in a single reflection that has been pursued in one go, we notice afterwards that there are significant breaks, which make it possible to distinguish several such units or messages, each of which then receives its own name and thus acquires its own identity and autonomy. At other times, on the other hand, a thought that had been cut short for one reason or another (usually fortuitous) is spontaneously extended the next day or the day after that; or a thought that was pursued over two or more consecutive days appears, in retrospect, as if it had been pursued in one go; it seems as if only the need to sleep has obliged us, unwillingly, to include some of our thoughts.

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"L'Enterrement", which became "L'Enterrement (1)" (or "La robe de l'Empereur de Chine"). This reflection was followed by the double-note "Mes orphelins" and "Refus d'un héritage - ou le prix d'une contradiction" (notes n° s 46, 47, pages 177, 192), annotating the final "section" of Récoltes et Semailles (or rather, of what was to become its Part I, or Fatuité et Renouvellement), "Le poids d'un passé" (n° 50, p. 131). Subsequently, other annotations were added to this same section (notes n° s 44<sup>2</sup> and 50), and still other notes were added as annotations to 'My orphans', which in turn gave rise to new annotating notes; not to mention, this time, real footnotes, when the planned annotations were (and remained, once they were put in black and white) of modest dimensions. So, theoretically, this whole part of Récoltes et Semailles (which was then supposed to constitute the second and final part) appeared as a set of 'notes' to the 'Weight of a past' 'section'. As a result of acquired inertia, this subdivision into 'notes' (instead of 'sections') was maintained in the following three parts, where I use both the footnote (when its size allows) and the subsequent note referred to in the text as a means of annotating a 'first draft' of the reflection.

Typographically, the 'note' is distinguished from the 'section' (used in RS I as the basic unit of the 'first draft' of the reflection) by a sign such as (¹ ), (² ) etc (including the number of the note placed between brackets and 'in the air', following a widespread usage for references to annotations), placed either at the beginning of the note in question, or as a reference to the appropriate place in the text which refers to it. The sections are designated by Arabic numerals from 1 to 50 (excluding unpleasant subscripts and superscripts, as I have had to use for the notes, for practical reasons). Having said that, it can be said that there is no essential difference between the function of the 'sections' in the first part of Harvest and Sowing, and that of the 'notes' in the later parts. The comments I make about this function in this part of my letter ('Spontaneity and structure') apply equally well to the 'sections' of RS I, even though I use the common noun 'notes'.

For further details and conventions, in particular concerning the reading of the table of contents of L'Enterrement (1), I refer you to the Introduction, 7 (The Ordering of Funerals), and in particular pages xiv- xv.

(physiological) caesura, marked only by a lapidary indication of the date (or even by several dates) between consecutive paragraphs of the "note" in question, which is then distinguished as such by a single name.

So each of the notes in *Récoltes et Semailles* has its own individuality, a face and a function that distinguish it from any other. For each one, I have tried to express its own particularity by its *name*, which is supposed to convey or evoke the essence, or at least something essential, of what it 'has to say'. I recognise each of them by their name, and it's by that name that I call them whenever I need their help.

Often the name has presented itself to me spontaneously, before I've even thought about it. Its sudden appearance tells me that the note I'm still writing is about to be finished - that it has said what it had to say by the time I finish the paragraph I'm writing.... . Often the name appears, just as spontaneously, as I reread the notes from the day before or the day before, before continuing my thoughts. Sometimes it changes a little in the days or weeks following the appearance of the new note, or it takes on a second name that I hadn't thought of at first. Many notes have a double name, expressing two different, sometimes complementary, perspectives on their message. The first of these double-names that presented itself to me, right from the start of "*Fatuité et Renouvellement*", was "*Rencontre avec Claude Chevalley - ou liberté et bons sentiments*" (n° 11).

Only twice have I already had a name in my head before starting a note - and both times, moreover, it was jostled by what happened next!

It is only with the benefit of hindsight, hindsight of weeks or even months, that an *overall movement* and *structure* emerges in the set of notes that follow one another from day to day. I've tried to capture both through various groupings and sub-groupings of notes, each with its own name, which gives it its own existence and its own function or message; a bit like the organs and limbs of the same body (to use the image from earlier), and such and such parts of its limbs. Thus, in 'the Whole' of Harvest and Sowing, there are the five 'parts' that I have already mentioned, each of which has its own structure: Fatuity and Renewal is grouped into eight 'chapters' I to VIII (\*), and the three parts that make up the 'Whole' of Harvest and Sowing are grouped into two 'chapters' (\*).

the Burial (which also gradually became clearer over the months...) is made up of a long and solemn Procession of twelve "*Cortèges*" I to XII. The last of these, or rather the '*Funeral Ceremony*' (that's what it's called) towards which the previous eleven Cortèges were heading (without really suspecting anything, surely...It takes up almost the whole of RS III (L'Enterrement (2)) and the whole of RS IV (L'Enterrement (3)), with its nearly eight hundred pages and one hundred and fifty notes (although initially this famous ceremony was only intended to contain two!). Conducted deftly (and with his well-known modesty...) by the Grand Officiant himself, the ceremony continues in nine separate 'beats' or liturgical acts, opening with the *Funeral Eulogy* (as one might have expected) and ending (as it should) with the final *De Profundis*. Two other of these 'times', one called '*The Key of Yin and Yang*', the other '*The Four Operations*', each constitute (by far) the largest part of the part (III or IV) of Harvest and Sowing into which it is inserted, and indeed give their name to the latter.

Throughout Harvest and Sowing, I have taken care (as if it were the apple of my eye!) of the table of contents, constantly reworking it to take account of the ever-renewed influx of unforeseen notes (\*), and to make it reflect as accurately as I could the overall movement of thought and the delicate structure that emerges. It is in parts 3part and especially IV (just mentioned), '*The Key*' and '*The Four Operations*', that this structure is at its most complex and interwoven.

In order to preserve the spontaneous nature of the text, and the unexpected aspects of the reflection as it unfolded and was actually experienced, I did not want to preface the notes with their names, which in each case only appeared after the fact. This is why I advise you, at the end of each note, to refer to the table of names.

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(\*) In Futility and Renewal, I occasionally refer to these chapters as 'parts' of Harvest and Sowing, not to be confused, of course, with the five parts already mentioned, which only appeared later.

(\*) These unforeseen notes include those "taken from a footnote which has taken on prohibitive dimensions". Most often, I have placed it immediately after the note to which it refers, giving it the same number with a superscript<sup>1</sup> or<sup>2</sup>, or even<sup>3</sup> if necessary - which avoids the prohibitive task of having to renumber all the subsequent notes already written at the same time! These notes, taken from one footnote to another, are preceded in the table of contents by the sign ! (at least in L'Enterrement (1)).

to learn what the note is called; and also, on occasion, to be able to see at a glance how it fits in with what you're already thinking, or even with what's still to come. Otherwise you run the risk of getting hopelessly lost in a seemingly indigestible and heterogeneous collection of notes whose numbering is sometimes bizarre, not to say off-putting (\*); like a traveller lost in a foreign city (pushed there strangely at the whim of generations and centuries. . . .), without a guide or even a guidebook. ), without a guide or even a map to help you find your way (\*\*).

## 12. Spontaneity and rigour.

Spontaneity and rigour are the two 'shadow' and 'light' sides of the same undivided quality. It is only by marrying them that that particular quality of a text, or of a being, is born, which we can try to evoke by an expression like 'quality of truth'. If in my past publications spontaneity has been (if not absent, then at least) at a minimum, I don't think that its late blossoming in me has made me any less rigorous. Rather, the full presence of its yin companion gives rigour a new dimension, a new fruitfulness.

This rigour is exercised in relation to itself, ensuring that the delicate 'sorting' it has to do in the multitude of things that pass through the field of consciousness, to constantly decant the significant or essential from the incidental or accessory, does not thicken and congeal into automorphisms of censorship and complacency. Only curiosity, only our thirst for knowledge, can awaken and stimulate such vigilance without heaviness, such liveliness, in contrast to the immense, omnipresent inertia of the (so-called) 'natural slopes', carved out by ready-made ideas, expressions of our fears and conditioning.

And this same rigour, this same vigilant attention is also directed towards spontaneity as towards what takes on the aspects of spontaneity, in order to distinguish, here again, between these 'slopes', which are certainly all natural, and what truly springs from the deepest layers of being, from the original impulse for knowledge and action, leading us to the 'new'.

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(\*) For the rationale behind such numbering, which at times may seem bizarre, I refer you to the previous footnote to this inexhaustible letter.

(\*\*) In the manuscript intended for printing, I intend to include the names of the "chapters" throughout the text.

and other groupings of notes and sections, to the exclusion of the notes (or sections) themselves. But even then, I feel it is essential to have occasional recourse to the table of contents, so as not to get lost in a jumble of hundreds of notes, following each other like a tail over more than a thousand pages...

meeting the world.

When it comes to writing, rigour manifests itself in a constant concern to use language to define as precisely and as faithfully as possible the thoughts, feelings, perceptions, images, intuitions... to express, without being content with a vague or approximate term where the thing to be expressed has clear-cut contours, or with a term of artificial precision (and therefore just as distorting) to express something that remains shrouded in the mists of what is still only sensed. When we try to capture it as it is in the moment, and only then, does the unknown thing reveal its true nature to us, perhaps even in the full light of day, if it is made for day and our desire prompts it to strip itself of its veils of shadow and mist. Our role is not to pretend to describe and fix what we do not know and what escapes us, but to humbly, passionately take note of the unknown and the mystery that surround us on all sides. In other words, the role of writing is not to record the results of a search, but rather the very process of the search - the labours of love and the works of our love for Our Mother the World, the Unknown One, who unceasingly calls us to Her in order to get to know Her again in Her inexhaustible Body, wherever in Her the mysterious ways of the desire.

In order to achieve this process, the backtracking, which qualifies, clarifies, deepens and sometimes corrects the "first draft" of the writing, or even a second or third, is part of the very process of discovery. They form an essential part of the text and give it meaning. This is why the 'notes' (or 'annotations') placed at the end of *Fatuité et Renouvellement*, and referred to here and there throughout the fifty 'sections' that make up the 'first draft' of the text, are an inseparable and essential part of it. I strongly advise you to refer to them as you go along, and at least at the end of each section where there are one or more references to such 'notes'. The same applies to the footnotes in the other parts of *Harvest and Sowing*, or to the references in a given 'note' (here constituting the 'main text') to a subsequent note, which then acts as a 'return' to it, or as an annotation. This, along with my advice not to separate yourself from the table of contents, is the main reading recommendation I have for you.

One last, practical question, which will bring this letter to a close (somewhat prosaically). There has been a bit of 'panic' at times, to prepare the various

Harvest and Sowing booklets for printing by the Duplication Department at the University, in time for the printing to take place (if possible) before the summer holidays. In the rush, there's a whole sheet of last-minute footnotes, to be added to fascicule 2 (*L'Enterrement* (1) - or *La robe de l'Empereur de Chine*), which was 'skipped'. It was mainly a matter of rectifying certain material errors that had only recently come to light in the course of writing *The Four Operations*. One of these footnotes is more substantial than the others, and I'd like to mention it here. It is an annotation to the note '*La victime - ou les deux silences*' (n° 78<sup>2</sup>, page 304). This note, in which I tried, among other things, to set out my impressions (all subjective, admittedly) of the way in which my friend Zoghman Mebkhou 'internalised' at that time the iniquitous spoliation of which he was the victim, was felt by him to be unfair to him, whereas I seemed almost to be putting him 'in the same bag' with his spoliators. What is certain is that in this note, which does not claim to give anything other than impressions linked to a particular 'moment', I am only presenting one sound of the bell, leaving in the dark (and as a matter of course, no doubt) certain other sounds that are just as real (and less debatable perhaps). The fact remains that the reflection on this delicate subject is considerably deepened, a year later, in the note '*Racines et Solitude*' (n° 171<sub>3</sub>). Zoghman had no reservations about it. Further food for thought on this same subject can also be found in the two notes "*Trois jalons - ou l'innocence*", and "*Les pages mortes*" (n° s 171 (x) et (xii)). These three notes form part of '*L'Apothéose*', which is the part of *Quatre Opérations* devoted to the appropriation and misappropriation of Zoghman Mebkhou's work.

All that's left for me to do is to wish you happy reading - and I look forward to reading you too!

Alexandre Grothendieck

## Postscript epilogue - or the context and prerequisites of a debate

February 1986

### 13. The bottle spectrograph.

It's been a full seven months since this Letter was written, and nearly four months since it was sent, with the 'paving stone' that goes with it. And with a dedication from me in each one(\*). Like a 'bottle in the sea', or rather, like a whole flock of such wandering bottles, my message landed and circulated in the remotest corners of this mathematical microcosm with which I was once familiar. And through the direct and indirect echoes that have come back to me over the days, weeks and months, I find myself unexpectedly in front of a vast X-ray of the mathematical milieu, taken by a tentacular spectrograph, of which my innocent 'bottles' are so many travelling antennae. So (noblesse oblige!), even though I have plenty to keep me busy, I find myself faced with the new task of deciphering the radio and reporting, as best I can, on what I have read there. This will be the sixth (and last, I promise!) part of Harvest and Sowing. This will be the crowning achievement, God willing, of 'the great sociological work of my old age'. For the moment, a few initial comments.

When it comes to welcoming my modest, very home-made flotilla, what seems to dominate by far is the half-scowling, half-snarky tone, along the lines of "here's Grothendieck becoming paranoid in his old age", or "here's one who takes himself very seriously" - and there you have it! However, I've only had one letter in that style(\*\*), plus two more in the vein of muted, self-satisfied derision(\*\*\*). Most of the mathematicians I wrote to, including some of my former students, were silent(\*\*\*\*) - a silence that speaks volumes to me.

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(\*) There are a few rare exceptions, mainly colleagues I don't know personally, who only received issues 0 and 4 of the provisional print run, as a bonus for their active participation in my Funeral.

(\*\*) This letter comes from one of my former students, and also one of my co-internees.

(\*\*\*) From two of my former work colleagues at Bourbaki, one of whom is one of the elders who gave me a warm welcome when I first started out,

(\*\*\*\*) For one hundred and thirty-one mailings to mathematicians, there have so far been fifty-three of them. the recipients who gave some sign of life, even if only to acknowledge receipt. These include six of my ex-students - I haven't heard from any of the other eight.

That doesn't prevent me from having already had a voluminous correspondence. Most of the letters are in tones of polite embarrassment, which is often intended to be friendly, as if for the sake of propriety. Two or three times I have felt, behind this embarrassment and as if filtered by it, the warmth of a feeling that is still alive. More often than not, when the embarrassment isn't expressed in protestations of good feeling (on one's own behalf, or on behalf of others), it's in compliments - I've never received so many in my life! To the tune of 'great mathematician', 'superb pages' (on creativity 'and all that'), 'indisputable writer', and so on. For good measure, I even received a heartfelt (and in no way ironic) compliment on the richness of my inner life. Needless to say, in all these letters, my correspondent is careful not to go into the heart of any matter, and even less, to get personally involved; the tone is more that of someone who has been 'asked to give his opinion' (to use the words of one of these letters), on a rather scabrous and what is more, hypothetical or even imaginary affair, and in any case and above all, one that does *not concern him personally*. When he does pretend to touch on one of these issues, it's with his fingertips and to keep it as far away from him as he can - whether it's with the help of some good advice I've given, or with cautious conditionals, or with the usual platitudes when you don't really know what to say, or in any other way. Even so, some people have suggested that there *may have been* some not-so-normal things going on - while taking care to leave it as vague as possible as to what and who they are.... .

I also had some frankly warm feedback from fifteen or sixteen of my old and new friends. Some of them expressed emotion, with no desire to hide it or keep it quiet. These echoes, and others just as warm from outside the mathematical world, will have been my reward for a long and solitary work, done not only for myself, but for everyone.

And of the hundred and thirty or so colleagues who received my letter, three responded, in the full sense of the word, by getting involved themselves, rather than confining themselves to a distant commentary on the events of the century. I received yet another such response from a non-mathematician correspondent. These were real *responses* to my message. And that too was my greatest reward.

#### 14. Three feet in one dish.

Many of my mathematician colleagues and friends have expressed the hope that *Récoltes et Semailles* will open up a wide-ranging *debate* in the mathematical community on the state of morality in this milieu, on the ethics of the mathematician, and on the meaning and purpose of his work. For the moment, the least we can say is that this is not happening. As of now (and to make the pun intended) the debate on a funeral looks set to be replaced by the burial of a debate!

However, whether we like it or not, and despite the silence and apathy of many, a debate is well and truly underway. It is unlikely that it will ever take on the scale of a real public debate, or even (heaven forbid!) the pomp and stiffness of the 'official' debate. In any case, many people have already jumped the gun, shutting it down in their own minds before even reading about it, on the strength of the eternal and unchanging consensus that 'everything is for the best in the best of all worlds' (mathematics, in this case). Perhaps, however, a challenge will eventually come *from the outside*, progressively, from 'witnesses' who, not being part of the same milieu, are not prisoners of the group consensus, and who therefore do not feel (even in their heart of hearts) personally challenged.

In almost all the feedback I've received, I've noticed the same confusion over the two preliminary questions: *what does* the 'debate' posed (at least tacitly) by *Récoltes et Semailles* concern; and *who is* qualified to take cognisance of it and give an opinion on it, or else: to form an opinion in full knowledge of the facts. In this connection, I would like to highlight *three 'reference points'*. Of course, this will not prevent those who want to remain confused from continuing to do so. At least, for those who would like to know what it's all about, perhaps it will help them not to be distracted by the all-out noise (including even the best-intentioned...).

a) Some sincere friends assure me that "everything will be sorted out in the end" (where "everything", I imagine, means "things" that have been badly damaged...); that all I had to do was make my comeback, "make my mark with new work", give lectures etc - and the others would do the rest. We'll generously say, 'We've been a bit unfair with that damned Grothendieck', and discreetly rectify the situation with varying degrees of conviction(\*); or even pat him on the shoulder with a paternal air and give him the 'great mathematician', and so on.

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(\*) I have already noticed several such discreet signs, showing that the lion has woken up. ...

The squid is a respectable fellow, who unfortunately pretends to be annoyed and to make unwanted waves.

It's not a question, as my friends suggest, of 'letting go' or getting people to let go. For my part, I have no need of compliments or even sincere admirers, and no need of 'allies', for 'my' cause or for any cause whatsoever. It's not about me, who's doing just fine, nor about my work, which speaks for itself, even to the deaf. If this debate also concerns, among others, my person and my work, it is simply as *revelations* of something else, through the reality of a Funeral (most revelatory indeed).

If there is 'someone' who seems to me to inspire a sense of alarm, concern and urgency, it is by no means myself, nor even any of my 'co-interred'. But it is a collective being, both elusive and very tangible, which is often talked about but never examined, and which is called '*the mathematical community*'.

Over the last few weeks, I've come to see her as a flesh-and-blood person, with a deep-rooted *gangrene in her body*. The best food, the choicest dishes, in her turn into poison, which makes the evil spread and become even more entrenched. Yet there's an irresistible bulimia to gorge herself on more and more, as a way of giving herself the lie about an evil she doesn't want to know about at any cost. Anything we say to her is wasted - even the simplest words have lost their meaning. They cease to carry a message, and serve only to trigger the triggers of fear and refusal. . .

b) Most of my colleagues or former friends, however well-disposed, when they venture an opinion, surround themselves with cautious conditionals, like "if it were true that... it would indeed be inadmissible" - just so they can sleep soundly again. I thought I'd made myself clear...

With the benefit of seven months' hindsight, I can now say that *almost all the events* reported and commented on in Harvest and Sowing are *uncontroversial*. I will come back later to the few exceptions, which will be indicated as such. each in its own place. For all the other facts, after the original version of Récoltes et Semailles had been written, careful discussions with some of the main people involved (namely Pierre Deligne, Jean-Pierre Serre and Luc Illusie) enabled errors of detail to be eliminated and an unambiguous agreement reached on the material facts themselves.

same(\*)).

So the debate is not about the reality of the facts, which is not in question, but about *whether or not the practices and attitudes described by these facts should be considered as accepted and as 'normal'*.

These are practices that I describe (perhaps wrongly...) as scandalous: as abuses of trust or power and as blatant dishonesty, on more than one occasion reaching the dimension of the iniquitous and the shameless. The quite unimaginable thing I had yet to learn, having been made aware of these facts (unthinkable even fifteen years ago), was that a large majority of my mathematical colleagues, and even those who were once my students or friends, now consider these practices to be normal and perfectly honourable.

c) There is a second way in which many of my colleagues and former friends maintain confusion. It's the air of "sorry, but we're not specialists in this field - don't ask us to take cognisance of facts that (providentially...) go over our heads...".

I would argue, on the contrary, that you don't need to be a 'specialist' (sorry about that!), or even know your multiplication table or the Pythagorean theorem, to get the main facts. You don't even need to have read 'Le Cid' or the Fables de la Fontaine. A normally developed ten-year-old is just as capable of this as the most renowned of specialists (or even better than him...) (\*\*).

Allow me to illustrate this point with just one example, the "first come" from L'Enterrement(\*\*\*). You don't need to know the ins and outs of the multifaceted and highly delicate mathematical concept of 'motif', or even have a school-leaving certificate, to be aware of the following facts, and to make a judgement on them

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(\*) I am pleased to express my gratitude to all three for the goodwill they have shown on this occasion, and acknowledge their complete good faith in all matters of material fact.

(\*\*) Of course, I didn't write Harvest and Sowing for a ten-year-old, and I wrote it for a child. I would choose language that is familiar to him.

(\*\*\*) This was the first 'great operation' of Burial that I discovered, on a certain 19 April 1984, when the name 'Burial' also imposed itself on me. On this subject, see the two notes written on the same day, "Souvenir d'un rêve - ou la naissance des motifs", and "L'Enterrement - ou le Nouveau Père" (ReS II, n° s 51, 52). It also gives the full reference for the book we are about to discuss.

about them.

1° ) Between 1963 and 1969 I introduced the notion of 'pattern', and around this notion I developed a 'philosophy' and a 'theory', which have remained partially conjectural. Rightly or wrongly (it doesn't matter here), I consider the theory of motifs to be the most profound contribution I have made to the mathematics of my time. The importance and depth of 'motivic yoga' is no longer disputed by anyone (after ten years of almost complete silence on the subject, immediately after my departure from the mathematical scene).

2° ) In the first and only book (published in 1981), devoted essentially to the theory of motives (and in which this name, introduced by me, appears in the title of the book), the one and only passage that might lead the reader to suspect that my modest person is in any way connected with any theory that might resemble the one developed at length in this book, is on page 261. This passage (of two and a half lines) consists of explaining to the reader that the theory developed there has nothing to do with that of a man called Grothendieck (a theory mentioned there for the first and last time, without any further reference or precision).

3° ) There is a famous conjecture, known as the "Hodge conjecture" (whatever it's about), whose validity would imply that the so-called "other" theory of patterns developed in the brilliant volume is *identical* to (a very special case of) the one I had developed, in full view of everyone, nearly twenty years before.

I might add a 4° ) that the most prestigious of the four co-authors of the book was my pupil, and that it was from none other than me that he learnt over the years the brilliant ideas that he presents here as if he had just found them at a moment's notice(\*), and 5° ) that these two circumstances are common knowledge among well-informed people, but that it would be futile to search the literature for a written trace attesting that the aforementioned brilliant author might have learned something from me(\*), and that 6° ) the delicate question of arithmetic which (according to what the principal author himself explained to me) constitutes the central problem of the book (and without my name being mentioned), had been worked out by me in the sixties, in the wake of the "yoga of motives", and that it was through me that the author

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(\*) I do not mean to say that there are not ideas in this book, and even beautiful ideas, due to this author or the other co-authors. But the whole problematic of the book, and the conceptual context that gives it its meaning, and even the delicate theory of  $\otimes$ -categories (wrongly called "Tannakian"), which technically constitutes the heart of the book, are my work.

(\*) With the exception of one line in a report by Serre in 1977, which will be discussed later.

in its place.

was aware of it; and I could pile on 7° and 8° etc. (which I'm sure I'll do in its place).

The foregoing will suffice for my purpose, which is this. You don't need any special 'skills' to be aware of such facts and pass judgement on them - *that's not 'where it happens'*.

The faculty at stake here, apart from sound reason (which in principle is available to everyone), is what I would call a *sense of decency*. The book in question is already one of the most cited in mathematical literature, and its 'principal author' one of the most prestigious mathematicians of the time. Having said all that, the thing that is now by far the most remarkable to me in this story is that *nobody* among the countless readers of this book, including those who know first-hand what it's about, and who were my students or my friends - that *nobody saw anything wrong with it*. In any case, not one of them, even today as I write these lines, has made himself known to me in order to express, on the subject of this prestigious book, the any reservations(\*\*).

As for those of my colleagues and former friends who have never held this book in their hands and who use it to plead incompetence, I say to them: you don't need to be a 'specialist' to ask for the volume in the first mathematical library you come across, leaf through it, and see for yourselves what nobody disputes...

### 15. Gangrene - or the spirit of the age (1).

This 'motive operation' is just *one* of four 'major operations' of the same kind, and one of a whole host of others on a lesser scale and in the same spirit. It is by no means the 'biggest' of the collective mystifications that flesh out my 'picture of the mores' of an era, nor, above all, the most iniquitous. It only consisted of plundering the rich man's hole, when he was absent (or dead. . . ), and not (with general indifference) strangling the poor man's sheep for his own pleasure and before his very eyes. And even in mathematical language, which has now entered common usage, the names of *ano-dines*, books, notions or statements quoted at any given moment are in themselves already a mystification or a sham(\*), and bear witness in their own way to the disgrace of a

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(\*\*) In all, there have been two colleagues (including Zoghman Mebkhout) who have expressed such 'reservations' to me. Neither of them can be considered as 'readers' of this book. They looked at it out of curiosity, just to see...

(\*) I'm thinking here, in particular, of the unusual acronym "SGA 4 $\frac{1}{2}$ " (fractional numbers are useful!), which is a

era.

If I believe that I have ever done anything useful for the 'mathematical community', it is to have brought into the light of day a certain number of inglorious facts that were lurking in the shadows. The kind of facts, surely, that everyone comes into contact with every day, from near or far. How many of them have taken the time to stop, even for a moment, to smell the air and look around?

He who has found himself the victim of the arrogance of some and the dishonesty of others (or of the same people), perhaps flattered himself that this was a very special misfortune that had fallen to him. By comparing his experience with my own, he may realise that this 'misfortune' is also a name he has given to a *spirit of the times*, which weighs on him as it weighs on everyone. And (who knows!) perhaps this will encourage him to get involved in a debate that concerns him as much as it concerns me.

But if this 'dirty laundry' that I am 'airing in the public arena' elicits nothing more than the mirthless sneer of some and the polite embarrassment of others, in the indifference of all, a situation that was murky will have become very clear. (At least for those who still care about using their eyes.) The traditional consensus of good faith and decency (\*\*), in the relationship between mathematicians and in that of the mathematician to his art, would now be a thing of the past, "outdated". Although it has not yet been solemnly proclaimed by any international association of mathematicians, it is now a matter of course, and virtually official: the 'brotherhood by cooptation' of those who wield power in the mathematical world is now *free to strike any kind of blow*, without reservation or limitation. All the scheming of ideas to lead by the nose the apathetic reader who asks only to believe, all the trafficking in authorship, and the bogus quotations between accomplices and the silence for those condemned to silence, and the cronyism and falsifications of all kinds and up to the crudest plagiarism in full view of everyone - *yes and amen to everything*, with the blessing, by word or by silence (when not with the active and em-

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double imposture in its own right (and one of the most quoted acronyms in contemporary mathematical literature), and with the names "Verdier duality" or "Verdier dual", "Deligne-Grothendieck conjecture", or finally "Tannakian categories" (where Tannaka, for that matter, is not involved, because he was never consulted). We will discuss this in more detail later.

(\*\*) When I speak of these "consensuses of good faith and decency", I do not mean to say that they were not "consensuses of good faith and decency". never transgressed. But even when they were transgressed, they were indeed 'transgressions', and the consensus itself was nonetheless accepted.

All the 'big names' and all the big and small bosses in the mathematical public arena. Yes and amen to the '*new style*' that's all the rage! What was once an art has now become, with (almost) unanimous assent, a muddle-headed fair under the paternal eye of the bosses.

There was a time when the exercise of power in the world of mathematicians was limited by unanimous and intangible consensus, the expression of a collective sense of *decency*. These consensuses and this feeling are now obsolete and outdated, unworthy as it were of the glorious era of computers, space cells and the neu-tron bomb.

This would be a foregone conclusion: power, for the brotherhood of those who wield it, is a *discretionary power*.

#### 16. Honorable fine - or the spirit of the times (2).

In the Letter, I explained sufficiently, I think, the spirit in which I wrote *Harvest and Sowing*, to make it clear that I in no way claim to be a historian. It is an honest account of first-hand experience, and a reflection on that experience. This testimony and reflection are available to all, including the historian, who can use it as one of several sources of material. It is then up to the historian to subject this material to critical analysis, in accordance with the rigorous canons of his art.

We must, of course, distinguish between the *facts* in the narrow sense ('raw facts' or 'material facts'), and the 'evaluation' or '*interpretation*' of these facts, which gives them *meaning*, which is not the same for one observer (or co-actor) as for another. Roughly speaking, we can say that the 'testimony' aspect of *Harvest and Sowing* concerns the facts, and that its 'reflection' aspect concerns their interpretation, in other words my work to give them meaning. Among the 'facts' that make up the testimony, I also include the 'psychic facts', and in particular the feelings, associations and images of all kinds that my testimony reflects, whether these took place in the more or less distant past, or at the very moment of writing.

For the events I describe or mention in *Récoltes et Semailles*, I distinguish three kinds of *sources*. There are the events that I *remember*, more or less precisely or more or less blurred from one occasion to the next, and sometimes distorted. About them, I can

This is a guarantee of truth at the time of writing, but by no means of the absence of any error. On the contrary, I have had occasion to point out a number of them, errors of detail which I point out in their place in later footnotes. On the other hand, there are *written documents*, in particular letters and, above all, scientific publications in due form, to which I refer from time to time with all due precision. Finally, there is the *testimony of third parties*. Sometimes these supplement my own memories, allowing me to revive them, clarify them and, sometimes, correct them. On some rare occasions (which I'll come back to shortly), this testimony provides me with entirely new information compared to what I already knew. When I happen to echo such testimony, it does not mean that I have had the opportunity to verify its accuracy and validity in every respect, but simply that it has been inserted in a sufficiently plausible way into the rich fabric of facts that were known to me at first hand, to lead me to believe (rightly or wrongly...) that this testimony was essentially true.

For an attentive reader, I don't think there will be any difficulty at any point in distinguishing between an account of the facts and an interpretation of them, and (in the first case) in discerning which of the three sources I have just described comes into play.

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When I alluded a moment ago to the testimony of a third party, which I echoed without having been able to 'verify its validity on all counts', I was referring to that of *Zoghman Mebkhout*, about the vast cover-up of his work. Of the 'material facts' I mention in *Récoltes et Semailles*, the only ones that are now subject to controversy or that, in my own judgement at present, require rectification are some of the facts attested by Mebkhout's testimony alone. To conclude this postscript, I would like to offer some critical comments on the version of the "Mebkhout affair" presented in the provisional edition of *Récoltes et Semailles*. More detailed comments and corrections will be included, each in its own place, in the printed edition (constituting the definitive text of *Récoltes et Semailles*).

The 'Mebkhout version', which I have tried to interpret, seems to me to consist essentially of the following two theses:

1° ) Between 1972 and 1979, Mebkhout would have been alone(\*), in general indifference and inspired by my work, in developing the "philosophy of  $\mathbb{Q}$ -Modules", as a new theory of "cohomological coefficients" in my sense.

2° ) It would appear that there was a unanimous consensus, both in France and internationally, to disregard his name and his role in this new theory, once its significance began to be recognised.

This version was well documented, on the one hand by Mebkhout's publications, which are entirely convincing, and on the other hand by numerous publications by other authors (in particular, by the *Acts of the Luminy Colloquium* of June 1981), where the deliberate intention to conceal the facts cannot be doubted. Finally, the more detailed details that Mebkhout gave me later (and which I echo in the section entitled "The Burial (3) - or the Four Operations"), although not directly verifiable, were nevertheless entirely consistent with a certain general atmosphere, the reality of which I could no longer doubt.

I have just been made aware of several new facts(\*) which show that point 1 (° ) above needs to be strongly qualified. The isolation in which Mebkhout found himself(\*\*) was indeed real, but it was a relative isolation. In France, the work of J. P. Ramis on the same subject (work of which Mebkhout has not said a word to me), and above all, it appears that certain important ideas developed and brought to fruition by Mebkhout, and for which he claims paternity, could be due to Kashiwara(\*\*\*) This makes

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(\*) With the exception of Kashiwara's 1975 constructibility theorem, whose importance in the theory is by no means disputed. But according to Mebkhout's version, this was Kashiwara's one and only contribution to the emerging theory. This (inaccurate) version was corroborated by the absence of other publications by Kashiwara in which he would have alluded to some of the key ideas.

(\*\*) I am grateful to Pierre Schapira and Christian Houzel for drawing my attention to this matter. on these facts, and on the tendentious nature of my presentation of the Mebkhout-Kashiwara dispute.

(\*\*\*) This isolation was due above all to the indifference of my former students to the ideas and work of Mebkhout, who stubbornly pretended to be inspired by an 'ancestor' doomed to oblivion by a unanimous consensus... (\*\*\*) The most important of these ideas is that of 'correspondence' (to use the new-style jargon). so-called "Riemann-Hilbert" conjecture for  $\mathbb{Q}$ -Modules. The relevant conjecture has been proved by Mebkhout, and also (according to what Schapira asserts to me) by Kashiwara (although Mebkhout assured me that his demonstration was the only one published). The question of the priority of the demonstration remains nebulous for me, and I give up spending the rest of my life trying to clear it up. ...

As for the sister statement in terms of  $\mathbb{Q}^\infty$  -Modules, there does not seem to be the slightest doubt that authorship

implausible or dubious some of the episodes in the Kashiwara-Mebkhout dispute, a s reported in the Mebkhouit version of which I have been the (too) faithful interpreter. There is no doubt that Mebkhouit was one of the main pioneers of the new theory of  $\mathbb{A}$ -Modules, perhaps even *the* main pioneer; the only one in any case who put his heart and soul into this task, the true scope of which still eluded him, as it eluded everyone else. And it is also true that the escapade that took place around this work, culminating in the Colloque de Luminy, remains for me one of the great disgraces of the century in the mathematical world. But it would be wrong to claim (as I have done in good faith) that Mebkhouit was the only one to do it. On the other hand, he was the only one who had the honesty and courage to state clearly the importance of my ideas.

and my work in his work and in the emergence of new theory.

This postscript is not the place to go into more detail on this affair - I shall do so in due course, including comments likely to shed light on the psychological context of the 'Mebkhout version'. If the 'Mebkhout-Kashiwara dispute' is of interest to me, it is only insofar as it sheds light on the general atmosphere of an era. And for me, even in its distortions and the forces that played a part in bringing them about, the 'Mebkhout version' also appears to be an eloquent 'sign of the times', among other less contentious material that I have added to the 'record of an era'.

It remains for me to make amends for my thoughtlessness in presenting a picture of the Mebkhouit-Kashiwara dispute that took account only of the testimony and documents provided by Mebkhouit, and this as if there could be no doubt about this version. This version presented a third party in a ridiculous, even odious light, which was all the more reason to be cautious. For my thoughtlessness and for this lack of healthy caution, I would like to offer Mr Kashiwara my sincerest apologies.

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for the idea and for the demonstration belongs to Mebkhouit.

# INTRODUCTION

## 1. Dream and fulfilment.

Three years ago, in July, I had an unusual dream. If I say "unusual", it's an impression that only came to me afterwards, when I thought about it when I woke up. The dream itself came to me as the most natural, obvious thing in the world, without any fanfare - so much so that when I woke up I almost didn't pay any attention to it, just pushed it into oblivion and moved on to the 'order of the day'. I'd been thinking about my relationship with mathematics since the day before. It was the first time in my life that I'd bothered to look into it - and even so, if I'd started at that point, it was because I'd really been forced to! There were things that were so strange, not to say violent, that had happened in the months and years before, explosions of mathematical passion bursting into my life without warning, that it was really no longer possible not to look at what was going on.

The dream I'm talking about had no scenario or action of any kind. It consisted of a single image, motionless but at the same time very much alive. It was the head of a person, seen in profile. You could see him looking from right to left. It was a middle-aged man, beardless, his wild hair forming a halo of strength around his head. The impression given off by this head was one of youthful, joyful strength, which seemed to spring from the supple, vigorous arch of the nape of the neck (which was more obvious than visible). The expression on his face was more that of a mischievous little boy, delighted at some trick he had just played or was thinking of playing, than that of a mature man, or one who had grown up, mature or not. Above all, he exuded an intense joie de vivre, contained and bursting with playfulness . . .

There wasn't a second person present, an 'I' who looked at or contemplated this other person, whose head was all we could see. But there was an intense perception of this head, of what was emanating from it. Nor was there anyone to feel the impressions, to comment on them, to name them, or to attach a name to the person perceived, to designate him or her as 'so-and-so'. There was only this very living thing, this man's head, and an equally living, intense perception of it.

When I woke up, without any deliberate intention, I remembered the dreams of the previous night, but the vision of this man's head did not stand out with any particular intensity,

she wasn't pushing herself forward to shout at me or whisper to me: you've got to look at  
me!

! When this dream appeared in the field of my quick glance at the dreams of the night, in the warm tranquillity of the bed, I naturally had the reflex of the awakened mind to put a name to what had been seen. All I had to do was ask the question and I knew immediately that the man's head that had been there in the dream was none other than my own.

That's not a bad one, I thought - it's something you have to do, to see yourself in a dream like that, as if it were someone else! This dream came to me a bit as if I'd stumbled across a four-leaf clover, or even a five-leaf clover, just by chance, to marvel at it for a few moments, as I should have done, and then continue on my way as if nothing had happened.

At least that's how it almost happened. Fortunately, as has happened to me many times in situations of this kind, I made a mental note of this 'not bad' incident and began a reflection that was supposed to build on the previous day's reflection. Then, one thing leading to another, that day's reflection was limited to immersing myself in the meaning of this unpretentious dream, this unique image, and the message about myself that it brought me.

This is not the place to dwell on what this one-day meditation taught me and brought me. Or rather, what this *dream* taught me and brought me, once I had put myself in the mood of attention and listening that enabled me to accept what it had to say to me. The first immediate fruit of the dream and this listening was a sudden influx of new energy. This energy supported the long-term meditation that continued over the following months, against stubborn inner resistance, which I had to dismantle one by one through patient and obstinate work.

In the five years since I began to pay attention to some of the dreams that came to me, this was the first 'messenger dream' that didn't present itself in the now recognisable guise of such a dream, with impressive stagecraft and exceptional, sometimes overwhelming, intensity of vision. This one was all about 'cool', with nothing to force attention, discretion even - take it or leave it, no fuss. ...

A few weeks earlier I had had a messenger dream in the old style, on a dramatic and even savage scale, which put a sudden and immediate end to a long period of mathematical frenzy. The only apparent similarity between the two dreams was that

in neither of them was there an observer. In a parable of lapidary force, this dream showed something that was happening in my life at the time, without my taking the trouble to pay attention to it - something I was even taking great care to ignore, to tell the truth. It was this dream that made me realise the urgency of a process of reflection, which I embarked on a few weeks later, and which then continued for nearly six months. I'll have a chance to say a little about it in the last part of this reflection-testimony, '*Harvest and Sowing*', which opens this volume and gives it its name (\*).

If I have begun this introduction by evoking this other dream, this image-vision of myself ('Traumgesicht meiner selbst' as I called it in my German notes), it is because in recent weeks the thought of this dream has come back to me more than once, as the meditation 'on a mathematician's past' drew to a close. To tell the truth, in retrospect, the three years that have passed since that dream seem to me like years of decanting and maturing, towards a fulfilment of its simple and limpid message. The dream showed me "*as I am*". It was also clear that in my waking life I was not fully who the dream showed me to be - weights and stiffnesses from afar often prevented (and still prevent) me from being fully and simply myself. Over the years, although the thought of this dream rarely came back to me, it must have *acted in some* way. It was by no means a kind of model or ideal that I would have tried to resemble, but a discreet reminder of a joyful simplicity that 'was me', that manifested itself in many ways, and that was called upon to free itself from what continued to weigh on it and to blossom fully. This dream was both a delicate and vigorous link, between a present still weighed down by many of the burdens of the past, and a very near 'tomorrow' that this present contains in germ, a 'tomorrow' that is me now, and that has surely always been in me...

Surely, if in these last few weeks this rarely evoked dream has been very present again, it's because at a certain level, which is not that of a thought that probes and analyses, I must have 'known' that the work I was in the process of doing and bringing to its conclusion, work that took up again and deepened that other work of three years ago, was a new step towards the fulfilment of the message about myself that it brought me.

This is now for me the main meaning of *Harvest and Sowing*, of this intense work of

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(\*) See in particular section 43, "The troublemaker boss - or the pressure cooker".

for almost two months. Only now that it's finished do I realise how important it was for me to do it. In the course of this work, I've had many moments of joy, often mischievous, joking, exuberant joy. And there have also been moments of sadness, and times when I've relived the frustrations or sorrows that have hit me so hard in recent years - but there has not been a single moment of bitterness. I'm leaving this job with the complete satisfaction of someone who knows they've completed a job. There is nothing, no matter how 'small', that I have avoided, or that I would have liked to say but didn't, that would leave me at this moment with the residue of dissatisfaction or regret, no matter how 'small'.

When I wrote this testimonial, it was clear to me that it would not please everyone. It's even possible that I've found a way of upsetting everyone without exception. However, that was in no way my intention, or even to upset anyone. My intention was simply to look at the simple and important things, the everyday things, from my past (and sometimes from my present too) as a mathematician, to discover at last (better late than never!) and without the shadow of a doubt or reservation, what they were and what they are; and, along the way, to say in simple words what I saw.

## 2. The spirit of a journey.

This reflection, which eventually became 'Récoltes et Semailles', had begun as an 'introduction' to the first volume (now nearing completion) of '*À la Poursuite des Champs*', the first mathematical work that I have been intending to publish since 1970. I wrote the first few pages at a low point, in June last year, and less than two months ago I picked up where I left off. I realised that there was a lot to look at and a lot to say, so I was expecting a really substantial introduction, thirty or forty pages long. Then, for the next two months or so, right up to the moment when I'm writing this new introduction to what was originally an introduction, I thought every day was the day I'd finish this work, or that it would be the next day or the day after that at worst. When, after a few weeks, I began to approach the hundred-page mark, the introduction was promoted to 'introductory chapter'. After a few more weeks, when the dimensions of this 'chapter' far exceeded those of the other chapters of the volume in preparation (all completed at the time of writing, except for the last one), I finally realised that it didn't belong in the

a maths book, that decidedly this reflection and this testimony would be cramped in it. Their true place was in a separate volume, which will be volume 1 of these '*Réflexions Mathématiques*' that I intend to continue in the coming years, following on from the *Poursuite des Champs*.

I would not say that *Récoltes et Semailles*, this first volume in the series of *Réflexions Mathématiques* (which will be followed by two or three volumes of *Poursuite des Champs*, to begin with) is an 'introductory' volume to the *Réflexions*. Rather, I see this first volume as the foundation of what is to come, or to put it better, as the one that gives the background note, the *spirit* in which I undertake this new journey, which I intend to continue in the years to come, and which will take me I cannot say where.

To conclude these details on the main part of the present volume, a few indications of a practical nature. The reader will not be surprised to find in the text of *Récoltes et Semailles* occasional references to the 'present volume' - by which I mean the first volume (*Histoire de Modèles*) of *Poursuite des Champs*, the introduction to which I believe I am still writing. I did not want to 'correct' these passages, as I wanted above all to preserve the spontaneity of the text, and its authenticity as a testimony not only to the distant past, but also to the very moment when I am writing.

It's also for the same reason that my alterations to the first draft of the text were limited to correcting stylistic clumsiness or a sometimes confused expression that interfered with the understanding of what I wanted to express. These changes sometimes led me to a clearer or finer understanding than when I wrote the first draft. Slightly substantial changes to the text, to nuance it, clarify it, complete it or (sometimes) correct it, are the subject of some fifty numbered *notes*, grouped together at the end of the *reflexion*, which make up more than a quarter of the text (\*). I refer to them by acronyms such as (¹) etc. . Among these notes, I have singled out twenty or so which seemed to me to be of comparable importance (in length or substance) to any of the fifty 'sections' or 'paragraphs' into which the reflection was spontaneously organised. These longer notes have been included in the table of contents, after the list of the fifty sections. Unsurprisingly, for some of the longer notes, the need has arisen to add one or more notes to the note. These are then included following the note, with the same type

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(\*) (28 May) This is the text of the first part of Harvest and Sowing, "Fatuity and Renewal".  
The second part had not been written at the time of writing.

cross-references, except for fairly short notes, which then appear on the same page as "footnotes", with cross-references such as (\*) or (\*\*).

I took great pleasure in giving a name to each of the sections of the text, as well as to each of the most substantial notes - not to mention the fact that, later on, this proved to be indispensable for finding my way around. It goes without saying that these names were found after the fact, whereas when I started a section or a note that was a bit long I wouldn't have been able to tell for any of them what the essential substance would be. The same applies a fortiori to the names (such as 'Work and discovery', etc. . . ) by which I have designated the eight parts I to VIII into which I have grouped the fifty sections that make up the text after the event.

I will confine myself to very brief comments on the content of these eight parts. The first two, I (Work and Discovery) and II (The Dream and the Dreamer), contain elements of a reflection on mathematical work, and on the work of discovery in general. My personal involvement is much more episodic and less direct than in the following parts. It is these parts in particular that have the quality of testimony and meditation. Parts III to VI are above all a reflection on and an account of my past as a mathematician 'in the mathematical world', between 1948 and 1970. The motivation behind this meditation was above all the desire to understand this past, in an effort to understand and come to terms with a present whose aspects are sometimes disappointing or confusing. Parts VII (L'Enfant s'amuse) and VIII (L'aventure solitaire) are more concerned with the evolution of my relationship with mathematics from 1970 to the present day, i.e. since I left 'the world of mathematicians' and have never returned. In particular, I examine the motivations, forces and circumstances that led me (to my own surprise) to resume 'public' mathematical activity (by writing and publishing *Réflexions Mathématiques*) after an interruption of more than thirteen years.

### 3. Compass and luggage.

I would have to say a few words about the other two texts which, with *Récoltes et Semailles*, make up the present volume of the same name.

The "*Outline of a Programme*" gives an outline of the main themes of mathematical reflection that I have pursued over the last ten years. I intend to develop at least a few of them over the next few years, in a series of informal reflections that I have already had occasion to mention, the "Mathematical Reflections". This

his sketch is the verbatim reproduction of a report I wrote last January in support of my application for a research post at the CNRS. I have included it in this volume because it is clear that this programme far exceeds the possibilities of my modest self, even if I were given another hundred years to live, and I chose to use them to follow the themes in question as far as I could.

The "*Thematic Outline*" was written in 1972 on the occasion of another application (for a professorship at the Collège de France). It contains a thematic outline of what I then considered to be my main mathematical contributions. This text reflects the circumstances in which it was written, at a time when my interest in mathematics was marginal, to say the least. So this sketch is little better than a dry, methodical enumeration (which, fortunately, is not intended to be exhaustive...). It does not appear to be driven by a vision or the breath of a desire

- as if these things that I review as if by conscience (and these were indeed my dispositions) had never been touched by a living vision, nor by a passion to bring them to light when they were still only hinted at behind their veils of mist and shadow...

If I have decided to include this uninspiring report here, I'm afraid, it's mainly to put a stop (if that's even possible) to certain high-flying colleagues and a certain fashion, who, since I left a world we shared, seem to look down their noses at what they kindly call 'grothendieckeries'. This, it seems, is synonymous with bombast about things too trivial for a serious mathematician in good taste to agree to waste precious time on them. Perhaps this indigestible 'digest' will seem more 'serious' to them! As for the texts from my pen, which are driven by a vision and a passion, they are not for those whom fashion keeps and justifies in complacency, making them insensitive to the things that enchant me. If I write for others rather than myself, it's for those who don't find their time and their person too precious to pursue without ever tiring of the obvious things that no one deigns to see, and to rejoice in the intimate beauty of each of the things discovered, distinguishing it from any other that was known to us in its own beauty.

If I wanted to situate the three texts that make up the present volume in relation to each other, and the role of each in the journey on which I have embarked with the Mathematical Reflections, I could say that the reflection-testimony Harvest and Sowing reflects and is a reflection of my own life.

describes the *spirit* in which I undertake this journey and which gives it meaning. The Programme Outline describes my sources of inspiration, which set a *direction*, if not a destination, for this journey into the unknown, rather like a compass or a strong Ariadne's thread. Finally, the Thematic Outline briefly reviews the *baggage* I acquired as a mathematician before 1970, at least some of which will be useful and welcome at this or that stage of the journey (just as my cohomological and toposical algebra reflexes are indispensable to me right now in the Pursuit of Fields). And the order in which these three texts follow one another, as well as their respective lengths, reflect well (without any deliberate intention on my part) the importance and weight I attach to them in this journey, the first stage of which is nearing its end.

#### 4. A journey in pursuit of the obvious. ...

I would still have to say a few more detailed words about this journey undertaken a little over a year ago, the Mathematical Reflections. I explain myself in some detail, in the first eight sections of *Récoltes et Semailles* (i.e. in parts I and II of the reflex-ion), about the *spirit* in which I am undertaking this journey, and which, I think, is already apparent in the present first volume, as well as in the one that follows it (*the Histoire de Modèles*, which is volume 1 of the *Poursuite des Champs*), now nearing completion. It therefore seems pointless to dwell on this subject in this introduction.

I certainly can't predict what the journey will be like, something I'll discover as it unfolds. I do not at present have an itinerary planned even in outline, and I doubt that one will emerge any time soon. As I said earlier, the main themes that will undoubtedly inspire my thinking are sketched out more or less in the "Outline of a Programme", the "compass-text". Among these themes, there is also the main theme of the *Poursuite des Champs*, i.e. the 'fields', which I hope to cover (and leave it at that) over the course of this year, in two or perhaps three volumes. On this theme I write in the Esquisse: ". . . it's a bit like a debt I owe to a scientific past in which, for some fifteen years (between 1955 and 1970), the development of cohomological tools was the constant leitmotif in my work on the foundations of algebraic geometry". So this is the theme that is most deeply rooted in my scientific 'past'. It is also the one that has remained present like a regret throughout these past fifteen years, like the most important gap in my knowledge.

Perhaps the most glaring gap of all is the work I left to do when I left the mathematical scene, and which none of my former students or friends have bothered to fill. For more details on this work in progress, the interested reader may refer to the relevant section in the *Esquisse d'un Programme*, or to the introduction (the real one this time!) to the first volume, now nearing completion, of the *Poursuite des Champs*.

Another legacy of my scientific past that is particularly close to my heart is the notion of *motif*, which is still waiting to emerge from the darkness in which it has been kept for the fifteen years or so since it first appeared. It's not out of the question that I'll end up working on the foundations that need to be laid here, if no one better placed than me (by virtue of my younger age, as well as the tools and knowledge at my disposal) decides to do so in the next few years.

I'd like to take this opportunity to point out that the fortune (or rather, misfortune...) of the notion of motive, and of a few others among those I've unearthed which seem to me to be (potentially) the most fruitful of all, are the subject of a retrospective reflection of nearly twenty pages, forming the longest (and one of the very last) of the 'notes' to *Harvest and Sowing* (\*). I have subsequently subdivided this note into two parts ('My orphans' and 'Refusal of an inheritance - or the price of a contradiction'), in addition to the three 'sub-notes' that follow it (\*). Taken together, these five consecutive notes are the only part of *Récoltes et Semailles* in which mathematical notions are evoked other than by allusion in passing. These notions become an opportunity to illustrate certain contradictions within the world of mathematicians, which themselves reflect contradictions in the people themselves. At one point I thought of separating this sprawling note from the text from which it comes, and attaching it to the Thematic Outline. This would have had the advantage of putting the latter into perspective, and breathing a little life into a text that looks a little too much like a catalogue. I have refrained from doing so, however, out of a concern to preserve the authenticity of a testimony of which this meganote, whether I like it or not, is very much a part.

To what is said in *Harvest and Sowing* about the mood in which I approach 'Reflections', I would like to add just one thing here, which I have already expressed in one of the notes ('Youth snobbery - or the defenders of purity'), when I write:

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(\*) This double note (n° s 46, 47) and its sub-notes have been included in the second part, 'L'Enterrement', of *Récoltes et Semailles*, which is a direct continuation of it.

(\*) These are sub-notes° s 48, 49, 50 (note° 48✉ was added later).

"My ambition as a mathematician throughout my life, or rather my joy and my passion, have always been to discover the obvious, and this is my only ambition in the present work" (*À la Poursuite des Champs*). This is also my sole ambition for this new journey that I have been pursuing for the past year with *Réflexions*. It has been no different in these *Récoltes et Semailles* which (for my readers at least, if there are any) open this journey.

### 5. A welcome debt.

I'd like to conclude this introduction with a few words about the two dedications to this volume, "Harvest and Sowing".

The dedication 'to those who were my students, to whom I gave the best of myself - and also the worst' has been with me at least since last summer, and in particular when I wrote the first four sections of what was still supposed to be an introduction to a mathematical book. In other words, I had already known for some years that there was a 'worst' to be examined - and now was the time or never! (But I had no idea that this 'worst' would end up leading me through a meditation of almost two hundred pages).

On the other hand, the dedication 'to those who were my elders' appeared only along the way, as did the very name of this reflection (which also became that of a volume). It revealed to me the important role they had played in my life as a mathematician, a role whose effects are still very much alive today. This will no doubt become clear enough in the pages that follow, so that there is no need for me to dwell on it here. These 'elders', in (approximate) order of appearance in my life when I was twenty, are Henri Cartan, Claude Chevalley, André Weil, Jean-Pierre Serre, Laurant Schwartz, Jean Dieudonné, Roger Godement and Jean Delsarte. The ignorant newcomer that I was was warmly welcomed by all of them, and many of them have since given me lasting friendship and affection. I must also mention Jean Leray, whose kind welcome during my first contact with the 'world of mathematicians' (in 1948/49) was also a precious encouragement. My reflections have revealed a debt of gratitude towards each of these men 'from another world and another destiny'. This debt is by no means a burden. Its discovery came as a joy, and made me feel lighter.

End of March  
1984

(4 May - . . . June)

## 6. Burial.

An unforeseen event has re-launched a process of reflection that had already been completed. It inaugurated a cascade of discoveries, large and small, over the course of the past few weeks, gradually revealing a situation that had remained unclear and sharpening its contours. In particular, this led me to take a detailed and in-depth look at events and situations that had previously only been mentioned in passing or by allusion. As a result, the fifteen-page 'retrospective reflection' on the vicissitudes of a work, mentioned earlier (Introduction, 4), has taken on unexpected dimensions, expanding by some two hundred additional pages.

By force of circumstance and the inner logic of reflection, I was led along the way to involve others as much as myself. The one who is involved more than anyone else (apart from myself) is a man with whom I have had a friendship for nearly twenty years. I wrote of him (euphemistically (\*)) that he had 'seemed a bit like a pupil', in the very early years of this affectionate friendship rooted in a shared passion, and for a long time and in my heart of hearts I saw in him a sort of 'legitimate heir' to what I believed I could contribute in mathematics, beyond a published work that has remained fragmentary. Many people will already have recognised him: he is *Pierre Deligne*.

I make no apology for making public with these notes, among others, a personal reflection on a personal relationship, and for involving him in this way without having consulted him. I feel it is important, and healthy for everyone, that a situation that has long remained hidden and confused should finally be brought out into the open and examined. In doing so, I am providing an account, admittedly subjective, which does not claim to exhaust a delicate and complex situation, nor to be free from error. Its primary merit (like that of my past publications, or those on which I am currently working) is that it exists, and is available to those who may find it of interest. My concern has been neither to convince, nor to shield myself from error or doubt behind the only things that are said to be 'obvious'. My concern is to be true, by saying things as I see or feel them, at any given moment, as a means of deepening and understanding them.

The name '*L'Enterrement*' (*The Burial*), for all the notes relating to the 'Weight of a past', came to the fore with increasing force during the course of the reflection (\*). I play the

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(\*) On the meaning of this 'euphemism', see the note 'L'être à part', n° 67<sup>2</sup>.

role of the anticipated deceased, in the mournful company of the few (much younger) mathematicians whose work took place after my 'departure' in 1970 and bears the mark of my influence, through a certain style and a certain approach to mathematics. Foremost among these is my friend *Zoghman Mebkhout*, who had the heavy privilege of having to face all the handicaps of being treated as Grothendieck's 'pupil after 1970', without having had the advantage of contact with me and my encouragement and advice, whereas he was only a 'pupil' of my work through my writings. This was at a time when (in the world he haunts) I was already regarded as 'dead', to the extent that for a long time the very idea of a meeting did not seem to arise, and an ongoing relationship (both personal and mathematical) was only finally established last year.

This did not prevent Mebkhout, against the tide of a tyrannical fashion and the disdain of his elders (who were my students) and in almost complete isolation, from producing an original and profound work, through an unexpected synthesis of the ideas of the Sato school and my own. This work provides a new insight into the cohomology of analytic and algebraic varieties, and holds out the promise of a far-reaching renewal in our understanding of this cohomology. There can be no doubt that this renewal would have been accomplished now and years ago, if Mebkhout had found the warm welcome and unreserved support from those who had been appointed to do it that he once received from me. At least, since October 1980 his ideas and work have provided the inspiration and the technical means for a spectacular revival of the cohomological theory of algebraic varieties, finally emerging (apart from Deligne's results on Weil's conjectures) from a long period of stagnation.

Incredibly, and yet truly, his ideas and results have been used by 'everyone' for nearly four years (in the same way as mine), while his name remains studiously ignored and silenced by the very people who know his work first-hand and use it in an essential way in their work. I don't know of any other time when mathematics has been so disgraced, when some of the most influential or prestigious of its followers set an example, in the midst of general indifference, of disregard for the most universally accepted rule of the ethics of the mathematical profession.

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(\*) Towards the end of this reflection, another name came to mind, expressing another striking aspect of a certain picture that had been gradually unveiling itself to my eyes over the past five weeks. It was the name of a tale, to which I shall return in due course: 'The robe of the Emperor of China'...

I see four men, mathematicians of brilliant means, who had and have the right with me to the honours of this burial by silence and disdain. And I see in each of them the bite of contempt on the beautiful passion that had animated him.

Apart from these, I see two men in particular, both in the limelight in the mathematical public square, who officiate at funerals in large company and who at the same time (in a more hidden sense) are buried with their own hands, at the same time as those they deliberately bury. I have already named one of them. The other is also a former student and friend, *Jean-Louis Verdier*. After my 'departure' in 1970, contact between him and me did not continue, apart from a few hasty professional meetings. This is probably why he appears in this reflection only through certain acts in his professional life, while the possible motivations for these acts, in terms of his relationship with me, are not examined and, moreover, escape me entirely.

If there is one pressing question that has imposed itself on me over the past few years, which was a profound motivation for Harvest and Sowing and which has also followed me throughout this reflection, it is that of my part in the advent of a certain spirit and certain morals that make possible disgraces such as the one I have mentioned, in a world that was mine and with which I had identified myself for more than twenty years of my life as a mathematician. Reflection has led me to discover that, through certain attitudes of fatuity in myself, expressed in a tacit disdain for colleagues with modest means, and in a complacency towards myself and certain mathematicians with brilliant means, I was no stranger to this spirit that I see spreading today among the very people I loved, and among those to whom I also taught a profession that I loved; those whom I disliked and taught badly and who today set the tone (when they don't make the law) in this world that was dear to me and that I have left.

I feel a wind of smugness, cynicism and contempt blowing. "It blows without concern for "merit" or "demerit", burning with its breath the humblest vocations as well as the most beautiful passions...". I've realised that this wind is the prolific harvest of blind and careless sowing that I've helped to sow. And if its breath comes back on me and on what I had entrusted to other hands, and on those whom I love today and who have dared to claim themselves or only to be inspired by me, this is a *return of things* of which I have no reason to complain, and which has much to teach me.

## 7. Funeral arrangements.

Under the name 'L'Enterrement', I have therefore grouped together in the table of contents the imposing parade of the main 'notes' relating to this seemingly innocuous section 'Le poids d'un passé' (s. 50), thus giving full meaning to the name that had immediately imposed itself on me for this final section of the 'first draft' of Récoltes et Semailles.

In this long procession of related notes, those added over the past four weeks (notes<sup>(51)</sup> to<sup>(97)</sup> (\*) stand out as the only ones dated (from 19 April to 24 May) (\*). I thought it most natural to give them in the chronological order in which they follow one another in the reflection (\*\*), rather than in any other so-called 'logical' order, or in the order in which references to these notes appear in earlier notes. In order to be able to find this last (by no means linear) order of filiation between participating notes, I have followed (in the table of contents) the number of each note by that of the note (among those preceding it) where it is first referred to (\*\*\*)�, or (failing that) by the number of the note of which it constitutes an immediate continuation (\*\*\*\*). (This latter relationship is indicated in the text itself by a reference symbol placed at the end of the note.

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(\*) To these should be added note no.<sup>o</sup> 104, dated 12 May 1984. The notes<sup>o</sup> 98 and following (with the exception of the previous note<sup>o</sup> 104) constitute the "third breath" of reflection, from 22 September 1984. They are also dated.

(\*) In a series of consecutive notes written on the same day, only the first is dated. The other notes undated are notes n° s 44<sup>□</sup> to 50 (forming cortèges I, II, III). Notes<sup>o</sup> s 46, 47, 50 are from 30 or 31 March, notes<sup>o</sup> s 44<sup>□</sup>, 48, 48<sup>□</sup>, 49 from the first half of April, and finally note<sup>o</sup> 44<sup>□□</sup> is dated (10 May). (\*\*) I have sometimes made a slight inversion in this chronological order, in favour of a more precise order. "The only exceptions, however, are eleven notes (preceded by a number!) taken from b.p. notes subsequent to a note and which have grown to a prohibitive size. As the only exceptions, however, I would like to mention eleven notes (preceded by the sign !) taken from b. de p. notes subsequent to a note and which have taken on prohibitive dimensions, and which I have placed in the following order each following the note to which it relates (except note no.<sup>o</sup> 98, which relates to note no.<sup>o</sup> 47).

(\*\*\*) When the reference to a note (such as<sup>(46)</sup>) is in the "Weight of a past" section itself, the number (50) of the latter, *placed in brackets*, is placed after that of the note, as in 46 (50).

(\*\*\*\*) The number of a note which is an immediate continuation of a preceding note (which numbers are follow) is preceded by the sign \* in the table of contents. Thus \*47, 46 indicates that note n° 47 is an immediate continuation of note n° 46 (which in this case is not the note that immediately precedes it, which is note n° 46 ).<sup>9</sup>

Lastly, I have *underlined* in the t. des m. the numbers of the notes that are not followed by another number, i.e. those that represent a 'new departure' in the thought process, not inserted at a specific point in the t. des m., or those that represent a 'new departure' in the thought process, not inserted at a specific point in the text.

of the first note, such as (-→ 47) placed at the end of the last line of the note <sup>(46)</sup>, which refers to the note <sup>(47)</sup> which continues it). Finally, certain details of a more or less technical nature are grouped together at the end of a note in sub-notes numbered by subscripts consecutive to the number of the original note - as in sub-notes (46<sub>1</sub>) to (46<sub>9</sub>) of note (46) "My orphans".

In order to give some structure to the overall order of the Burial, and to make it easier to identify with the multitude of notes that crowd together, I thought it would be appropriate to include a number of highly suggestive subtitles in the procession, each preceding and leading a long or short procession of consecutive notes linked by a common theme.

I had the pleasure of seeing ten (\*) processions gather one by one in a long solemn procession to honour my funeral - some humble, others imposing, some contrite and others secretly jubilant, as cannot be otherwise on such an occasion. So here we go: the *posthumous pupil* (whom everyone makes a point of ignoring), the *orphans* (freshly exhumed for the occasion), *Fashion* and its *Illustrious Men* (I've earned that), the *motives* (last born and last exhumed of all my orphans), *my friend Pierre* modestly leading the largest of the processions, followed closely by the *Accord Unanime des notes* (silencieusement) concertantes and by the *Colloque* (known as the 'Pervers') in its entirety (distinguishing itself from the posthumous pupil, alias the Unknown Pupil, by interposed funeral processions bearing flowers and wreaths); Finally, to bring the imposing procession to a fitting close, here comes the *Pupil* (by no means posthumous and even less unknown) alias *the Boss*, followed by the bustling troop of *my pupils* (armed with shovels and ropes) and finally the *Funeral Van* (bearing four beautiful oak coffins firmly screwed together, not to mention the Gravedigger).... ten processions finally at full strength (it's about time), slowly making their way to the *Funeral Ceremony*.

The highlight of the ceremony was the eulogy, delivered with perfect skill by none other than my friend Pierre himself, who presided over the funeral in response to everyone's wishes and to general satisfaction. The Ceremony concludes with a final and definitive De Profundis (at least we hope so), sung as a sincere thanksgiving by the deceased himself, who

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thought already given.

(\*) (29 September) In fact, there are twelve processions, including the Funeral Van (X), and "The deceased (still not deceased)" (XI) who has just slipped into the procession at the last minute...

unbeknownst to anyone, survived his impressive funeral and even took some of the blame, to his *complete satisfaction* - which satisfaction forms the final note and the final chord of the memorable Burial.

#### 8. The fin of a secret.

In the course of this (hopefully) final stage of reflection, it occurred to me that it would be useful to append two other texts of a mathematical nature to this volume 1 of Réflexions Mathématiques, in addition to the three mentioned above (\*).

The first is a reproduction of a two-part *report* with commentary that I wrote in 1968 and 1969 on the work of P. Deligne (some of which remains unpublished to this day), corresponding to mathematical activity at the IHES during the three years 1965/67/68.

The other text is a sketch of a '*form of the six variances*', bringing together the features common to a duality formalism (inspired by Poincaré's duality and Serre's duality) that I drew up between 1956 and 1963, a formalism that has proved to be 'universal' for all cohomological duality situations encountered to date. This formalism

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(\*) In addition, I am thinking of adding to the Thematic Outline (see "Compass and Luggage", Introduction, 3) a "commentary" giving some details about my contributions to the "themes" which are summarily reviewed there, and also about the influences which played in the genesis of the main ideas-force in my mathematical work. The retrospective of the last six weeks has already revealed (to my own surprise) the role of Serre as a 'detonator' for the start of most of these ideas, as well as for some of the 'major tasks' I set myself between 1955 and 1970.

Finally, as another text of a mathematical nature (in the usual sense), and the only one to appear (incidentally) in the non-technical text "Harvest and Sowing", I would like to mention the sub-note n° 87<sub>1</sub> to the note "The massacre" (n° 87), where I explain with the care it deserves a "discrete" (conjectural) variant of the Riemann-Roch-Grothendieck theorem familiar in the coherent context. This conjecture appeared (among a number of others) in the closing talk of the SGA 5 seminar in 1965/66, a talk of which no trace remains (any more than many others) in the volume published eleven years later under the name SGA 5. The vicissitudes of this crucial seminar in the hands of some of my students, and their links with a certain 'SGA 4 1/2 operation', gradually come to light in the course of the reflections pursued in notes n° s 63□□□, 67, 67<sup>□</sup>, 68, 68<sup>□</sup>, 84, 85, 85<sup>□</sup>, 86, 87, 88.

As another note providing fairly detailed mathematical comments on the desirability of establishing a common "toposical" framework (as far as possible) for known cases where we have a duality formalism known as the "six operations" formalism, I would also point out sub-note no.° 81<sub>2</sub> to the note "Credit thesis and comprehensive insurance", no.° 81.

seems to have fallen into disuse with my departure from the mathematical scene, to the extent that to my knowledge nobody (apart from me) has yet taken the trouble to write a list of the fundamental operations, the fundamental canonical isomorphisms to which they give rise, and the essential compatibilities between them.

This sketch of a coherent form will be for me the first obvious step towards this "vast overall picture of the *dream of motifs*", which for more than fifteen years "has been waiting for the bold mathematician who will paint it". In all likelihood, that mathematician will be none other than myself. It is indeed high time that what was born and entrusted to me in private nearly twenty years ago, not to remain the privilege of one person but to be available to *all*, should finally emerge from the night of secrecy and be born once again into the full light of day.

It's true that only one person, apart from me, had an intimate knowledge of this 'yoga of patterns', having learned it from me in the days and years before I left. Of all the mathematical things I had had the privilege of discovering and bringing to light, this reality of patterns still appears to me as the most fascinating, the most charged with mystery - at the very heart of the profound identity between 'geometry' and 'arithmetic'. And the 'yoga of patterns' to which this long-ignored reality has led me is perhaps the most powerful instrument of discovery that I have unleashed in this first period of my life as a mathematician.

But it's also true that this reality, and the 'yoga' that strives to capture it as closely as possible, had by no means been kept secret from me. Absorbed by the imperative task of writing up the fundamentals (which everyone is now quite happy to be able to use as they are in their everyday work), I did not take the few months necessary to write up a broad outline of this yoga of motives, and thus make it available to everyone. Nevertheless, in the years leading up to my sudden departure, I spoke about it at random and to anyone who wanted to hear about it, starting with my students, who (apart from one of them) have forgotten it, just as everyone else has forgotten it. The reason I spoke about it was not to introduce 'inventions' that would bear my name, but to draw attention to a reality that manifests itself at every step, as soon as one takes an interest in the cohomology of algebraic varieties and, in particular, in their 'arithmetic' properties and the relations between them of the various cohomological theories known to date. This reality is as tangible as that of the 'infinitely small', perceived long before the appearance of the rigorous language that enabled it to be perfectly apprehended and 'established'. And to grasp reality

motives, we are by no means short today of a flexible and adequate language, nor of consummate experience in the construction of mathematical theories, which our predecessors lacked.

If what I once shouted from the rooftops has fallen on deaf ears - and if the disdainful silence of one has been echoed by the silence and lethargy of all those who pretend to be interested in cohomology (and yet have eyes and hands just like me...), I cannot hold responsible the one person who chose to keep the 'benefit' of what I had entrusted to him for the benefit of all. It has to be said that our age, whose unbridled scientific productivity rivals that invested in armaments or consumer goods, is a long way from the 'bold dynamism' of our seventeenth-century predecessors, who 'didn't beat about the bush' to develop a calculation of the infinitely small, without worrying whether it was 'conjectural' or not; Nor did they wait for some prestigious man among them to deign to give them the green light, in order to grasp what everyone could see with their own eyes and feel at first hand.

#### 9. The stage and the Actors.

By virtue of its own internal structure and particular theme, "The Burial" (which now forms more than half the text of Harvest and Sowing) is to a large extent and logically independent of the long reflection that precedes it. But this independence is superficial. For me, this reflection on a 'funeral' gradually emerging from the mists of the unspoken and the prescient, is inseparable from the one that preceded it, from which it springs and which gives it its full meaning. Begun as a quick glance 'in passing' at the vicissitudes of a work that I had lost sight of a little (a lot), it became, without having planned or sought it out, a meditation on an important relationship in my life, leading me in turn to reflect on the fate of this work in the hands of 'those who were my students'. To separate this reflection from the one from which it spontaneously sprang seems to me a way of reducing it to a simple 'tableau de mœurs' (or even a settling of scores in the mathematical 'beau monde').

It is true that, if we insist on it, the same reduction to a "picture of manners" can be made for Harvest and Sowing as a whole. Of course, the mores that prevail at a given time and in a given environment, and that help to shape the lives of the men who live there, have their own particularities.

their importance and deserve to be described. However, it will be clear to an attentive reader of Harvest and Sowing that my aim is not to describe mores, that is to say a certain *scene*, changing over time and from place to place, on which our actions take place. This stage to a large extent defines and delimits the *means available* to the various forces within us, allowing them to express themselves. While the stage and these means it provides (and the 'rules of the game' it imposes) vary ad infinitum, the nature of the forces deep within us that (at the collective level) shape the stages and that (at the level of the individual) express themselves on them, does seem to be the same from one milieu or culture to another, and from one era to another. If there is one thing in my life, apart from mathematics and the love of a woman, that I have felt the mystery and attraction of (admittedly late in life), it is the hidden nature of these few forces that have the power to make us act, for 'better' or 'worse', to bury and to create.

#### 10. An act of respect.

This reflection, which came to be called 'L'Enterrement', began as an *act of respect*. A respect for things that I had discovered, that I had seen condense and take shape in a void, whose taste and vigour I was the first to know, and to which I gave a name, to express both the knowledge I had of them, and my respect. I gave the best of myself to these things. They have been nourished by the strength that lies within me, they have grown and flourished, like many vigorous branches sprouting from a single living trunk with many vigorous roots. These are living and present things, not inventions that can be made or not made - things closely interwoven in a living unity that is made of each of them and gives each its place and its meaning, an origin and an end. I had left them a long time ago without any concern or regret, because I knew that what I was leaving behind was healthy and strong and didn't need me to grow and flourish and multiply, according to its own nature. What I was leaving behind was not a bag of money that could be stolen, nor a pile of tools that could rust or rot.

And yet, over the years, when I thought I was well away from a world I'd left behind, here and there, even in my retreat, I would hear whiffs of insidious disdain and discreet derision, referring to things I knew to be strong and beautiful, things that had their own unique place and function that nothing else could ever fulfil. I

felt like orphans in a hostile world, a world sick with the disease of contempt, lashing out at the unarmoured. It was in this mood that this reflection began, as an act of respect towards these things and thus towards myself - as a reminder of a profound link between these things and myself: whoever takes pleasure in showing disdain towards one of these things that have been nurtured by my love, it is *I* whom he takes pleasure in scorning, and everything that comes from me.

And the same applies to the person who, knowing at first hand the link that connects me to such and such a thing that he has learnt from no one else but me, pretends to regard as negligible or to ignore this link or to claim (even tacitly and by omission) on his own behalf or on behalf of someone else a fictitious 'paternity'. I clearly see in this an act of contempt for a thing born of the worker as well as for the obscure and delicate work that allowed this thing to come into being, *and* for the worker, and above all (in a more hidden and essential way) for himself.

If my 'return to maths' were to serve only to remind me of this link and to arouse in me this act of respect in front of all - in front of those who affect to disdain and in front of the indifferent witnesses - this return will not have been in vain.

It's true that I'd really lost touch with the written and unwritten (or at least unpublished) work I'd left behind. As I began this reflection, I could see the branches quite clearly, without really remembering that they were all part of the same tree. Strangely enough, it took the picture of the *ransacking* of what I'd left behind to gradually reveal itself to me, for me to regain a sense of the living unity of what had been ransacked and scattered in this way. One person took a few écus and the other a tool or two to take advantage of them or even to use them - but the unity that gives life and true strength to what I had left eluded each and every one of them. Yet I know of one person who has felt this unity and this strength deeply, and who still feels it in his heart today, and who takes pleasure in dispersing the strength that is in him by wanting to destroy this unity that he has felt in others through his work. It is in this living unity that the beauty and creative virtue of the work lies. Despite the destruction, I find them intact as if I had just left them - except that I have matured and now see them with new eyes.

If anything, however, is damaged and mutilated, and stripped of its original strength, it is in those who forget the strength that lies within themselves and imagine that they are destroying something that is at their mercy, when in fact they are only cutting themselves off from the creative virtue of what is at their disposal, just as it is at the disposal of everyone

else, but in no way at their mercy or in the power of their own hands.

no one.

So this reflection, and through it this unexpected 'return', will also have put me back in touch with a forgotten beauty. It is having fully felt this beauty that gives full meaning to the act of respect that was awkwardly expressed in the note 'My orphans' (\*), and that I have just reiterated here with full knowledge of the facts.

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(\*) This note (n° 46) is chronologically the first of all those appearing in L'Enterrement.



# HARVESTING AND SOWING

Reflections and testimony  
on a mathematician's past

by

Alexandre GROTHENDIECK

Part One:

## FATUITY AND RENEWAL

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To those who were my elders  
who welcomed me fraternally into this  
world of theirs  
and which became mine

To those who were my pupils  
to whom I have given the best of myself  
and also the worst. ...

# HARVESTING AND SOWING (I)

Fatuity and Renewal

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(\*) The notes to the section "The weight of a past" (section 50) are not included in this list but form the second part of Harvest and Sowing (notes n° s 44<sup>✉</sup> to 97).

June 1983

### 1. The Child and the Good Lord.

The mathematical notes on which I am now working are the first in thirteen years that I have intended for publication. The reader will not be surprised that, after a long silence, my style of expression has changed. This change of expression is not, however, the sign of a change in style or working method (<sup>1</sup>), and even less that of a transformation in the very nature of my mathematical work. Not only has it remained the same, but I have become convinced that the nature of the work of discovery is the same from one discoverer to the next, that it transcends the differences created by infinitely varying conditioning and temperament.

Discovery is a child's privilege. It's the little child I'm talking about, the child who is not yet afraid of making mistakes, of looking stupid, of not being serious, of not being like everyone else. Nor is he afraid that the things he looks at have the bad taste of being different from what he expects them to be, from what they should be, or rather: from what it is well understood that they *are*. He ignores the mute and unwavering consensus that is part of the air we breathe - that of all sensible people and well known as such. God knows there have been many sensible people known as such since the dawn of time!

Our minds are saturated with a heterogeneous 'knowledge', a tangle of fears and laziness, cravings and prohibitions, all kinds of information and push-button explanations - a closed space where information, cravings and fears pile up without the wind of the open sea ever blowing in. With the exception of routine know-how, it would seem that the main role of this 'knowledge' is to evacuate a living perception, a grasp of the things of this world. Its effect is above all one of immense inertia, of an often crushing weight.

The little child discovers the world as it breathes - the ebb and flow of its breathing makes it welcome the world into its delicate being, and projects itself into the world that welcomes it. Adults also discover, in those rare moments when they have forgotten their fears and their knowledge, when they look at things or themselves with eyes that are wide open, eager to know, with new eyes - the eyes of a child.

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God created the world as he discovered it, or rather he *creates* the world eternally, as he discovers it - and he discovers it as he creates it. He has created the world and is creating it day after day, repeating himself millions and millions of times, without respite; groping, making mistakes millions and millions of times and rectifying his aim, without tiring. ... Each time, in this game of sounding out things, of the response from things ("that's not a bad shot", or: "you're really messing up", or "it's going like clockwork, keep it up"), and the new sounding out rectifying or repeating the previous sounding out, in response to the previous response...., with each return trip in this infinite dialogue between the Creator and Things, which takes place at every moment and in every place of Creation, God learns, discovers and becomes more intimately acquainted with things, as they take on life and form and are transformed in His hands.

Such is the process of discovery and creation, such seems to have been from all eternity (as far as we can tell). It has been like this, without man having to make his late entrance on the scene, barely a million or two years ago, and get his hands dirty - with, in recent times, the unfortunate consequences we know about.

Sometimes one of us discovers one thing or another. Sometimes we rediscover in our own lives, with wonder, what it is to *discover*. Everyone has everything they need to discover everything that attracts them to this vast world, including this marvellous capacity within them - the simplest, most obvious thing in the world.

! (And yet this is something that many of us have forgotten, just as we have forgotten to sing, or to breathe as a child breathes.... . )

Everyone can rediscover what it is to discover and create, and no one can invent it. They were there before us, and they are what they are.

## 2. Error and discovery.

To come back to the style of my mathematical work proper, or its 'nature' or 'approach', it is now like those that the good Lord himself taught us without words, God knows when, long before we were born perhaps. *I do as he did*. It's also what everyone does instinctively, as soon as curiosity pushes them to know something of all things, something invested from then on by this desire, this thirst.... .

When I'm curious about something, mathematical or otherwise, I *ask* it. I ask it, without worrying whether my question is perhaps stupid or whether it will appear so, without it being weighed up at all costs. Often the question takes the form of an assertion - an assertion which, in truth, is a sounding board. I believe my assertion more or less, depending of course on where I am in my understanding of the things I'm looking at. Often, especially at the beginning of a research project, the assertion is downright false - but you had to make it to be convinced. Often, all you had to do was write it down and it was obvious that it was false, whereas before writing it down there was a blur, like a feeling of unease, instead of this obviousness. Now you can come back to the charge with less ignorance, with a question-assertion that's perhaps a little less 'off the mark'. Even more often, the assertion taken literally turns out to be false, but the intuition that, still clumsily, tried to express itself through it is right, though still vague. Little by little, this intuition is going to be decanted from an equally shapeless gangue of false or inadequate ideas, it is going to emerge little by little from the limbo of the misunderstood that only asks to be understood, of the unknown that only asks to be known, to take on a form of its own, refining and sharpening its contours, as the questions I ask these things in front of me become more precise or more relevant, to define them more and more closely.

But it can also happen that through this process, repeated probing converges on a certain image of the situation, emerging from the mists with sufficiently marked features to lead to the beginnings of a conviction that this image does indeed express reality - when in fact it does not, when this image is tainted by a major error, likely to distort it profoundly. The work, sometimes laborious, which leads to the detection of such a false idea, starting from the first 'take-offs' observed between the image obtained and certain obvious facts, or between this image and others which also had our confidence - this work is often marked by a growing tension. The work is often marked by a growing tension as we approach the crux of the contradiction, which at first appears vague but then becomes more and more glaring - until finally it explodes, with the discovery of the error and the collapse of a certain vision of things, which comes as an immense relief, like a liberation. *The discovery of error is one of the crucial moments, a creative moment of all, in any work of discovery*, whether mathematical or self-discovery. It's a moment when our knowledge of the thing being probed is suddenly renewed.

*Fearing error and fearing truth are one and the same thing.* He who fears error is powerless to discover. It is when we fear being wrong that the error in us becomes immovable as a rock. Because in our fear, we cling to what we once thought was 'true', or to what has always been presented to us as true. When we are driven, not by the fear of seeing an illusory security vanish, but by a thirst for knowledge, then error, like suffering or sadness, passes through us without ever becoming fixed, and the trace of its passage is renewed knowledge.

### 3. The unmentionable labours.

It is surely no coincidence that the spontaneous process of all genuine research never appears in the texts or discourse that are supposed to communicate and transmit the substance of what has been 'found'. More often than not, texts and speeches are confined to recording '*results*', in a form that must appear to ordinary mortals as so many austere and immutable laws, inscribed for all eternity on the granite tables of some sort of giant library, and dictated by some omniscient God to the initiates-scribes-savants and assimilated; to those who write learned books and no less learned articles, those who transmit knowledge from the pulpit, or in the more restricted circle of a seminar. Is there a single textbook, a single manual for use by schoolchildren, secondary school pupils, students, or even 'our researchers', that can give the unfortunate reader the slightest idea of what research is all about - apart from the universally accepted idea that research is something you do when you're really good at it, when you've passed lots of exams and even competitions, the big shots, Pasteur and Curie and the Nobel Prize winners and all that...? The rest of us, readers or listeners, are just trying to swallow up the knowledge that these great men have been willing to record for the good of humanity, but we're only good enough (if we work hard) to pass our exams at the end of the year, and even then...

How many of us, including the unfortunate 'researchers' themselves, desperate for theses or articles, including even the most 'learned' and prestigious among us, have the simplicity to see that 'research' is no more and no less than *questioning* things, passionately - like a child who *wants to know* how he or his little sister came into the world. That seeking and finding, that is to say: questioning and listening, is the simplest, most spontaneous thing in the world, something that no one in the world has the privilege of doing. It's a 'gift' that we've all been given from the cradle - made to express ourselves and flourish.

in an infinite number of guises, from one moment to the next and from one person to the next.

...

When you dare to say such things, you get the same half-worried, half-understanding smiles from all sides, from the dunce who is sure he is a dunce, to the scholar who is sure he is a scholar and well above the common man, as if you had just made a joke that was a bit thick around the edges, as if you were displaying a naivety stitched together with white thread; that's all well and good, of course you shouldn't spit on anyone - but you shouldn't push it - a dunce is a dunce and not Einstein or Picasso

!

In the face of such unanimous agreement, I would be hard pressed to insist. Incorrigibly determined, I've lost yet another opportunity to keep quiet...

No, it is surely no coincidence that, in perfect harmony, instructive or edifying books and manuals of all kinds present 'Knowledge' as if it had emerged fully clothed from the genius brains that recorded it for our benefit. Nor can it be said that this is bad faith, even in the rare cases where the author is 'in the know' enough to know that this image (which his text cannot fail to suggest) in no way corresponds to reality. In such cases, the presentation may be more than just a collection of results and recipes, it may be infused with a breath of fresh air, animated by a living vision that is sometimes communicated from the author to the attentive reader. But an unspoken consensus, of considerable force it seems, means that the text leaves no trace of the *work of* which it is the product, even when it expresses with lapidary force the sometimes profound vision of things that is one of the real fruits of this work.

To tell the truth, there have been times when I myself have confusedly felt the weight of this force, of this silent consensus, on the occasion of my project to write and publish these 'Mathematical Reflections'. If I try to fathom the tacit form taken by this consensus, or rather the form taken by the resistance within me to my project, triggered by this consensus, the word 'indecency' immediately comes to mind. The consensus, internalised in me I can't say for how long, says to me (and this is the first time I've taken the trouble to bring into the light of day, into the field of my gaze, what it's been mumbling to me with some insistence for weeks, if not months): "It's indecent to flaunt before others, or even publicly, the ups and downs, the messy trial and error around the edges, the 'dirty laundry' in short, of a work of discovery. All it does is waste the reader's precious time. What's more, it's going to add up to pages and pages and pages, which will have to be typeset and printed - what a waste, given

the price of printed paper.

scientific! You've got to be really vain to flaunt things that are of no personal interest to you, as if my own screw-ups were something remarkable!

- an opportunity to strut one's stuff, in short". And even more secretly: "It is indecent to publish the notes of such a reflection, as it is *really* going on, just as it would be indecent to make love in a public place, or to expose, or just leave lying around, the blood-stained sheets of the labours of childbirth...".

The taboo here takes the form, insidious and imperious at the same time, of the sexual taboo. It is only as I write this introduction that I am beginning to glimpse its extraordinary force, and the significance of the extraordinary fact that testifies to this force: that the real process of discovery, so disconcertingly simple, childlike simplicity, is practically nowhere to be seen; that it is silently suppressed, ignored, denied. This is the case even in the relatively innocuous field of scientific discovery, not the discovery of one's willy or anything like that, thank goodness - a 'discovery' in short that can be placed in anyone's hands, and which (one might think) has nothing to hide...

If I wanted to follow the 'thread' that runs through it - a thread that is by no means tenuous, but very thick and strong - it would surely take me much further than the few hundred pages of homologic-homotopic algebra that I will eventually finish and deliver to the printer.

#### 4. Infallibility (of others) and contempt (of self).

You see, when you haven't written for thirteen years, it's not the same as before, your 'style of expression' has to change, of course? The difference is that I used to 'express myself' (sic) like everyone else: I'd do the work, then redo it in verse, carefully erasing all the cross-outs. Along the way, I'd cross out new things, sometimes making the whole job worse than the first draft. So it had to be done again - sometimes three or even four times, until everything was perfect. Not only were there no dodgy corners or sweepings surreptitiously shoved under a suitable piece of furniture (I've never liked sweepings in corners, as long as you take the trouble to sweep); but above all, when I read the final text, the admittedly flattering impression I got from it (as from any other scientific text) was that *the author* (my modest self in this case) *was infallibility incarnate*. Infallibly, he came across 'the' right concepts, then 'the' right statements, one after the other

in a well-oiled engine, with demonstrations that "fell" with a dull noise, each at exactly the right moment!

Judge for yourself the effect it has on an unsuspecting reader, a dis- ons secondary school pupil learning the Pythagorean theorem or equations of the second degree, or even one of my colleagues in so-called 'higher' education or research institutions (hear, hear!) shouting (let's say) about reading an article by a prestigious colleague! As this kind of experience is repeated hundreds, thousands of times over the course of a pupil's, or even a student's or researcher's, life, amplified by the appropriate concert in the family and in all the media in all the countries of the world, the effect is what you might expect. You can see it in yourself as well as in others, if you take the trouble to pay attention: *it's the intimate conviction of your own worthlessness*, in contrast to the competence and importance of people 'who know' and people 'who do'.

This intimate conviction is sometimes compensated for, but in no way resolved or defused, by the development of an ability to memorise things that are not understood, or even by the development of a certain operational skill: multiplying matrices, 'putting together' a French composition using 'thesis' and 'antithesis'... In short, it's the ability of the parrot or the learned monkey, more highly prized today than ever before, sanctioned by coveted diplomas and rewarded by comfortable careers.

But even those who have diplomas and are well set up, perhaps covered in honours, are not fooled, deep down, by these false signs of importance, of 'value'. Nor even the rarer person who has invested his or her all in the development of some genuine gift, and who in his or her professional life has been able to give his or her all and do creative work - he or she is not convinced, deep down, by the glitter of his or her fame, with which he or she often wants to give the impression to himself or herself and to others. The same unexamined doubt lives in both of them, just as it does in the first dunce who comes along, the same conviction that perhaps they will never dare to acknowledge.

It is this doubt, this intimate, unspoken conviction, that drives both of them to constantly surpass themselves in the accumulation of honours or works, and to project onto others (above all onto those over whom they have some power...) this contempt for themselves that secretly gnaws at them - in an impossible attempt to escape it, by accumulating 'proof' of their superiority over others ( ).<sup>2</sup>

February 1984

### 5. The forbidden dream.

I'm taking the opportunity of a three-month break in the writing of *The Pursuit of the Fields* to pick up the Introduction where I left off last June. I've just reread it carefully, more than six months later, and added a few subtitles.

When I wrote this Introduction, I was well aware that this type of reflection could not fail to give rise to many 'misunderstandings' - and it would be pointless to try to anticipate them, which would simply mean piling more on top of the first! The only thing I would add on this subject is that I have no intention of waging war against the scientific writing style that has been established for thousands of years, which I myself have practised assiduously for more than twenty years of my life, and taught to my students as an essential part of the mathematical profession. Rightly or wrongly, I still regard it as such today and continue to teach it. If anything, I'm old-fashioned in my insistence on a job done to the end, hand-stitched from start to finish, and with no mercy for any dark corners. If I've had to put water in my wine over the last ten years or so, it's by necessity! For me, 'writing in form' remains an important stage in mathematical work, both as an instrument of discovery, to test and deepen an understanding of things that would otherwise remain approximate and fragmentary, and as a means of communicating such an understanding. From a didactic point of view, the rigorous method of exposition, the deductive method, which in no way excludes the possibility of painting vast pictures, offers obvious advantages in terms of conciseness and ease of reference. These are real advantages, and significant ones, when it comes to presentations aimed at mathematicians, let's say, and more particularly, mathematicians who are already sufficiently familiar with some of the ins and outs of the subject being dealt with, or others very close to it.

These advantages, on the other hand, become entirely illusory for a presentation aimed at children, young people or adults who are not at all 'in the loop' beforehand, whose interest is not yet aroused, and who, moreover, are more often than not (and will remain, and for good reason. . .) in total ignorance of what the real process of discovery is. Readers, to put it better, who are unaware *of the very existence of* such work, which is within *the reach of anyone* gifted with curiosity and common sense - the work from which is constantly born and reborn

our intellectual knowledge of things in the Universe, including that expressed in imposing ordinances such as Euclid's 'Elements' or Darwin's 'Origin of Species'. Complete ignorance of the existence and nature of such work is almost universal, including among teachers at all levels of education, from primary school teachers to university professors. This is an extraordinary fact, which first came to my attention during the reflection begun last year with the first part of this Introduction, at the same time as I was glimpsing the deep roots of this disconcerting fact...

Even though it is aimed at readers who are perfectly 'in the know' from every point of view, there is still one important thing that the 'de rigueur' mode of presentation refuses to communicate. It's also something that's totally frowned upon in the circles of serious people, like us scientists in particular! I'm talking about *dreams*. The dream, and the visions it breathes into us - impalpable at first, like the dream itself, and often reluctant to take shape. Long years, even a lifetime of intense work may not be enough to see a dream vision fully manifest, to see it condense and polish to the hardness and brilliance of a diamond. This *is* our work, whether we work with our hands or with our minds. When the work is finished, or a certain part of it, we present the tangible result in the brightest light we can find, we rejoice in it, and often take pride in it. However, it is not in this diamond, which we have cut for a long time, that we find what inspired us to cut it. Perhaps we have fashioned a tool of great precision, an efficient tool - but the tool itself is limited, like everything made by the hand of man, even when it seems great to us. A vision, nameless and vague at first, tenuous as a wisp of mist, has guided our hand and kept us bent over the work, without feeling the hours or perhaps the years pass. A flap that noiselessly detached itself from a bottomless sea of mist and half-light... What is boundless in us is Her, this Sea ready to conceive and give birth unceasingly, when our thirst fecundates Her. The Dream arises from these marriages, like the embryo nestled in the womb, awaiting the obscure labours that will lead it to a second birth, in the light of day.

Woe betide a world where dreams are scorned - it's also a world where what's deep inside us is scorned. I don't know whether any other culture before ours - the culture of television, computers and transcontinental rockets - has professed such contempt. It must be one of the

There are many ways in which we differ from our predecessors, whom we have so radically supplanted, eliminated as it were from the face of the planet. I have not come across another culture where the dream is not respected, where its deep roots are not felt by all and recognised. And is there any major work in the life of a person or a people that was not born of a dream and nourished by a dream, before blossoming into the light of day? In our country (or should we say everywhere?) respect for dreams is called 'superstition', and it is well known that our psychologists and psychiatrists have taken the measure of dreams in great length and breadth - hardly enough to clutter the memory of a small computer, surely. It's also true that no-one 'back home' knows how to light a fire, or dares to stand in their own home and watch their child being born, or their mother or father dying - there are clinics and hospitals for that, thank God... Our world, so proud of its power in atomic megatons and in the quantity of information stored in its libraries and computers, is undoubtedly also the one in which the *powerlessness* of each individual, this fear and contempt for the simple and essential things in life, has reached its peak.

Fortunately, dreams, like the original sex drive in even the most repressive society, have a way of enduring! Superstition or no superstition, dreams continue to obstinately whisper knowledge that our waking minds are too heavy or too faint-hearted to grasp, and to give life and wings to the projects they have inspired.

I suggested earlier that dreams are often reluctant to take shape, but that's just an appearance, and doesn't really go to the heart of the matter. The 'reticence' comes rather from our waking mind, in its ordinary 'plate' - and 'reticence' is a euphemism! Rather, it is a deep-seated mistrust that covers up an ancestral fear - *the fear of knowing*. Speaking of dreams in the true sense of the term, this fear is all the more powerful, all the more effective as a screen, because the message of the dream touches us more closely, because it carries with it the threat of a profound transformation of our person, if by any chance it were to be heard. But it must be said that this mistrust is present and effective even in the relatively harmless case of the mathematical 'dream', to the extent that all dreams seem to be banned not only from texts (I know of none where there is any trace of them), but also from discussions between colleagues, in small groups, or even one-to-one.

If this is the case, it is certainly not because the mathematical dream does not exist or no longer exists - our science would then have become sterile, which is by no means the case. Surely the

he reason for this apparent absence, this conspiracy of silence, is closely related to that other consensus - that of carefully erasing all trace and all mention of the *work* through which our knowledge of the world is discovered and renewed. Or rather, *it is one and the same silence that surrounds both the dream and the work it inspires and nourishes*. So much so that the very term 'mathematical dream' will seem nonsensical to many of us, who are so often driven by push-button clichés rather than the direct experience we can have of a very simple, everyday, important reality.

## 6. The Dreamer.

In fact, I know from experience that when the mind is eager to get to know it, instead of running away from it (or approaching it with a patented grid in hand, which amounts to the same thing), the dream is in no way reluctant to 'take shape' - to allow itself to be described delicately and to deliver its message, which is always simple, never silly, and sometimes deeply moving. On the contrary, the Dreamer in us is an incomparable master at finding, or creating from scratch, from one occasion to the next, the language best suited to circumventing our fears and shaking our torpor, with theatrical means varying infinitely, from the absence of any visual or sensory element whatsoever to the most breathtaking stagings. When He manifests Himself, it's not to shy away, but to encourage us (almost always to no avail, but His benevolence never wearies...) to get out of ourselves, out of the heaviness in which He sees us trapped, and which He sometimes amuses Himself by parodying in comical colours. Lending an ear to the Dreamer within us means communicating with ourselves, against the powerful barriers that would like to prevent us from doing so at all costs.

But who can do more can do less. If we can communicate with ourselves through dreams, revealing ourselves to ourselves, then surely it must be possible in an equally simple way to communicate to others the message of the mathematical dream, which is by no means intimate, let's say, and which does not bring into play forces of resistance of comparable power. And to tell the truth, what else have I done in my past as a mathematician, if not follow, 'dream' to the end, until their most manifest, most solid, irrefutable manifestation, shreds of dream detaching themselves one by one from a heavy, dense fabric of mists? And how many times did I tremble with impatience at my own obstinacy in jealously polishing down to the last facet each precious or semi-precious stone in which my dreams were condensed, rather than following a deeper impulse: that of

following the multi-faceted arcane of my dreams?

forms of the mother fabric - on the indecisive border between the dream and its patent incarnation, 'public-able' in short, according to the canons in force! I was about to follow this impulse, to embark on a work of 'mathematical science fiction', 'a kind of daydream' about a theory of 'patterns' that remained purely hypothetical at the time - and has remained so to this day, for want of another 'daydreamer' to embark on this adventure. This was towards the end of the 1960s, when my life (without my having the slightest inkling of it) was about to take a completely different turn, which for the next ten years or so would relegate my mathematical passion to a marginal, if not disowned, position.

But all things considered, '*A la Poursuite des Champs*', this first publication after fourteen years of silence, is very much in the spirit of that 'waking dream' which was never written, and of which it seems to have taken the provisional continuation. Admittedly, the themes of these two dreams are as dissimilar, at least at first sight, as it is possible for two mathematical themes to be; not to mention that the first, that of motifs, would seem to lie more on the horizon of what might be 'feasible' with the means at hand, whereas the second, the famous 'fields' and the like, appear to be entirely within reach. These are dissimilarities that could be called fortuitous or accidental, and which may disappear much sooner than we expect<sup>(3)</sup>. They have relatively little impact, it seems to me, on the kind of work to which the two themes can give rise, as long as it's just a question of 'daydreaming', or, to put it in less provocative terms: of continuing the work of conceptual rough-casting until an overall vision of sufficient coherence and precision is achieved, to bring about the more or less complete conviction that the vision does indeed correspond, essentially, to the reality of things. In the case of the theme developed in this book, this should mean, more or less, that the detailed verification of the validity of this vision becomes a matter of pure craft. This can certainly require a considerable amount of work, with its share of astuteness and imagination, and no doubt also unexpected twists and perspectives, which will make it something other than a purely routine task (a 'long exercise', as André Weil would say).

It's the kind of work, in short, that I've done over and over again in the past, that I have at my fingertips and that it's therefore pointless for me to do again in the years that are still ahead of me. Insofar as I am once again investing myself in mathematical work, it is on the fringes of the 'daydream' that my energy will surely be best used. In this

My choice is not inspired by a concern for profitability (assuming that such a concern could inspire anyone), but by a dream, or dreams. If this new impetus within me is to prove a source of strength, it will have been drawn from the dream!

### 7. Galois' legacy.

It would seem that of all the natural sciences, it is only in mathematics that what I have called 'dreaming', or 'daydreaming', is subject to a seemingly absolute ban, more than twice a millennium old. In the other sciences, including reputedly 'exact' sciences such as physics, dreaming is at least tolerated, even encouraged (depending on the era), under what are admittedly more 'outlandish' names such as 'speculations', 'hypotheses' (such as the famous 'atomic hypothesis', the result of a dream, or rather a speculation by Democritus), 'theories', etc. The transition from the status of a dream-which-dare-not-say-its-name to that of 'scientific truth' takes place by insensible degrees, through a consensus that gradually broadens. In mathematics, on the other hand, it is almost always (these days at least) a sudden transformation, by virtue of the magic wand of a *demonstration* (<sup>4</sup>). At a time when the notion of mathematical definition and demonstration was not, as it is today, clear and the object of a (more or less) general consensus, there were nevertheless some visibly important notions that had an ambiguous existence - such as the notion of a 'negative' number (rejected by Pascal) or that of an 'imaginary' number. This ambiguity is reflected in the language still in use today.

The gradual clarification of the notions of definition, statement, demonstration and mathematical theory has been very salutary in this respect. It has made us aware of all the power of the tools, however childishly simple, that we have at our disposal to formulate with perfect precision the very things that might have seemed unformulate - by virtue of a sufficiently rigorous use of everyday language, more or less. If there is one thing that has fascinated me about mathematics since I was a child, it is precisely this power to capture in words, and to express perfectly, the essence of those mathematical things that at first sight appear in such elusive or mysterious form that they seem beyond words...

However, an unfortunate psychological side-effect of this power, of the resources offered by perfect precision and demonstration, is that they have further accentuated the traditional taboo on the 'mathematical dream'; in other words, on anything that does not present itself as a 'mathematical dream'.

This is guaranteed by demonstrations in form, or else (and increasingly so these days...) by sketches of demonstrations, which are supposed to be able to be put into form. Occasional *conjectures* are tolerated at a pinch, provided that they satisfy the conditions of precision of a questionnaire, where the only answers allowed would be 'yes' or 'no'. (And on condition, needless to say, that the person who allows himself to do so is well known in the mathematical world). To my knowledge, there has been no example of the development, on an 'experimental' basis, of a mathematical theory that is explicitly conjectural in its essential parts. It is true that, according to modern standards, the entire calculus of the 'infinitely small' developed from the seventeenth century onwards, which has since become the differential and integral calculus, would seem to be a daydream, which was finally transformed into serious mathematics only two centuries later, by the wave of Cauchy's magic wand. But this time it only took less than a hundred years for another wand, this time from Jordan (if I remember correctly), to give the dream a new name, 'Galois theory'.

The conclusion that emerges from all this, and which is not to the advantage of 'Mathematics 1984', is that it's fortunate that people like Newton, Leibnitz, Galois (and I'm sure many others, as I'm not well versed in history...) were not encumbered by our current canons, at a time when they were content to discover without taking the trouble to canonise!

The example of Galois, who came here without my calling him, strikes a chord in me. I seem to remember that a feeling of fraternal sympathy for him was awakened the first time I heard about him and his strange destiny, when I was still a pupil or student, I think. Like him, I had a passion for mathematics.

- and like him I felt like an outsider, a stranger in the 'beautiful world' which (it seemed to me) had rejected him. Yet I ended up being part of this beautiful world myself, only to leave it one day, with no regrets.... This somewhat forgotten affinity reappeared to me quite recently and in a completely new light, as I was writing the 'Outline of a Programme' (for my application to become a researcher at the Centre National de la Recherche Scientifique). This report is mainly devoted to an outline of my main themes of reflection over the last ten years or so. Of all these themes, the one that fascinates me the most, and which I intend to develop above all in the coming years, is the very type of mathematical dream, which

is, moreover, similar to the "dream of motifs", for which it provides a new approach. In writing this sketch, I was reminded of the longest mathematical reflection I have pursued in one go in the last fourteen years. It lasted from January to June 1981, and I called it "The Long Walk through Galois Theory". One thing led to another and I realised that the daydream I had been pursuing sporadically for several years, which had come to be known as "Anabelian algebraic geometry", was nothing other than a continuation, "an ultimate culmination of Galois' theory, and no doubt in the spirit of Galois".

When this continuity occurred to me, as I was writing the passage from which the line quoted above is taken, a joy came over me that has not gone away. It was one of the rewards of working in complete solitude. Its appearance was as unexpected as the more than fresh welcome I had received from two or three colleagues and old friends who were well 'in the know', one of whom was my pupil, and to whom I had had the opportunity to talk, still 'on the spot' and in the joy of my heart, about these things I was in the process of discovering... It reminds me that to take up Galois' legacy today is surely also to accept the risk of the solitude that was his in his time. Perhaps times change less than we often think! But this 'risk' is not a threat to me. Although I am sometimes saddened and frustrated by the indifference or disdain of those I have loved, never for many years has solitude, mathematical or otherwise, weighed on me. If there is one faithful friend that I always long to meet again when I am alone, it is my wife.

I've just left her, it's her!

## 8. Dream and demonstration.

But let's come back to the dream, and to the prohibition that has plagued mathematics for thousands of years. This is perhaps the most inveterate of all the a-priorities, often implicit and rooted in habit, decreeing that one thing is 'maths' and another is not. It took millennia for things as childish and ubiquitous as the symmetry groups of certain geometric figures, the topological forms of others, the number zero and sets to find their way into the sanctuary! When I talk to students about the topology of a sphere, and the shapes that can be deduced from a sphere by adding handles - things that don't surprise young children, but which baffle them because they think they know what 'maths' is - the first spontaneous response I get is: 'What is maths?

But that's not maths! Maths, of course, is the Pythagorean theorem, the heights of a triangle and second-degree polynomials... These students are no more stupid than you or I. They are reacting as all the world's mathematicians have reacted from time immemorial to the present day, with the exception of people like Pythagoras or Riemann and maybe five or six others. Even Poincaré, who wasn't the first to come along, managed to prove with a well-felt philosophical *A* plus *B* that infinite sets weren't maths! Surely there must have been a time when triangles and squares weren't maths - they were drawings that children or craftsmen traced in the sand or clay of vases, not to be confused...

This fundamental inertia of the mind, suffocated by its 'knowledge', is certainly not peculiar to mathematicians. I'm straying a little from my subject: *the ban on the mathematical dream*, and through it, on everything that does not present itself in the usual guise of a finished product, ready for consumption. The little I've learnt about the other natural sciences is enough to make me realise that a ban of similar rigour would have condemned them to sterility, or to a tortoise's progress, rather like in the Middle Ages when there was no question of dehornifying the letter of the Holy Scriptures. But I am also well aware that the deep source of discovery, just like the process of discovery in all its essential aspects, is the same in mathematics as in any other region or thing in the Universe that our body and mind can experience. *To banish the dream is to banish the source* - to condemn it to an occult existence.

And I am also well aware, from an experience that has not wavered since my first and juvenile love affair with mathematics, that in the unfolding of a vast or profound vision of mathematical things, it is this unfolding of a vision and an understanding, this progressive penetration, that constantly *precedes* the demonstration, that makes it possible and gives it meaning. When a situation, from the humblest to the most vast, has been understood in its essential aspects, the demonstration of what is understood (and of the rest) falls like ripe fruit. Whereas the demonstration plucked like a still-green fruit from the tree of knowledge leaves an aftertaste of dissatisfaction, a frustration of our thirst that has never been quenched. Two or three times in my life as a mathematician, for want of anything better to do, I have had to pluck the fruit rather than pick it. I'm not saying that I did wrong, or that I regret it. But what I did best and what I liked best, I took willingly, not by force. If mathematics has given me joy in profusion and continues to

fascinated me in my middle age, it wasn't by the demonstrations that I was able to extract from her, but by the inexhaustible mystery and perfect harmony that I felt in her, always ready to reveal itself to a loving hand and gaze.

#### 9. Foreigners welcome.

I think the time has come to say something about my relationship with the world of mathematicians. This is quite different from my relationship with mathematics. That relationship existed and was strong from an early age, long before I even realised that there was a world and a milieu of mathematicians. A whole complex world, with its learned societies, its periodicals, its meetings, colloquia and congresses, its primas-donnes and its tâcherons, its power structure, its éminences grises, and the no less grey mass of the taillables et corvéables, in need of a thesis or articles, and also those, rarer still, who are rich in means and ideas and come up against closed doors, desperate to find the support of one of these powerful, pressurised and feared men who have that magic power: to get an article published. . . I discovered the existence of a mathematical world when I arrived in Paris in 1948, at the age of twenty, with in my meagre suitcase a Licence ès Sciences from the University of Montpellier, and a manuscript with tight lines, written on both sides, with no margins (paper was expensive).

), representing three years of solitary reflection on what (I later learned) was then well known as the "theory of measurement" or "Lebesgue's integral". As I had never met anyone else, I thought, until the day I arrived in Paris, that I was the only person in the world who 'did maths', the only *mathematician*. (It was the same thing for me, and remains so to this day). I had juggled with what I called measurable sets (without ever having come across a set that wasn't measurable. . . ) and with convergence almost everywhere, but I didn't know what a topological space was. I was a bit lost in a dozen or so non-equivalent notions of 'abstract space' and compactness, picked up in a little booklet (by someone called Appert, I think, in Actualités Scientifiques et Industrielles), which I'd stumbled across somehow. I'd never heard before, in a mathematical context at least, such strange or barbaric words as group, body, ring, module, complex, homology (and I could go on!), which suddenly, without warning, came crashing down on me all at once. It was a rude shock!

If I 'survived' this shock, and continued to do maths and even to make it my profession, it's because in those distant days, the mathematical world was hardly what it is today.

has since become. It is also possible that I had been lucky enough to land in a more welcoming corner of this unsuspected world. I had a vague recommendation from one of my professors at the Faculty of Montpellier, Monsieur Soula (no more than his colleagues, he had not seen me often in his classes!), who had been a pupil of Cartan (father or son, I couldn't really say). As Elie Cartan was already 'out of the game' by then, his son Henri Cartan was the first 'fellow' I had the pleasure of meeting. I had no idea how auspicious that was! I was greeted by him with the kindly courtesy that distinguishes him, well known to the generations of normaliens who had the good fortune to make their very first acquaintance with him. He must not have realised the extent of my ignorance, judging by the advice he gave me at the time to guide my studies. Be that as it may, his benevolence was clearly aimed at the person, not at any potential baggage or gifts, nor (later on) at a reputation or notoriety...

In the year that followed, I was the host of one of Cartan's lectures at 'l'Ecole' (on the differential formalism of varieties), to which I was firmly attached; I was also the host of the 'Séminaire Cartan', witnessing in amazement the discussions between him and Serre, with their 'Suites Spectrales' (br

) and drawings (called 'diagrams') full of arrows covering the whole board. It was the heroic era of the theory of 'beams', 'carapaces' and a whole arsenal whose meaning totally escaped me, even though I was doing my best to ingest definitions and statements and to check demonstrations. At the Séminaire Cartan there were also regular appearances by Chevalley and Weil, and on the days of the Bourbaki Seminars (attended by no more than twenty or thirty participants and listeners), the other members of the famous Bourbaki gang would turn up, like a group of slightly noisy friends: Dieudonné, Schwartz, Godement and Delsarte. They were all on a first-name basis, spoke the same language that almost totally escaped me, smoked a lot and laughed a lot. The only thing missing was a case of beer to complete the atmosphere - that was replaced by chalk and sponge. It was a completely different atmosphere from Leray's lectures at the Collège de France (on Schauder's theory of topological degree in infinite-dimensional spaces, woe is me!), which I went to listen to on Cartan's advice. I had gone to see Monsieur Leray at the Collège de France to ask him (if I remember correctly) what his lecture would be about. I don't remember how he explained it to me, or whether I understood anything.

- It's just that, there too, I felt a kindly welcome, open to the first stranger who came along. It was this and nothing else, I'm sure, that made me go to the course and take it.

I bravely stuck to my guns, as I did at the Cartan Seminar, even though the meaning of what Leray was explaining there almost totally escaped me at the time.

The strange thing was that in this world to which I was a newcomer and whose language I hardly understood, let alone spoke, I didn't feel like a stranger. Although I hardly ever had the opportunity to talk (and with good reason!) with one of those merry men like Weil or Dieudonné, or with one of those more distinguished gentlemen like Cartan, Leray or Chevalley, I felt *accepted*, I would almost say: *one of them*. I can't recall a single occasion when I was treated with condescension by one of these men, nor an occasion when my thirst for knowledge, and later, once again, my joy in discovery, was rejected by smugness or disdain<sup>(5)</sup>. Had it not been so, I would not have 'become a mathematician' as they say - I would have chosen another profession, where I could give my all without having to face contempt...

Although 'objectively' I was a stranger to this world, just as I was a stranger in France, a link united me to these men from another background, another culture, another destiny: a common passion. I doubt that in that crucial year when I was discovering the world of mathematicians, any of them, not even Cartan, of whom I was a bit of a pupil but who had many others (and some of them not so out of touch!), perceived in me the same passion that inhabited them. For them, I must have been one of a mass of people listening to lectures and seminars, taking notes and obviously not in the loop. If I perhaps stood out in any way from the other listeners, it was that I wasn't afraid to ask questions, which more often than not had to do with my phenomenal ignorance of both language and mathematics. The answers could be brief, or even astonished, but the bemused eccentric that I was at the time never met with a rebuff, a 'putting in my place', either in the informal environment of the Bourbaki group, or in the more austere setting of the Leray course at the Collège de France. In those years, ever since I arrived in Paris with a letter to Elie Cartan in my pocket, I have never had the impression of finding myself in front of a clan, a closed or even hostile world. If I've ever experienced this inner contraction in the face of contempt, it wasn't in that world; at least not in those days. Respect for the individual was part of the air I breathed there. You didn't have to earn respect, you didn't have to prove yourself before you were accepted, and you didn't have to be treated kindly. Strangely enough perhaps, it was enough to be a person, to have a human face.

## 10. The "mathematical community": fiction and reality.

So it's hardly surprising that, perhaps from that year onwards, and in any case more and more clearly over the years that followed, I felt part of this world, to which I was happy to refer under the name, charged with meaning for me, of '*mathematical community*'. Before writing these lines, I never had the opportunity to examine the meaning I gave to this name, even though I identified with this 'community' to a large extent. It is now clear that this community represented for me nothing more and nothing less than a kind of ideal extension, in space and in time, of the benevolent world that had welcomed me and accepted me as one of their own; a world, moreover, to which I was linked by one of the great passions that have dominated my life.

This 'community', with which I gradually became identified, was not an entirely fictitious extrapolation of the mathematical milieu that had initially welcomed me. I mean that the circle of mathematicians that I came to meet regularly, driven by common interests and personal affinities, grew wider and wider in the ten or twenty years that followed that initial contact. In concrete terms, it was the circle of colleagues and friends, or rather this concentric structure allowing the colleagues to whom I was most closely linked (first Dieudonné, Schwartz, Godement, later especially Serre, later still people like Andreotti, Lang, Tate, Zariski, Hironaka, Mumford, Bott, Mike Artin, not to mention the people in the Bourbaki group, which was also gradually expanding, and the students who came to me from the 1960s onwards...), and other colleagues whom I had met here and there and to whom I was linked more or less closely by more or less strong affinities - it was this microcosm, therefore, built up by chance encounters and affinities, which represented the concrete content of this name, so full of warmth and resonance for me: the mathematical community. When I identified with it as a living, warm entity, it was in fact this microcosm that I was identifying with.

It was only after the 'great turning point' of 1970, the first *awakening*, I should say, that I realised that this cosy, friendly microcosm represented only a very small part of the 'mathematical world', and that the traits I liked to attribute to this world, which I continued to ignore and had never thought of taking an interest in, were fictitious traits.

In the course of these twenty-two years, this microcosm itself had changed in many ways.

face, in a world that was also changing. I, too, had certainly changed over the years without realising it, as had the world around me. I don't know whether my friends and colleagues were more aware of this change than I was, in the world around them, in their own microcosm, and in themselves. Nor can I say when or how this strange change came about - it probably happened insidiously, in fits and starts.

The *man of notoriety* was feared. I myself was feared - if not by my students, then by my friends, or by those who knew me personally, at least by those who knew me only through notoriety, and who did not themselves feel protected by comparable notoriety.

I only became aware of the fear that is rife in the mathematical world (and just as much, if not more so, in other scientific circles) in the aftermath of my 'awakening' nearly fifteen years ago. Over the previous fifteen years, I had gradually and unsuspectingly taken on the role of 'big boss' in the world of mathematics Who is Who. Without realising it either, I was a prisoner of this role, which isolated me from everyone except a few 'peers' and a few students (and even then...) who decidedly 'wanted it'. It was only when I got out of that role that at least some of the fear surrounding it fell away. Tongues were loosened that had been silent before me for years.

The testimony they gave me was not just one of fear. It was also one of *contempt*. Especially the contempt of those in power for others, a contempt that creates and feeds fear.

I didn't have much experience of fear, but I did have experience of contempt, in times when a person's person and life didn't carry much weight. It had pleased me to forget the time of contempt, and now it had come back to haunt me! Perhaps it had never stopped, when I had been content simply to change the world (as it seemed to me), to look elsewhere, or simply: to pretend not to see or hear anything, apart from the passionate and interminable mathematical discussions? These were the days when I finally came to terms with the fact that contempt was rampant all around me, in the world I had chosen as my own, with which I had identified, which had had my backing and which had pampered me.

## 11. Meet Claude Chevalley, or: freedom and good feelings.

Perhaps the preceding lines give the impression that I was upset

by the testimonials that began pouring in almost overnight. But this was not the case. These testimonies were recorded at a level that remained superficial. They were simply added to other facts that I had just learned, or that I knew about but had avoided paying attention to until then. Today, I would express the lesson I learned then as follows: 'scientists', from the most illustrious to the most obscure, are people just like everyone else! I had deluded myself into thinking that 'we' were something better, that we had something extra - it took me a good year or two to get rid of that persistent illusion!

Among the friends who helped me, only one was part of the environment I had just left with no desire to return (<sup>6</sup>). That was Claude Chevalley. Although he didn't make speeches and wasn't interested in mine, I think I can say that I learnt more important and more hidden things from him than those I've just mentioned. In the days when I saw him quite regularly (the days of the 'Survivre' group, which he joined with great conviction), he often baffled me. I don't know how, but I felt that he had a knowledge that I didn't have, an understanding of certain essential and simple things, which can certainly be expressed in simple words, but without the understanding 'passing' from one to the other. I realise now that there was a difference in maturity between him and me, which meant that I often felt at odds with him, in a kind of dialogue of the deaf that wasn't due to a lack of mutual sympathy or esteem. Although he didn't express himself in these terms (as far as I can remember), it must have been clear to him that the 'questioning' (of the 'social role of the scientist', of science, etc. . . ) that I was coming to at the time, either on my own or through the logic of joint reflection and activity within the 'Survivre' group (which later became 'Survivre et Vivre') - that this questioning was basically superficial. They concerned the world in which I lived, and even the role I played in it - but they didn't really involve me in any profound way. My view of myself, during those heady years, didn't change one bit. It wasn't then that I started to get to know myself. It was only six years later that for the first time in my life I got rid of a persistent illusion, not about other people or the world around me, but about myself. It was another awakening, more far-reaching than the first that had prepared it. It was one of the first in a whole 'cascade' of successive awakenings, which I hope will continue in the years that remain to me.

devolved.

I don't recall Chevalley ever alluding to self-knowledge, or 'self-discovery', to put it better. In retrospect, however, it's clear that he must have started getting to know himself a long time ago. He sometimes spoke about himself, just a few words on the occasion of this or that, with disconcerting simplicity. He was one of the two or three people I never heard come up with a cliché. He spoke very little, and what he said expressed, not ideas that he had adopted and made his own, but a personal perception and understanding of things. That's why I'm sure he often disconcerted me, even when we were still meeting in the Bourbaki group. What he said often upset ways of seeing that were dear to me, and which for that reason I considered to be 'true'. There was an inner autonomy in him that I lacked, and which I began to perceive obscurely at the time of 'Survivre et Vivre'. This autonomy is not a matter of intellect or discourse. It's not something you can 'adopt', like ideas, points of view, etc. . Fortunately, the idea would never have occurred to me to want to 'make my own' this autonomy perceived in another person. I had to find my own autonomy. That also meant learning (or relearning) to be myself. But in those years, I had no idea of my lack of maturity, of inner autonomy. If I ended up discovering it, surely the meeting with Chevalley was one of the factors that silently worked within me, at a time when I was embarking on major projects. It wasn't speeches or words that sowed that seed. To sow it, it was enough for a person I met along the way to dispense with speeches and just be himself.

It seems to me that in those early seventies, when we met regularly to publish the bulletin "Survivre et Vivre", Chevalley was trying, without insisting, to communicate a message to me that I was then too clumsy to grasp, or too wrapped up in my militant tasks. I was obscurely aware that he had something to teach me about freedom - about inner freedom. Whereas I had a tendency to operate on the basis of great moral principles and had begun to sound that trumpet from the very first issues of Survivre, as a matter of course, he had a particular aversion to moralistic discourse. I think that was the thing that most disturbed me about him in the early days of Survivre. For him, such rhetoric was just an attempt at constraint, superimposed on a multitude of other external constraints that were suffocating him.

the person. Of course, one can spend one's whole life discussing the pros and cons of such a viewpoint. It completely overturned mine, which (as you can imagine) was driven by the noblest and most generous feelings. It was incomprehensible to me that Chevalley, for whom I had the highest esteem and with whom I felt a bit like a comrade in arms, should take such malicious pleasure in not sharing these feelings! I didn't understand that the truth, the reality of things, is not a question of good feelings, points of view or preferences. Chevalley *saw* something, something simple and real, and I didn't see it. It's not that he'd read about it somewhere; there's nothing in common between seeing something and reading about it. You can read a text with your hands (in Braille script) or with your ears (if someone reads it to you), but you can only *see* the thing itself with your own eyes. I don't think Chevalley had better eyes than me. But he used them, and I didn't. I was too caught up in my good feelings and everything else to have the leisure to look at the effect of my good feelings and principles on myself and on others, starting with my own children.

He must have realised that I often didn't use my eyes, that I didn't even want to. It's strange that he never let me know. Or did he, without my hearing? Or did he refrain, judging that it was a wasted opportunity? Or perhaps the idea didn't even occur to him - it was my business after all, not his, whether I used my eyes or not!

## 12. Merit and contempt.

I would like to take a closer look, in the light of my own limited experience, at when and how contempt took hold in the world of mathematicians, and more particularly in that 'microcosm' of colleagues, friends and students that had become like my second home. And at the same time, to see what part I played in this transformation.

I think I can say, without reservation, that in 1948-49, in the circle of mathematicians I mentioned earlier (whose centre for me was the original Bourbaki group), I did not encounter the slightest trace of contempt, or simply disdain or condescension, towards myself or any of the other young people, French or foreign, who had come there to learn the profession of mathematician. The men who played a leading role there, because of their position or prestige, such as Leray, Cartan and Weil, were not feared by me, nor I believe by any of my fellow students. Apart from Leray and Cartan, who

were very 'distinguished gentlemen', and it took me a long time to realise that each of these gentlemen, who had just turned up with no manners, saying 'Cartan' like a friend and obviously 'in the know', was a university professor just like Cartan himself, did not aim from hand to mouth like me, but received what I considered to be astronomical emoluments, and was moreover a mathematician of international stature and audience.

Following a suggestion from Weil, I spent the next three years in Nancy, which at that time was Bourbaki's headquarters, with Delsarte, Dieudonné, Schwartz, Godement (and a little later also Serre) teaching at the University. There was only a handful of four or five young people there with me (including Lions, Malgrange, Bruhat and Berger, unless I'm mistaken), so there was much less 'drowning in the crowd' than in Paris. The atmosphere was even more familiar, everyone knew each other personally, and I think we were all on first-name terms. When I look back in my memory, however, this was the first and only time I saw a mathematician treat a student with undisguised contempt. The unfortunate fellow had come for the day, from another town, to work with his boss (he was to prepare a doctoral thesis, which he eventually passed with flying colours, and has since acquired a certain notoriety, I believe). I was quite taken aback by the scene. If someone had used that kind of tone with me for even a second, I'd have slammed the door in their face! As it was, I knew the 'boss' well, I was even on first-name terms with him, not the pupil I only knew by sight. My eldest had, in addition to a broad culture (not only mathematical) and an incisive mind, a kind of peremptory authority that impressed me at the time (and for quite a long time afterwards, until the early 70s). He had a certain ascendancy over me. I don't remember whether I asked him a question about his attitude, only the conclusion I drew from the scene: that this unfortunate pupil must really be pretty poor to deserve to be treated like that - something like that. I didn't say to myself that if the pupil was indeed rubbish, that was a reason to advise him to do something else, and to stop working with him, but in no way to treat him with contempt. I had identified with the 'maths whizzes' such as this prestigious elder, at the expense of the 'nobodies' whom it would be lawful to despise. So I followed the ready-made path of connivance with contempt, which suited me, by highlighting the fact that *I was* accepted into the brotherhood of deserving people, those who were good at maths!  
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Of course, no more than anyone else, I would have said to myself in no uncertain terms: people who try to do maths but don't succeed are to be despised! If I had heard someone say something like that, around that time or any other, I would have taken it back in fine style, sincerely sorry for such phenomenal spiritual ignorance. The fact is that I was bathed in ambiguity, I was playing on two sides that weren't communicating: on the one hand, fine principles and feelings, and on the other: poor guy, you really have to be a loser to be treated like that (implying: this kind of misadventure couldn't happen to me, that's for sure!).

In the end, it seems to me that the incident I reported, and above all the (apparently harmless) role I played in it, is in fact typical of an ambiguity in me, which has followed me throughout my life as a mathematician in the twenty years that followed, and which only dissipated in the aftermath of the 'awakening' of 1970 (<sup>8</sup>), without me clearly detecting it until today, when I am writing these lines. It's a pity that I didn't realise it at the time. Perhaps the time was not ripe for me. In any case, the evidence I was hearing at the time about the reign of contempt to which I had chosen to turn a blind eye did not implicate me personally, nor indeed any of my colleagues and friends in the part of my beloved microcosm closest to me (<sup>9</sup>). It was more along the lines of: ah! how sad to have to learn (or: to teach you) such things, who would have thought, you really have to be a bastard (I was going to say: null, sorry!) to treat living beings that way! It's not so different from the other way around: just replace 'lame' by 'bastard' and 'get treated' by 'treat' and there you have it! And honour, of course, is safe for the champion of good causes!

The thing that emerges clearly from this is my connivance with attitudes of contempt. At the very least, it goes back to the very beginning of the 1950s, to the years that followed the kind reception I received from Cartan and his friends. If I didn't 'see anything' later on, when contempt was becoming commonplace just about everywhere, it was because I didn't want to see - any more than in this isolated and particularly flagrant case, where you really had to pull out all the stops to pretend not to see or feel anything!

This connivance was in close symbiosis with my new identity, that of a respected member of a group, the group of deserving people, the maths whizzes. I remember feeling particularly satisfied, proud even, that in this world that I had chosen for myself, that had co-opted me, it wasn't social position or even (but no!) reputation alone that mattered.

If you were a mediocre mathematician (poor fellow!), you were nothing. What counted was merit, profound and original ideas, technical virtuosity, vast visions and all that!

This ideology of merit, with which I had identified unreservedly (even though it remained, of course, implicit and unspoken), still took a heavy toll on me on the eve, as I said, of the famous awakening of 1970. I'm not sure that it disappeared without a trace from that moment on. For that to happen, I would probably have had to clearly identify it in myself, whereas it seems to me that I was mainly identifying it in others. In fact, it was Chevalley who was one of the first, along with Denis Guedj, whom I also met through Survivre, to draw my attention to this ideology (they called it '*meritocracy*', or something like that), and the violence and contempt it contained. It was because of this, Chevalley told me (it must have been at the time of our first meeting at his house, about Survivre), that he could no longer stand the atmosphere at Bourbaki and stopped going there. Looking back, I'm convinced that he must have realised that I had indeed been part of that ideology, and perhaps even that traces of it still remained in some corners. But I don't remember him ever suggesting that. Perhaps he preferred to leave it to me to dot the *i's* and cross the *t's*, and I waited until now to do so. Better late than never!

### 13. Strength and thickness.

It's quite possible that the incident I recounted also marks the moment of an inner shift in me, towards a more or less unconditional identification with the brotherhood of merit, at the expense of people considered worthless, or simply 'without genius' as we would have said a few generations before (this term was no longer in vogue in my time): dull, mediocre people - at best 'sounding boards' (as Weil wrote somewhere) for the great ideas of those who really count... The mere fact that my memory, which so often acts as a gravedigger even for episodes that at the time mobilise considerable psychic energy, retained this episode, is not linked to any other directly related memory, and appears so innocuous, makes this feeling of a 'tipping point' that would have taken place then plausible.

In a meditation less than five years ago, I came to the realisation that

that this ideology of "we, the great and noble minds... . .", in a particularly extreme and virulent form, had been present in my mother since she was a child, and dominated her relationship with others, whom she liked to look upon from the height of her grandeur with a disdainful, even contemptuous commiseration. I had unreserved admiration for my parents. The first and only group with which I identified, before the famous 'mathematical community', was the family group reduced to my mother, my father and myself, who had the honour of being recognised by my mother as worthy of having them as parents. In other words, the seeds of contempt must have been sown in me from childhood. It would perhaps be an opportune moment to follow the vicissitudes, through my childhood and my adult life, of these seeds, and the harvests of illusion, isolation and conflict into which some of them have grown. But that's not the place here, where I have a more limited purpose. I think I can say that this attitude of contempt has never in my life taken on a vehemence and destructive force comparable to those I saw in my mother's life (when I took the trouble to look at my parents' lives, twenty-two years after my mother's death, and thirty-seven years after my father's). But now is as good a time as any to examine carefully, here, at least, what place this attitude has had in my life as a mathematician.

Before doing so, in order to put the incident described in the preceding paragraph into its general context, I would like to emphasise that it stands entirely alone among my memories of the 1950s and even later. Even today, when I see a sometimes disconcerting erosion of certain elementary forms of courtesy and respect for others in the environment that was once mine (<sup>10</sup>), the direct and undisguised expression of contempt from boss to pupil must be a fairly rare occurrence. As far as the fifties are concerned, I have very few memories of any fear that might have surrounded a well-known figure at the time, or of a contemptuous or simply disdainful attitude. If I dig into this, I can say that the first time I was received at Dieudonné's home in Nancy, with the delicate kindness he always showed me, I was a little taken aback by the way this refined and affable man talked about his students - all of them morons, I might add! It was a chore lecturing them, and it was obvious that they didn't understand anything. ... After 1970 I heard the echoes coming from the lecture theatre side, and I knew that Dieudonné was indeed feared by the students. However, although he was reputed to have strong opinions and to express them with a sometimes thunderous frankness, I never saw him behave in a hurtful or humiliating way, even in the presence of colleagues of whom he had a very poor reputation.

or at times of his legendary temper tantrums, which would subside as quickly and easily as they had arisen.

Without associating myself with the feelings expressed by Dieudonné about his students, I didn't distance myself from his attitude either, presented as the most obvious thing in the world, as almost self-evident on the part of someone who had a passion for mathematics. Thanks to the benevolent authority of my elder brother, this attitude seemed to me to be at least one of the possible attitudes one could reasonably have towards students and teaching tasks.

It seems to me that for Dieudonné and for me, both imbued with the same ideology of merit, its isolating effect was largely negated when we found ourselves in front of a real person, whose very presence silently reminded us of realities more essential than those of so-called 'merit', and re-established a forgotten link. The same must have happened to most of our colleagues and friends, no less imbued than Dieudonné or myself with the widespread superiority syndrome. This is no doubt still the case today for many of them.

Weil also had the reputation of being feared by his students, and he is the only one in my microcosm, in the fifties, whose reputation I had the impression that he was feared even among colleagues of more modest status (or simply temperament). At times, he would display attitudes of unremitting haughtiness, which could disconcert even the most hardened of self-confidence. My susceptibility helped, and once or twice this led to temporary quarrels. I didn't perceive in his manner any hint of contempt or a deliberate intention to hurt or crush; rather, he had the attitude of a spoilt child, taking pleasure (sometimes maliciously) in making people feel uncomfortable, as a way of convincing himself of the power he wielded. In fact, he had a truly astonishing influence over the Bourbaki group, which he sometimes gave me the impression of bossing around, rather like a nursery school teacher bossing around a group of well-behaved children.

I can only remember one other occasion in the 1950s when I felt a brutal, undisguised expression of contempt. It came from a foreign colleague and friend, about my age. He had uncommon mathematical power. A few years earlier, when this power was already quite apparent, I had been struck by his submission (which seemed to me almost obsequious) to the great professor whose modest assistant he still was. His exceptional abilities quickly earned him an international reputation.

and a key position at a particularly prestigious university. There he ruled over a small army of student assistants, apparently just as absolutely as his boss had ruled over him and his fellow students. When I asked him (if I remember correctly) if he had any students (by which he meant students who did good work with him), he replied, with an air of false casualness (I'm translating into French): "douze pièces! - where "pièces" was the name by which he referred to his pupils and assistants. It is certainly rare for a mathematician to have so many students at the same time doing research under his direction - and surely my interlocutor was secretly proud of this, which he tried to hide under that careless air, as if to say: "oh, just twelve pieces, not even worth talking about! That must have been around 1959, I already had a good shell, so I'm sure, but I still felt a little sick! I had to tell him straight away one way or another, and I don't think he was angry with me. Perhaps even his relationship with his students wasn't as sinister as his expression might suggest (I didn't get a testimonial from one of his students), and he'd simply been caught up in his childish desire to strut before me in all his glory. Looking back, I can see that this incident must have marked a turning point in our relationship, which had been one of friendship - I sensed in him a kind of fragility, a finesse too, which attracted my affectionate sympathy. These qualities had become blunted, corroded by his position as an important man, admired and feared. After that incident, I still felt uneasy about him - I definitely didn't feel part of the same world as him. . .

Yet we were part of the same world - and without realising it any more than he did, I was probably getting thicker too. I still have a vivid memory of the Edinburgh International Congress in 1958. Since the previous year, with my work on the Riemann-Roch theorem, I had been promoted to the big star, and (although I didn't have to tell myself this in no uncertain terms at the time) I was also one of the stars of the Congress. (I gave a talk there on the vigorous start of schema theory that same year). Hirzebruch (another star of the day, with his own Riemann-Roch theorem) was giving a keynote speech, in honour of Hodge who was retiring this year. At one point, Hirzebruch suggested that mathematics was made by the work of young people in particular, rather than that of mature mathematicians. This triggered a general outcry of approval in the Congress hall, where young people formed the majority. I was delighted and very much in agreement, of course; I was thirty years old, which could still pass for young, and the world was mine! In my enthusiasm, I had to shout out loud and type

the table. I happened to be sitting next to Lady Hodge, the wife of the eminent mathematician who was supposed to be honoured on this occasion, as he was about to retire. She turned to me with wide eyes and said a few words that I can no longer remember - but I must have seen reflected in her astonished eyes the tactless thickness that had just been unleashed on this lady at the end of her life. I felt something then, of which the word 'shame' perhaps gives a distorted image - rather a humble truth about who I was then. I didn't have to bang on any more tables that day. ...

#### 14. The birth of fear.

It was around this time I suppose, when (without having sought it) I began to be seen as a star in the mathematical world, that a certain fear must also have begun to surround my person, for a good number of unknown or lesser-known colleagues. I suppose so, without being able to place it in a precise memory, in an image that struck me and became fixed in my memory, like the incident reported earlier (which undoubtedly marked my first encounter with contempt in my adopted environment). It must have happened insensitively, without attracting my attention, without manifesting itself in some particular, typical incident that memory would have retained, in a light perhaps just as deliberately anodyne as that other incident. What I remember 'en bloc' from those years of transition is that it was not uncommon for people who approached me, whether after my seminar, or during a meeting such as the Bourbaki seminar or some colloquium or congress, to have to overcome a kind of stage fright, which remained more or less apparent during our discussion, if there was one. When the discussion lasted more than a few minutes, this discomfort usually disappeared gradually as we spoke and the conversation became more animated. Occasionally, on rare occasions, the discomfort would persist to the point of becoming a real obstacle to communication, even at the impersonal level of a mathematical discussion, and I would then feel a confused sense of helpless suffering, exasperated with itself. I'm talking about all this without really 'remembering', as if through a fog that nevertheless gives me back impressions that must have been recorded, and no doubt evacuated as I went along. I wouldn't be able to place in time, other than by supposition, the appearance of this discomfort, an expression of fear.

I don't think that this fear emanated from me personally and that it was limited to an attitude, to behaviour that would have set me apart from my colleagues. If that had been the case, it seems to me that I would have ended up receiving echoes of it in the early seventies, when I stepped out of a role to which I had lent myself until then, the role of the star, the 'big boss'. I think it was this role, and not myself, that was surrounded by fear. And this role, it seems to me, with this halo of fear that has nothing in common with respect, did not exist, not yet, at the beginning of the fifties, at least not in the mathematical milieu that had welcomed me from the very moment I met it, in 1948.

Before this 'awakening' in 1970, I wouldn't have thought of describing as 'fear' the stage fright and embarrassment that I sometimes experienced with colleagues who weren't part of my most familiar environment. I was embarrassed by it myself when it appeared, and did everything I could to dispel it. A remarkable thing, typical of the lack of attention paid to this kind of thing in my beloved microcosm: I can't remember a single time, in the twenty years I've been part of this environment, when the question was raised between a colleague and myself, or by others in front of me! <sup>(11)</sup> Nor does this 'fog' that serves as my memory give me any impression of conscious or unconscious gratification that such situations might have aroused in me. I don't think there were any at the conscious level, but I wouldn't venture to say that I wasn't occasionally touched by them at the unconscious level in the early years. If so, it must have been fleeting, without any repercussions in terms of behaviour that would have acted as a fixative for a discomfort. It's certainly not that my fatuity wasn't involved in the role I was playing! But if I invested all my energies in this role, then what motivated my ego was not the ambition to impress the 'rank and file', but to constantly surpass myself in order to win the ever-renewed esteem of my 'peers' - and above all, perhaps, of the elders who had given me credit and accepted me as one of their own even before I had had a chance to prove myself. It seems to me that my inner attitude towards the fear I was the object of, which I tried my best to ignore while at the same time dispelling it as best I could where it manifested itself - that attitude can be considered typical throughout the sixties in the milieu (the 'microcosm') of which I was a part.

The situation has deteriorated considerably in the ten or fifteen years since then, at least judging by the signs that reach me from time to time.

I have been a close witness to, and sometimes even a co-actor in, many of these situations. More than once, among those of my former friends or students who had been dearest to me, I was confronted with the familiar, unmistakable signs of contempt; with the (seemingly 'gratuitous') desire to discourage, to humiliate, to crush. A wind of contempt blew through this world that had been dear to me. It blows, regardless of 'merit' or 'demerit', burning with its breath the humblest vocations as well as the most beautiful passions. Is there a single one of my companions of yesteryear, each protected, along with 'his own', by solid walls, settled (as I once was) in the hushed fear that surrounds his person - is there a single one who feels that breath? I know one and only one of my old friends who felt it and told me about it, without calling it by name. And another who felt it one day, as if against his will, only to forget about it the very next day (<sup>12</sup>). Because to feel this breath and to accept it, for one of my friends of yesteryear as for myself, is also to accept to look at ourselves.

### 15. Harvesting and sowing.

I don't think, I wouldn't dream of being indignant about a wind that blows, when I have clearly seen that I am not a stranger to this wind, as some fatuity in me would have me believe. And even if I had been a stranger to it, my indignation would have been a derisory offering to those who are humiliated as well as to those who humiliate, and whom I have loved both.

I was no stranger to this wind, through my connivance with the contempt and fear in the world I had chosen. It suited me to turn a blind eye to these and many other blunders, both in my professional life and in my family life. In both, I reaped what I sowed - and what others also sowed before me or with me, both my parents (and my parents' parents...) and my new friends of yesteryear. And others besides me are now reaping the rewards of those seeds that were sown, both my children (and my children's children) and one of my pupils today, who was treated with contempt by one of my pupils of yesteryear.

And there is neither bitterness nor resignation in me, nor self-pity, when I speak of sowing and reaping. For I have learned that even in the bitter harvest there is substantial flesh which it is up to us to feed on. When this substance is eaten and becomes part of our flesh, the bitterness, which was only a sign of our resistance, disappears.

in front of our own food.

And I also know that there are no harvests that are not also the sowing of other harvests, often more bitter than those that preceded them. There are still times when something in me tightens at the seemingly endless chain of carefree sowing and bitter reaping, handed down and repeated from generation to generation. But I am no longer overwhelmed by it or revolted by it as if it were a cruel and inescapable fate, and even less am I its complacent and blind prisoner, as I once was. For I know that there is a nourishing substance in everything that happens to me, whether the seeds are sown by me or by others - it is up to me to eat and see it transformed into knowledge. And it's no different for my children and all those I have loved and those I love at this moment, when they reap what I sowed in times of fatuity and carelessness, or what I happen to be sowing even today.

#### 16. Marshes and front rows.

But I haven't yet reached the end of this reflection, on the part I played in the appearance of contempt and in its progression, in this world to which I continued so blithely to refer by the name of 'mathematical community'. It is this reflection, I feel now, that is the best thing I have to offer to those I have loved in this world, at a time when I am preparing not to return to it, but to express myself once again.

Above all, I think, I need to examine the kind of relationships I had with the people who were part of that world, when I was still part of it like them.

Thinking about it now, I'm struck by the fact that there was a whole part of this world that I used to come into contact with regularly, but which escaped my attention as if it hadn't existed. I must have perceived it at the time as a kind of 'swamp' with no clearly defined function in my mind, not even that of a 'sounding board' I suppose - as a kind of grey, anonymous mass of people who invariably sat in the back rows of seminars and colloquia, as if they had been assigned there by birth, those who never opened their mouths during a talk to hazard a question, certain as they must have been in advance that their question could only be beside the point. If they did ask a question of people like me, who were reputed to be 'in the know', it was in the corridors, when it was obvious that 'those in the know' weren't pretending to want to know anything.

talk amongst themselves - they would then ask their question quickly and as if on tiptoe, ashamed of taking up the precious time of important people like us. Sometimes the question seemed to be off the mark and I tried (I imagine) to explain in a few words why; often it was relevant and I answered it as best I could, I think. In both cases it was rare for a question asked in such a mood (or, should I say, in such an atmosphere) to be followed up by a second question, which would have clarified it or expanded on it. Perhaps we, the people in the front rows, were in too much of a hurry in these cases (even though we were certainly sometimes trying not to appear so), for the fear in front of us to dissipate, and for an exchange to take place. Of course, I sensed, as did my interlocutor, what was false and artificial about the situation in which we were involved - without my ever having formulated it to myself, and without him, no doubt, ever having formulated it to himself. The two of us functioned like strange automatons, and a strange connivance bound us together: that of pretending to ignore the anguish that embraced one of us, obscurely perceived by the other - that particle of anguish in the anguish-laden air that saturated the place, that everyone surely perceived as we did, and that everyone chose to ignore by common agreement ( ).<sup>13</sup>

This confused perception of anguish only became conscious in me on the Friday of the first 'awakening', in 1970, at the moment when this 'swamp' came out of the half-light in which I had hitherto liked to keep it in my mind. Without any deliberate decision, without my realising it at the time, I left one environment to enter another - the environment of the people 'in the front ranks' for the 'swamp'.

Suddenly, most of my new friends were precisely those who, just a year before, I would have tacitly located in this nameless, featureless land. The so-called marsh was suddenly alive and kicking with the faces of friends linked to me by a shared adventure.

- another adventure!

#### 17. Terry Mirkil.

To tell the truth, even before this crucial turning point, I had made friends with comrades (who later became 'colleagues') whom I would probably have located in the 'swamp', had the question been put to me (and had they not been my friends...). It took this reflection, and me digging through my memories, to remember and for the scattered memories to come together. I made

I got to know these three friends in the very early days, when I was learning the trade in Nancy like them - at a time when we were still in the same boat, when nothing designated me as an 'eminence'. It's probably no coincidence that there were no other such friendships in the twenty years that followed. The four of us were foreigners, and that was certainly a significant link - my relations with the young 'Nor-Maliens', parachuted into Nancy like me, were much less personal, and we hardly saw each other except at university. One of my three friends emigrated to South America one or two years later. Like me, he was a research associate at the CNRS, and I had the impression that he didn't really know what he was 'looking for'. We continued to see or write to each other from time to time, and eventually we lost touch. My relationship with the other two friends lasted longer, was stronger and much less superficial. Our mathematical interests played little or no part in it.

Terry Mirkil and his wife Presocia, slim and fragile like him, with an air of gentleness in both of them, often spent evenings, and sometimes nights, in Nancy, singing, playing the piano (Terry was playing at the time), talking about music, which was their passion, and about other important things in our lives. Not the *most* important things, it's true - not the things that are always so carefully hushed up... But I got a lot out of that friendship. Terry had a finesse and a discernment that I lacked, when most of my energy was already focused on mathematics. Much more than me, he had retained a sense of the simple and essential things - the sun, the rain, the earth, the wind, singing, friendship.... .

After Terry had found a position to his liking at Dartmouth College, not so far from Harvard, where I made frequent visits (from the late fifties onwards), we continued to meet and write to each other. In the meantime, I knew that he was prone to depression, which led to long stays in 'madhouses', as he called them in the only terse letter he ever wrote to me, following one of those 'horrible stays'. When we met, it was never mentioned - except once or twice, very incidentally, in response to my astonishment that he and Presocia were not adopting children. I don't think it ever occurred to me that he and I could talk about the substance of the problem, or even touch on it - certainly not even the idea that there might be problems to look at, in my friend's life or in mine... These things were taboo,

unspoken and insurmountable.

Gradually, the meetings and letters became less frequent. It's true that I was becoming more and more the prisoner of tasks and a role, and above all of this desire, which had become like a fixed idea, perhaps an escape from something else, to constantly surpass myself in the accumulation of works - while my family life was mysteriously, inexorably deteriorating...

When I learned one day, through a letter from one of Terry's colleagues at Dartmouth, that my friend had committed suicide (it was long after he was already dead and buried. . . ), this news came to me as if through a fog, like an echo from a very distant world that I had left behind, God knows when. A world inside me, perhaps, that had died long before Terry ended his life, devastated by the violence of an anguish he hadn't known or wanted to resolve, and that I hadn't known or wanted to guess...

#### 18. Vingt ans de fatuité, or: the tireless friend.

My relationship with Terry was not distorted, at any time I think, by the difference in our status in the mathematical world, or by any feeling of superiority that I might have derived from it. This friendship, and one or two others that life gave me in those days (without worrying whether I 'deserved' it!) was surely one of the rare antidotes at the time against a secret fatuity, fuelled by social status and, even more, by the awareness that I had acquired of my mathematical power and the value that I myself placed on it. The same was not true of my relationship with the third friend. Over the years, he and later his wife (whom he had met when we first met in Nancy) showed me a warm friendship, marked by delicacy and simplicity, whenever we met, in their house or mine. In this friendship there was clearly no ulterior motive, linked to status or cerebral capacity. Yet my relationship with them remained marked for more than twenty years by that deep ambiguity in me, that division I mentioned, which has marked my life as a mathematician. In their presence, each time again, I couldn't help but feel their affectionate friendship and respond to it, almost unwillingly! At the same time, for more than twenty years I managed to pull off the feat of looking down on my friend from the height of my stature. This must have been the case from my early years in Nancy, and for a long time my prejudice extended to his wife, as if he couldn't possibly have a wife of his own.

his wife could only be as 'insignificant' as he was. Between my mother and me, we chose to refer to him only by a mocking nickname, which must have stayed with me long after my mother's death in 1957. It now appears to me that at least one of the forces behind my attitude was the influence that my mother's strong personality exerted on me throughout her life, and for almost twenty years after her death, during which time I continued to be imbued with the values that had dominated her own life. My friend's gentle, affable, non-combative nature was tacitly classed as 'insignificant', and became the object of mocking disdain. It is only now, taking the trouble for the first time to examine what that relationship was, that I am discovering the full extent of the stubborn isolation from the warm sympathy of others that marked it for so long. My friend Terry, no more combative or forceful than this other friend, had the good fortune to be approved of by my mother and was not the object of her mockery - and I suspect that this is why my relationship with Terry was able to blossom without any inner resistance within me. His investment in mathematics was no more fervent, nor were his 'gifts' any more promising, without my using this as an excuse to cut myself off from him and his wife by this shell of disdain and smugness!

What is still incomprehensible to me in this other relationship is that my friend's affectionate friendship was never discouraged by the reticence he could not fail to sense in me at each new meeting. Yet today I know that I was *something other* than that shell and that disdain, something other than a cerebral muscle and a fatuity that took pride in it. As in them, there was the child in me - the child I tried to ignore, the object of disdain. I had cut myself off from him, and yet he lived somewhere inside me, healthy and vigorous as the day I was born. The affection of my friends, less cut off from their roots than I was, surely went to the child. And it was surely he too who responded in secret, on the sly, when the Great Chief's back was turned...

#### 19. The world without love.

Fortunately, the Big Chief has aged, he's become a little more effete, and the kid has since been able to take it all in his stride. As for this relationship with these really tough friends, it seems to me that I've put my finger on the most blatant, the most grotesque case in my life of the effects of a certain fatuity (among other things) in a personal relationship. Perhaps I am

But I believe that this is also the only case where my relationship with a colleague or a friend in the mathematical world (or even elsewhere) has been invested in a lasting way by fatuity, instead of just appearing occasionally, discreetly and fleetingly. It seems to me, moreover, that among the many friends I had in the mathematical world at the time and whom I liked to keep company with, there is not one for whom I could imagine that they had experienced a similar lapse in their relationship with a colleague, whether a friend or not. Of all my friends, I was perhaps the least 'cool', the most 'polite', the least inclined to show a hint of humour (it only came to me later), the most inclined to take myself terribly seriously. In fact, I probably wouldn't have sought out the company of people like me (assuming there were any)!

The amazing thing was that my friends, swamp or no swamp, put up with me and even took a liking to me. This is a good and important thing to say here - even though we often saw each other only to discuss maths for hours on end and days on end: affection flowed, as it still does today, between the friends of the time (according to sometimes fortuitous affinities) and me, from that first moment when I was received with affection in Nancy, in 1949. In the house of Laurent and Hélène Schwartz (where I was somewhat part of the family), that of Dieudonné, that of Godement (which at one time I also visited regularly).

This affectionate warmth that surrounded my first steps in the world of mathematics, and which I have tended to forget, has been important throughout my life as a mathematician. It was certainly this affection that gave a warm tone to my relationship with the environment that my elders embodied for me. It gave all its strength to my identification with this environment, and all its meaning to the name 'mathematical community'.

Clearly, for many young mathematicians today, it is being cut off during their apprenticeship, and often well beyond, from any current of affection or warmth; seeing their work reflected in the eyes of a distant boss and his parsimonious comments, rather as if they were reading a circular from the Ministry of Research and Industry, which clips the wings of work and deprives it of a deeper meaning than that of a dull and uncertain livelihood.

But I'm anticipating, by talking about this disgrace, the most profound of all perhaps, of the mathematical world of the 70s and 80s - the mathematical world where those who were

my pupils, and the pupils of my old friends, set the tone. A world where, often, the boss assigns his subject of work to the student, like throwing a bone to a dog - that or nothing! Like assigning a cell to a prisoner: this is where you will purge your solitude! Where such meticulous and solid work, the fruit of years of patient effort, is rejected by the smiling contempt of the one who knows everything and has the power in his hands: "this work doesn't amuse me!" and the matter is filed away. Good for the dustbin, let's say no more about it. . .

I am well aware that such disgraces did not exist in the milieu I knew, among the friends I made, in the fifties and sixties. It's true that I learned in 1970 that this was the bread and butter of the scientific world outside maths.

— and even in maths this was apparently not so rare, open contempt, flagrant abuse of power (and no recourse), even among certain renowned colleagues whom I had had the opportunity to meet. But in the circle of friends that I had naively taken to be 'the' mathematical world, or at least a faithful miniature expression of it, I knew nothing of the sort.

And yet the seeds of contempt must already have been there, sown by my friends and me, and have sprouted in our students. And not only in our students, but also in some of my former companions and friends. But my role is not to denounce or even to fight: you can't fight corruption. When I see it in some of my students whom I once loved, or in some of my former companions, something inside me tightens - and rather than accepting the knowledge that pain brings me, I often refuse the pain and struggle, taking refuge in refusal and a fighting attitude: such a thing has no place! And yet it is - and I even know deep down what it means. In more ways than one, I'm no stranger to it, if a pupil or former companion whom I loved takes pleasure in discreetly crushing another whom I love and in whom he recognises me.

Once again I digress, doubly so I might say - as if the wind of contempt only blew around my home! Yet it is by blowing on me above all and on those who are close and dear to me that I am touched by it and know it. But the time is not ripe to talk about it, except to myself alone, in silence. Instead, it's time for me to pick up the thread of my reflection-testimony, which could well be called 'In Pursuit of Contempt' - contempt in myself and those around me, in the mathematical environment that was mine in the fifties and sixties.

## 20. A world without conflit?

I thought I'd say a few lines about the 'marsh', just to say that it was there but that I didn't go there - and as so often in meditation (and also in mathematical work), the 'nothing' we look at turns out to be full of life and mystery, and hitherto neglected knowledge. Like that other 'nothing', which also happened to be in Nancy (decidedly the cradle of my new identity!), the 'nothing' of that student who was probably a bit of a loser who was being treated like.... I thought of it again in a flash earlier, when I wrote (a bit hastily perhaps?) that 'these disgraces' didn't yet exist 'back home'. Let's just say that this is the one and only incident of its kind that I can report, which (admittedly) resembles the 'disgrace' I was referring to, without dwelling too much on a detailed description. Those who have experienced it will know what I'm talking about, without having to spell it out. And also those who, without having experienced it, are not in a hurry to close their eyes every time they are confronted with it. As for the others, those who despise to their heart's content as well as those who are content to close their eyes (as I myself successfully did for twenty years), even an album of drawings would be a wasted effort...

It remains for me to examine my personal and professional relationships with my colleagues and pupils, over these two decades, and incidentally also, what I was able to know about the relationships of my closest colleagues with each other, and with their pupils. The thing that strikes me most today is how *conflit* seems to *have been absent from all these relationships*. I must add straight away that this is something that in those days seemed quite natural to me - a bit like the least of things. Conflict, between people of good will, mentally and spiritually mature and all that (the least of things, again!), *had no place*. Where there was conflict, I looked on it as a kind of regrettable misunderstanding: with the right amount of goodwill and by explaining things to each other, it could only be resolved as quickly as possible and without leaving any traces! If I chose mathematics as my favourite subject from an early age, it was surely because I felt that this was the path along which my vision of the world had the best chance of not coming up against disturbing denials at every step. Once you've *demonstrated* something, after all, everyone agrees - people of goodwill and all that, that is.

As it happens, I was right. And the story of these two decades spent in the

The quietude of the 'conflict-free' (?) world of my beloved 'mathematical community', is also the story of a long inner stagnation within me; eyes and ears blocked, with nothing to take in except maths or very little of it - while in my private life (first in the relationship between my mother and me, then in the family I founded immediately after her death) there was a silent destruction that at no time during those years did I dare to look at. But that's another story... . The 'awakening' of 1970, about which I have often spoken in these lines, was a turning point not only in my life as a mathematician, and a radical change of environment, but also a turning point (give or take a year) in my family life. It was also the year when, for the first time, in contact with my new friends, I ventured an occasional glance - albeit a furtive one - at the conflict in my life. It was the moment when a doubt began to dawn on me, which matured over the years that followed, that the conflict in my life, and the conflict that I sometimes feared in the lives of others, was not just a misunderstanding, a 'burr' that could be wiped away with a sponge.

This (at least relative) absence of conflict, in the environment I had chosen as my own, seems to me in retrospect a rather remarkable thing, when I have come to learn that conflict rages wherever humans live, in families as well as in workplaces, be they factories, laboratories or teachers' or assistants' offices. It's almost as if I'd stumbled upon the one heavenly island in the Universe where people live without conflict, in September or October 1948, landing in Paris without suspecting a thing!

All of a sudden it seems really extraordinary to me, after everything I've learnt since 1970. Surely it deserves a closer look - is it myth, or reality? I can see the affection that flowed between so many of my friends and me, and later between students and me, I don't have to invent it - but it almost seems as if I have to invent conflict, in this heavenly world from which conflict seems banished!

It's true that in the course of this reflection I've had occasion to touch on two situations of conflict, each revealing an inner attitude within me: one is the incident of the 'null pupil' in Nancy, the ins and outs of which I don't know between the direct protagonists. The other is a situation of conflict within myself, a division, in my relationship with the 'indefatigable friend' - but this never expressed itself in the form of a conflict between people, the only form of conflict generally recognised. Remarkably, in the conventional sense of the word, the relationship between these friends and myself was entirely free of

conflict - there was never a cloud in the sky. The division was in me, not in them.

I continue the census. One of my first thoughts: the Bourbaki group! During the years when I was a more or less regular member of the group, right up to the end of the fifties, this group embodied for me the ideal of collective work carried out with respect both for the seemingly minute details of the work itself and for the freedom of each of its members. At no time did I sense among my friends in the Bourbaki group the shadow of a hint of constraint, either on myself or on anyone else, whether a seasoned member or a guest, who had come to try things out to see if things would 'click' between him and the group. At no time was there any hint of a struggle for influence, be it over differences of opinion on this or that issue on the agenda, or a rivalry for hegemony over the group. The group functioned without a leader, and apparently nobody in their heart of hearts, as far as I could see, aspired to play that role. Of course, as in any group, one member exerted a greater influence on the group, or on other members, than another. Weil played a special role in this respect, which I have already mentioned. When he was present, he was a bit of a 'playmaker' (<sup>14</sup>). Twice, I think, my sensibilities got the better of me, and I left - these are the only signs of 'conflict' that I know of. Gradually, Serre exerted an ascendancy over the group comparable to that of Weil. When I was a member of Bourbaki, this did not give rise to any rivalry between the two men, and I am not aware of any enmity that may have developed between them later on. With the benefit of twenty-five years' hindsight, Bourbaki, as I knew him in the 1950s, still seems to me to be an example of remarkable success in terms of the quality of the relationships within a group formed around a common project. This quality of the group seems to me to be even rarer than the quality of the books that came out of it. It was one of the many privileges of my life, full of privileges, to have met Bourbaki, and to have been part of it for a few years. If I did not stay, it was not because of conflicts or because the quality I mentioned had deteriorated, but because more personal tasks attracted me even more strongly, and I devoted all my energy to them. Moreover, this departure cast no shadow over my relationship with the group or with any of its members.

I'd have to go through all the conflict situations in which I was involved, which pitted me against one of my colleagues or one of my students, between 1948 and 1970. The only

thing that stands out at all are the two temporary falling-outs with Weil, which have already been mentioned. A few fleeting shadows, very fleeting shadows on my relations with Serre, because of my susceptibility to the sometimes disconcerting casualness with which he would cut me short when a conversation had finished interesting him, or express his lack of interest, or even his aversion to a particular work in which I was involved, or a particular vision of things that I insisted on, perhaps a little too much and too often! It never developed into a falling out. Temperamental differences aside, our mathematical affinities were particularly strong, and he must have felt as I did that we complemented each other.

The only other mathematician to whom I was linked by a comparable and even stronger affinity was Deligne. On this subject, I remember that the question of Deligne's appointment to the IHES in 1969 gave rise to tensions, which I did not perceive at the time as a 'conflict' (which would have been expressed, say, by a falling out, or by a turning point in a relationship between colleagues).

It seems to me that I've come full circle - that in terms of conflict between people, visible through tangible manifestations, in relations between colleagues or between colleagues and pupils in the environment I haunted, that's all during those twenty-two years, incredible as it may seem. In other words, there was no conflict in the paradise I had chosen - so no scorn? Another contradiction in mathematics?

I'll definitely have to take a closer look!

## 21. A well-kept secret.

Yesterday I certainly forgot a few minor episodes, such as temporary 'cold spots' in my relationship with a colleague, due in particular to my susceptibility. I should also add three or four occasions when my self-esteem was disappointed, when colleagues and friends did not remember, in some of their publications, that an idea or result I had shared with them must have played a role in their work (so it seemed to me). The fact that I still remember it shows that it was a sensitive point, and one that perhaps hasn't entirely disappeared with age! Except on one occasion, I refrained from mentioning it to those concerned, whose good faith was certainly above suspicion. The opposite situation must also have occurred, but I never heard anything about it. I am not aware of any case, in my 'microcosm', where a question of priority has been the occasion of a quarrel or enmity, or even of bitter-sweet words between the parties concerned. Even so, the only

On one occasion when I had such a discussion (in what seemed to me an egregious case) there was a sort of spat, which cleared the air without leaving a residue of resentment. It was about a particularly brilliant colleague, who had, among other abilities, the ability to assimilate with impressive speed everything he heard, and it seems to me that he often had an unfortunate tendency to take as his own the ideas of others that he had just learned from their mouths.

There is a difficulty here which must be found in a more or less strong form among all mathematicians (and not only among them), and which is not only due to the egotistical drive which pushes most of us (and I am no exception) to attribute 'merits' to ourselves, whether real or supposed. The understanding of a situation (mathematical or otherwise), however we arrive at it, with or without the assistance of others, is in itself something of a personal essence, a personal experience whose fruit is a vision, also necessarily personal. A vision can sometimes be communicated, but the vision communicated is different from the initial vision. That being the case, we need to be very vigilant in determining the part played by others in the formation of our vision. I'm sure I didn't always have this vigilance, which was the least of my worries, even though I expected it from others! Mike Artin was the first and only person to suggest to me one day, with the joking air of someone divulging an open secret, that it was both impossible and perfectly pointless to bother trying to discern which part was 'one's own' and which was 'someone else's' when you manage to get to grips with a substance and understand something about it. This was a bit disconcerting for me, even though it was not at all part of the deontology that had been taught to me by example by Cartan, Dieudonné, Schwartz and others. Yet I had a vague feeling that there was a truth in his words, and just as much in his laughing gaze, that had escaped me until then(\*). My relationship with mathematics (and above all, with mathematical production) was heavily invested by the ego, and this was not the case with Mike. He really gave the impression of doing maths like a kid having fun, without forgetting to eat and drink.

## 22. Bourbaki, or my big chance - and its dreams.

Even before diving a little further below the visible surface, there's one thing you should be aware of

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(\*) (30 September) For another aspect of things, see the note of 1 June (three months after the present text), "Ambiguity" (no.° 63<sup>60</sup>), examining the pitfalls of a certain complacency towards oneself and others.

which is obvious to me right now: it's that *the mathematical environment I inhabited for two decades, in the 50s and 60s, was indeed a 'world without conflit'*, so to speak! That's quite an extraordinary thing in itself, and deserves a little thought.

I should make it clear straight away that this is a very restricted milieu, the central part of my mathematical microcosm, limited to my immediate 'environment' - the twenty or so colleagues and friends whom I met regularly, and to whom I was most closely linked.

Reviewing them, I was struck by the fact that more than half of these colleagues were active members of Bourbaki. Clearly, *the core and soul of this half-crocosm was Bourbaki* - it was, more or less, Bourbaki and the mathematicians closest to Bourbaki. In the 60s I was no longer part of the group myself, but my relationship with some of the members remained as close as ever, particularly with Dieudonné, Serre, Tate, Lang and Cartier. I continued to be a regular at the Séminaire Bourbaki, or rather I became one at that time, and it was at that time that I gave most of my talks there (on the theory of schemas).

It was undoubtedly in the 1960s that the 'tone' in the Bourbaki group shifted towards an increasingly pronounced elitism, of which I was certainly a part at the time, and which for that reason I was unlikely to notice. I still remember how astonished I was, in 1970, to discover the extent to which the very name of Bourbaki had become unpopular with large sections of the mathematical world (which I had hitherto ignored), as being more or less synonymous with elitism, narrow dogmatism, the cult of the 'canonical' form at the expense of a living understanding, hermeticism, castrating anti-spontaneity, and so on! And it wasn't just in the 'swamp' that Bourbaki got a bad press: in the 1960s, and perhaps even earlier, I'd heard occasional echoes of it from mathematicians with a different turn of mind, allergic to the 'Bourbaki style' (<sup>15</sup>). As an unconditional adherent, I was surprised and a little saddened by this - I thought that mathematicians brought minds together! But I should have remembered that when I started out, it wasn't always easy or inspiring to swallow a Bourbaki text, even if it was quick. The canonical text hardly gave any idea of the atmosphere in which it was written, to say the least. It seems to me now that this is precisely the main shortcoming of the Bourbaki texts - that not even an occasional smile can give rise to the suspicion that these texts were written by *people*, and people bound together by something other than some oath of unconditional fidelity to ruthless canons of rigour...

But the question of the slide towards elitism, like that of Bourbaki's writing style, is a digression here. The thing that strikes me here is that this 'Bourbakian microcosm' that I had chosen as my professional milieu *was a world without conflit*. This seems to me all the more remarkable in that the protagonists in this milieu each had a strong mathematical personality, and many are considered to be 'great mathematicians', each of whom certainly had the weight to form his own microcosm, of which he would have been the centre and undisputed leader! (<sup>16</sup>) It is the cordial and even affectionate coexistence, for two decades, of these strong personalities in the same microcosm and in the same working group, that strikes me as so remarkable, perhaps unique. This ties in with the impression of 'exceptional success' that was already expressed yesterday about Bourbaki.

In the end, it would seem that I was exceptionally fortunate, when I first came into contact with the world of mathematics, to have stumbled upon *the* privileged place, in time and space, where a mathematical community of exceptional quality, perhaps unique for that quality, had been forming for some years. This environment became mine, and has remained for me the embodiment of an ideal 'mathematical community', which probably did not exist at that time (beyond the environment which for me embodied it) any more than at any other time in the history of mathematics, except perhaps in a few equally restricted groups (such as perhaps the one which had formed around Pythagoras in a quite different spirit).

My identification with this milieu was very strong, and inseparable from my new identity as a mathematician, born at the end of the 1940s. It was the first group, apart from my family, where I was warmly welcomed and accepted as one of them. Another link, of a different kind: my own approach to mathematics found confirmation in that of the group, and in those of the members of my new environment. It wasn't identical to the 'Bourbachian' approach, but it was clear that the two were brothers.

This environment, moreover, must have represented for me that ideal place (or very close to it!), that *place without conflit* whose quest had undoubtedly directed me towards mathematics, the science above all where any hint of conflict seemed to me to be absent! And although I spoke earlier of my 'exceptional luck', it was clear to me that this luck had its downside. While it has enabled me to develop my skills and to show my worth as a mathematician in the midst of my elders, who have become my peers, it has also been a welcome means of escaping from the world of mathematics.

conflict in my own life, and a long period of spiritual stagnation.

### 23. De Profundis.

This 'Bourbach' environment has undoubtedly exerted a strong influence on me as a person and on my vision of the world and my place in it. This is not the place to try and pinpoint this influence and how it has manifested itself in my life. I would only say that it does not seem to me that my inclinations towards fatuity, and their meritorious rationalisations, were in any way stimulated by my contact with Bourbaki and by my insertion into the 'Bourbachean milieu' - at least not at the end of the forties and in the fifties. The seeds had been sown in me for a long time, and would have found an opportunity to develop in any other environment. The incident of the 'null student' that I have reported is in no way typical, quite the contrary, of an atmosphere that would have prevailed in that environment, I repeat, but solely of an ambiguous attitude in my own person. The atmosphere at Bourbaki was one of respect for the individual, an atmosphere of freedom - at least that's how I felt; and it was such as to discourage and attenuate any inclination towards attitudes of domination or fatuity, whether individual or collective.

This environment of exceptional quality is no more. It died, I don't know when, without anyone noticing and sounding the death knell, even within themselves. I suppose there must have been an insensitive deterioration in people - we all had to 'grow a pair', become stale. We've become important people, listened to, powerful, feared, sought after. Perhaps the spark was still there, but the innocence was lost along the way. Some of us may find it again before we die, like a new birth - but the environment that welcomed me is no more, and it would be pointless for me to expect it to resurrect. Everything is back to normal.

And respect may also have been lost along the way. By the time we had pupils, it was perhaps too late for the best to be passed on - there was still a spark, but no longer any innocence or respect, except for 'his peers' and 'his own'.

The wind can pick up and blow and burn - we're sheltered behind thick walls, each of us with 'our own'.

Everything's back to normal. ...

### 24. My farewell, or: strangers.

This retrospective of my life as a mathematician takes a completely different path than I had planned. To tell the truth, I wasn't even thinking of a retrospective, but only of saying in a few lines, or even a page or two, what my relationship was today with this world that I had left, and perhaps also, conversely, what was the relationship to me of my former friends, according to the echoes that reach me from far and wide. I had intended, on the other hand, to take a closer look at the sometimes strange vicissitudes of some of the ideas and notions that I had introduced during these years of intense mathematical work - I should say rather

The new types of objects and structures that I have had the privilege of glimpsing and drawing out of the night of the totally unknown into the penumbra, and sometimes even into the clearest light of day! This statement now seems out of place in what has become a meditation on the past, in an effort to better understand and come to terms with a certain, sometimes bewildering, present. Decidedly, the planned reflection on a certain 'school' of geometry, which was formed at my instigation, and which has vanished without (almost) leaving any trace, will have to wait for a more propitious occasion(\*). For the time being, therefore, my concern will be to bring to a conclusion this retrospective on my life as a mathematician in the world of mathematicians, not to epilogise on a work and its fate.

During the last five days, when I have been busy with tasks other than these reflective notes, one memory has come back to me with some insistence. It will serve as an epilogue to the *De Profundis* on which I had stopped.

It was towards the end of 1977. A few weeks earlier, I had been summoned to appear before the Montpellier Magistrates' Court for the offence of having "gratuitously housed and fed a foreigner in an irregular situation" (i.e. a foreigner whose residence papers in France were not in order). It was at the time of this quotation that I learned of the existence of this incredible paragraph of the 1945 ordinance governing the status of foreigners in France, a paragraph that prohibits any French person from providing assistance in any form whatsoever to a foreigner 'in an irregular situation'. This law, which had no analogue even in Hitler's Germany with regard to the Jews, had apparently never been applied in its literal sense. By a very strange 'coincidence', I had the honour of being taken as the first guinea pig for the first implementation of this unique paragraph.

For a few days I was stunned, as if struck by paralysis, a discouragement-

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(\*) This 'more propitious occasion' appeared earlier than expected, and the reflection in question is the subject of the second part, 'The Burial', of *Harvest and Sowing*.

profound feeling. Suddenly I felt like I'd gone back thirty-five years, to a time when life didn't weigh much, especially for foreigners... . Then I reacted, I shook myself. For a few months I put all my energy into trying to mobilise public opinion, first in my university and in Montpellier, and then at national level. It was during this period of intense activity, for a cause that later proved to be lost in advance, that the episode that I could now call *my farewell took place*.

With a view to taking action at national level, I wrote to five well-known 'personalities' in the scientific world (including a mathematician) to inform them of this law, which still seems as incredible to me today as it did the day I was quoted. In my letter, I proposed a joint action to demonstrate our opposition to this scurrilous law, which was tantamount to outlawing hundreds of thousands of foreigners living in France, and singling out millions of other foreigners for public suspicion, like lepers, so that they became suspects, likely to cause the worst trouble to any French person who was not on his guard.

Surprisingly, and completely unexpectedly for me, I received no response from *any of* these five 'personalities'. I certainly had a lot to learn...

It was then that I decided to go to Paris for the Bourbaki Seminar, where I was sure to meet up with many old friends, in order first of all to mobilise opinion in the mathematical community, with which I was most familiar. This community, it seemed to me, would be particularly sensitive to the cause of foreigners, since all my mathematical colleagues, like myself, have to deal on a daily basis with foreign colleagues, pupils and students, most if not all of whom have had problems with their residency papers, and have had to face arbitrariness and often contempt in the corridors and offices of police headquarters. Laurent Schwartz, whom I had informed of my project, told me that I would be given the floor at the end of the presentations on the first day of the Seminar to explain the situation to the colleagues present.

So it was that I arrived that day with a bulky packet of leaflets in my suitcase for my colleagues. Alain Lascoux helped me distribute them in the corridor of the Institut Henri Poincaré, before the first session and during the 'intermission' between the two lectures. If I remember correctly, he even produced a small leaflet of his own - he was one of the two or three colleagues who, having heard about the affair, were moved and contacted me before my trip to Paris to offer their help (<sup>17</sup>). Roger Godement is one of

He even produced a leaflet with the headline "A Nobel Prize winner in prison". It was chic of him, but we were definitely not on the same wavelength: as if the scandal was to attack a "Nobel Prize", rather than the first lampoonist!

There were a lot of people there on that first day of the Bourbaki Seminar, a lot of people I had known more or less closely, including Bourbaki's friends and companions from the old days; I think most of them were there. Several of my former students too. It must have been ten years since I last saw all these people, and I was glad to have this opportunity to see them again, even if it meant seeing a lot of them at once! But we'd end up meeting up again in smaller numbers...

It was quite clear from the outset, however, that the reunion "wasn't that". Many hands were held out and shaken, that's for sure, and many questions were asked: "Hey, you, what brings you here?", yes - but there was an air of indefinable embarrassment behind the cheerful tones. Was it because they weren't really interested in the cause that brought me here, even though they had come for some tri-annual mathematical ceremony that demanded all their attention? Or, irrespective of what brought me here, was it my very person that made them feel so uncomfortable, rather like a defrocked priest would feel among a group of good-natured seminarians? I couldn't say - perhaps it was both. For my part, I couldn't help noticing the transformation that had taken place in certain faces that had once been familiar, even friendly. They had frozen, you might say, or sunk. A mobility that I had known there seemed to have disappeared, as if it had never been. I found myself standing before strangers, as if nothing had ever linked me to them. Obscurely, I felt that we weren't living in the same world. I had thought I had found brothers on this exceptional occasion, and here I was before strangers. Admittedly well behaved, I don't remember any bitter-sweet comments or leaflets lying around. In fact, all (or almost all) of the leaflets handed out must have been read, curiosity permitting.

But that doesn't mean that the scurrilous law has been jeopardised! I had my five minutes, perhaps even ten, to talk about the situation of those whom I considered to be brothers, called 'foreigners'. There was a packed amphitheatre of colleagues there, quieter than if I'd been giving a mathematical lecture. Perhaps there was no longer the conviction to speak to them. There was no longer, as there used to be, a current of sympathy and interest. There must be some people in a hurry, I thought, so I cut it short, proposing that we

meet on the spot, with colleagues who felt concerned, to discuss in greater detail what could be done... .

When the session was declared adjourned, there was a general stampede for the exits - everyone had a train or underground train about to leave, which they couldn't afford to miss! In the space of a minute or two, the Hermite amphitheatre was empty - it was like a miracle! The three of us found ourselves in the large deserted amphitheatre, under the bright lights. Three of us, including Alain and me. I didn't know the third, one of those unmentionable foreigners again I bet, in dubious company and illegal to boot! We didn't take the time to dwell at length on the quite eloquent scene that had just unfolded before us. Perhaps I was the only one who couldn't believe my eyes, and my two friends were kind enough to refrain from commenting on the matter. Clearly, I had just arrived...

The evening ended with Alain and his ex-wife Jacqueline taking stock of the situation and reviewing what could be done; getting to know each other a little better, too. Neither on that day, nor later, did I take the time to situate the episode I had just experienced in terms of the past. It was on that day, however, that I had to understand without words that a certain environment, a certain world that I had known and loved was no more, that a living warmth that I had thought I would find again had dissipated, no doubt a long time ago.

That hasn't stopped the echoes that still reach me, year after year, from that world whose warmth has fled, from disconcerting me and touching me painfully. I doubt that this reflection will change anything in the future - except, perhaps, that I will rebel less at being touched in this way...

## 25. The student and the Programme.

I have not finished reviewing my relationships with other mathematicians, at a time when I felt that I belonged with them to the same world, to the same 'mathematical community'. Above all, I need to look at my relationships with my students, as I experienced them, and with others for whom I was the elder statesman.

Generally speaking, I think I can say, without any reservation, that my relationship with my students has been one of respect. In this respect at least, I believe that what I received from my elders when I was a pupil myself did not deteriorate over the years. As I had a reputation for doing 'difficult' maths (admittedly one of the most sub-

As well as being more demanding than other bosses (which is already less subjective), the students who came to me were highly motivated from the start: 'they wanted it'! There was just one student who at first was a bit 'ollé ollé', it wasn't really clear whether he was going to start - and then he did, he started without me having to push...

As far as I can remember, I accepted all the students who asked to work with me. For two of them, it turned out after a few weeks or months that my style of working didn't suit them. To tell the truth, it seems to me now that on both occasions these were blocking situations, which I hastily interpreted as signs of an inability to work in mathematics. Today I would be much more cautious about making such predictions. I had no hesitation in sharing my impressions with the two people concerned, advising them not to continue in a career which, it seemed to me, was not suited to their talents. In fact, I knew that for one of these two students at least, I had made a mistake - this young researcher went on to make a name for himself in difficult subjects, at the frontiers of algebraic geometry and number theory. I don't know whether the other student, a young woman, continued or not after her disappointment with me. It cannot be ruled out that my impression of her abilities, expressed too peremptorily, discouraged her, even though she was perhaps just as capable of doing a good job as anyone else. It seems to me that I had given credit and confidence to these students as to the others. On the other hand, I lacked the discernment to distinguish between what were surely signs of blocking, rather than ineptitude ( ).<sup>18</sup>

From the early 1960s onwards, over a period of ten years, eleven students worked with me on their doctoral dissertations (<sup>19</sup>). Having chosen a subject to suit them, they each did their work with gusto, and (as I felt) they identified strongly with the subject they had chosen.

There was one exception, however, in the case of a student who had chosen, perhaps without any real conviction, a subject that 'had to be done', but which also had its thankless aspects, since it involved a technical development, sometimes arduous, even dry, of ideas that had already been accepted, when there were hardly any surprises or suspense in prospect (<sup>20</sup>). Carried away by the needs of a vast programme for which I needed manpower, I must have lacked psychological discernment in proposing this subject, which was certainly not suited to the particular personality of this student. I'm sure he didn't realise what he was getting himself into! In any case, neither he nor I could see it in time.

that we'd got off on the wrong foot, and that it was better to start afresh.

He was obviously working without any real conviction, and always with a slightly sad, sullen look on his face. I think I had already reached a point where I didn't pay too much attention to these things, which (I should have remembered) are the day and night of all research work, and not just research! My role then was limited to being annoyed when the work seemed to be dragging on, and to breathing a sigh of relief when it got going again, and then when the planned programme was finally 'completed'. It was only years after my awakening in 1970, having corresponded with this former pupil (now a teacher, like everyone else in these clement times!), that the idea came to me that something had definitely gone wrong in this case, that perhaps it wasn't a total success. Today, I see it as a failure, despite the 'completed programme' (by no means a botched one!), the diploma and the job. And I bear a large part of the responsibility for having put the needs of a programme before those of an individual.

— of a person who had entrusted himself to me with confidence. The 'respect' that I sometimes claimed ('without any reservation'), that I would have shown towards my pupils, remained superficial here, separated from what is the real soul of respect: a loving attention to the person's needs, at least insofar as their satisfaction depended on me. The need, here, for joy in the work, without which it loses its meaning and becomes a constraint.

In the course of this reflection, I had occasion to speak of a 'world without love', and I was looking for the seeds of that world in myself, which I rejected. Here is a major one - and I can't say today how it has sprung up in others. This superficial respect, devoid of attention and true love, is the 'respect' I also gave my children. With them, I had the privilege of seeing this seed grow and proliferate. And I've also come to understand that there's no point in begrudging the harvest. ...

## 26. Rigour and thoroughness.

With the exception of this one pupil, who was certainly no less 'gifted' than the others, I can say that relations between my pupils and myself were cordial, often even affectionate. By force of circumstance, they all learned to be patient with my two main faults as a 'boss': my impossible handwriting (although I think they all eventually learnt to decipher it) and, more seriously (and which I didn't realise until much later), my fundamental difficulty in following other people's thoughts, without me even knowing what they were saying.

first translated it into my own images, and rethought it in my own style. I was much more inclined to communicate to my students a certain vision of things that I had imbibed strongly, rather than encouraging them to develop a personal vision that was perhaps quite different from my own. This difficulty in relating to my students hasn't disappeared yet, but it seems to me that its effects are lessened because I'm aware of this tendency within myself. Perhaps my temperament, innate or acquired, predisposes me more to solitary work, which was mine for the first fifteen years of my mathematical activity (from 1945 to about 1960), than to the role of 'teacher' in contact with pupils whose mathematical vocation and personality are not fully formed <sup>(21)</sup>. It is also true, however, that since my early childhood I have loved teaching, and that from the 1960s to the present day, the pupils I have had have played an important role in my life. In other words, my teaching activity and my role as a teacher have always played a major role in my life and continue to do so today ( ).<sup>22</sup>

During this first period of my teaching activity, there was no ap-parent conflict between any of my pupils and me, which would have expressed itself even by a temporary 'coldness' in our relations. Only once did I find myself obliged to tell a pupil that he wasn't being serious about his work and that I wasn't interested in continuing with him if it went on like that. Of course, he knew just as well as I did what he was talking about, he pulled himself together and the incident was closed without a trace. On another occasion, at the beginning of the seventies, when most of my energy was devoted to the activities of the 'Survivre et Vivre' group, a student to whom I had shown (as is my custom) the thesis report I had just written on his work, became angry, judging that certain considerations in the report called into question the quality of his work (which was in no way my intention). This time it was I who rectified the situation without any difficulty. It didn't seem to me at the time that this short incident could cast a shadow over our relationship, but I may have been wrong. The relationship between this pupil and myself had been more impersonal than with the other pupils (apart from the 'sad pupil' I mentioned), a good working relationship with nothing more, without any real warmth passing between us. I don't think, however, that it was an unconscious lack of benevolence on my part that made me include in my report the considerations that he considered disadvantageous to him, adding that 'he wasn't going to let it go', as a friend of his who had already done his thesis with me had done. With this other pupil, who was naturally sensitive and affectionate, I had a particularly close relationship.

friendly; if I had included in my report on his thesis the same kind of consideration that had so displeased his fellow student, it was surely not for lack of benevolence! Moreover, for both of them, as for all my students, I would not have given the green light for a defence if I had not been fully satisfied with the work they presented. In fact, none of my students from that period had any difficulty in finding a suitable job quickly after their thesis.

Until 1970, I had practically unlimited availability to my students (<sup>22</sup>). When the time was ripe, and whenever it would be useful, I would spend whole days with one or other of them, if necessary, working on questions that had not yet been dealt with.

I never felt that I played the role of 'director' making decisions. As I experienced these work sessions, it doesn't seem to me that I ever played the role of 'director' making decisions, but that each time it was a joint research project, where discussions took place on an equal footing, until both parties were completely satisfied. The student contributed a considerable amount of energy, which of course was nothing compared to what I had to contribute myself, although I had more experience and sometimes a more acute sense of smell.

However, the thing that seems to me to be the most essential for the quality of any research, intellectual or otherwise, is not at all a question of experience. It's the *demands we make of ourselves*. It is not a matter of scrupulous compliance with any standards, rigorous or otherwise. It consists of an extreme *attention* to something delicate within ourselves, which escapes all norms and all measures. This delicate thing is the absence or presence of an understanding of the thing being examined. More precisely, the attention I want to talk about is an attention to the *quality of understanding* present at each moment, from the cacophony of a heterogeneous pile of notions and statements (hypothetical or continued), to the total satisfaction, the completed harmony of a perfect understanding. The depth of a search, whether its outcome is a fragmentary or total understanding, lies in the quality of this attention. Such attention does not appear as the result of a precept that we follow, of a deliberate intention to 'goof off', to be attentive - it arises spontaneously, it seems to me, from the passion to know, it is one of the signs that distinguish the drive to know from its egotistical counterfeits. This attention is also sometimes called '*rigour*'. It is an inner rigour, independent of the canons

of rigour that may prevail at a given moment in a (let's say) determined discipline. If in this book I allow myself to take liberties with canons of rigour (which I have taught and which have their *raison d'être* and their usefulness), I do not believe that this more essential rigour is less than in my past publications, in canonical style. And if I have perhaps been able, in spite of everything, to pass on to my students something of greater value than language and know-how, it is undoubtedly this demand, this attention, this rigour

- if not in the relationship with others and with oneself (where I lacked it as much as anyone), at least in mathematical work<sup>(23)</sup>. Admittedly, that's a very modest thing, but perhaps, in spite of everything, better than nothing.

## 27. The blunder - or twenty years later.

Except perhaps in the case of the two students I mentioned, with whom a working relationship was not established in the end, I don't remember any of the other students who came to me to ask to work with me coming with 'stage fright' or fear. No doubt they already knew me to a greater or lesser extent, having attended my seminar at IHES for at least some time. If there was any awkwardness at the start of our relationship, it eventually dissipated, leaving no trace, in the course of the work. I should, however, make two exceptions here. One concerns the student who never really got to grips with his work, and who remained monosyllabic even during our work together. Perhaps he also came at a time when I was becoming less available, and we didn't have sessions with him working on pieces, for whole afternoons and days on end. No, in fact I don't remember any such sessions; I rather think that we mostly met in the spur of the moment, for an hour or two, to see where he was at. He was definitely the one who had the worst time with me!

The other student I wanted to mention worked with me at a time when I still had complete availability for my students. Our relationship was cordial from the start. He's even one of the few students with whom I've established a friendly relationship, the ones I'd sometimes see at their place just as they'd come to mine, a sort of family-to-family relationship. It's true that even in these cases, the relationship always remained on a relatively superficial level, at least as far as I was concerned. On a conscious level, while I was already unaware of much of what was going on at home, under my own roof, I knew almost nothing about the lives of my mathematician friends, students and colleagues.

or not, apart from the names of the wife and children (and even then, I sometimes forgot them, without anyone ever blaming me!) Perhaps I was an extreme case of a 'coward', but I think that in the mathematical environment I knew, most if not all relationships, even friendly and affectionate ones, remained at that superficial level where you really know very little about each other, apart from what is perceived at an informal level. This is surely one of the reasons why conflict between people was so rare in this environment, whereas it's clear to me that division existed within most of my colleagues and friends, and within their families, just as much as it did in my own home and everywhere else.

I don't think that my relationship with this pupil was any different from my relationship with others, nor did I feel at the time that, conversely, his relationship with me was any markedly different from that of other pupils, particularly those with whom I had formed friendships. It's only recently that I've been able to realise that it must have been a stronger relationship than for most of my other students. The visible manifestations of an unspoken conflict came as an unexpected revelation, almost twenty years after he had been my pupil. Only then did I make the connection with a long-forgotten 'little' fact. For a long time, perhaps even throughout the period (a few years in fact) when we worked together more or less regularly, this student had retained a certain amount of 'stage fright'. This would manifest itself at every meeting, in unmistakable signs. These signs disappeared fairly quickly afterwards, during our work together. I was naturally embarrassed by these signs of unease, and I sensed that he was even more so. We both just pretended to ignore it. Surely the idea of talking about it wouldn't have occurred to either of us, nor even the idea of paying any attention to a strange situation that was obviously worthy of interest! For him as for me, this 'stage fright' must have felt like a simple 'burr', which had no reason to be. We were regularly reminded of the 'burr', but each time it had the good taste to disappear, leaving us free to get on with the serious business of maths. - and at the same time to forget 'things that didn't belong'. I don't remember stopping once to ask myself any questions about the meaning of the blunder, and I'm sure that my pupil and friend felt the same way. No doubt nothing in what we had both known around us since our early childhood could suggest to him or to me the idea of any other attitude towards a troublesome thing than that of *removing* it as far as possible so that it would cease to be a nuisance.

to get in the way. In this case, it was perfectly possible and even easy, and we all agreed that we had seen nothing, felt nothing and heard nothing.

Through the many echoes and cross-references that have come back to me over the last two or three years, I've come to realise that what had been dismissed as having no place to be has not necessarily ceased to be, and to manifest itself. The things that sometimes come back to me don't 'belong' either - and yet 'they do', and now they can't be dismissed out of hand...

## 28. The unfinished harvest.

Until the first 'awakening' in 1970, my relationships with my pupils, like my relationship with my own work, were a source of satisfaction and joy, one of the tangible, indisputable foundations of a sense of harmony in my life, which continued to give it meaning, while elusive destruction raged in my family life. At that time, I saw no apparent element of conflict in these relationships, none of which was at any time, however fleetingly, the cause of frustration or grief. It may seem paradoxical that the conflict in the relationship with one of my students only became apparent after this famous awakening, after a turning point that gave my life an openness it had not known before, and my person a little beginning of flexibility perhaps - qualities which, one might think, should be such as to resolve or avoid conflict, and not to provoke or exacerbate it.

On closer examination, however, I can see that the paradox is only apparent, and that it disappears, whichever way you look at it. The first thing that comes to mind is that for a conflict to have a chance of being resolved, it must first have manifested itself. The stage of the manifested conflict represents a maturing compared to that of the hidden or ignored conflict, whose manifestations do in fact exist, and are all the more 'effective' because the conflict expressed by them remains ignored. So: for a conflict to manifest itself in a recognisable way, a *distance* must first have been reduced or disappeared. The changes that have taken place in my life over the last fifteen years, particularly in the course of successive 'awakenings', have all been changes, it seems to me, that have reduced a distance, erased an isolation. A conflict that has difficulty expressing itself to a prestigious, admired boss feels more at ease with someone who has been stripped of a position of power (voluntarily, in this case), who has been exiled from a certain environment that holds authority and

of prestige, who is seen less and less as an incarnation or privileged representative of some entity (such as mathematics), and more and more as a person like any other: a person who is not only susceptible to injury, but who, moreover, is less and less inclined to hide injury or pain. And thirdly and above all: the evolution that has been mine since the first awakening, especially at that time and in the years that followed, was likely to give rise (or perhaps awaken) to questions, concern and 'questioning' in the well-ordered world of my former pupils. I have had ample opportunity to realise that this was the case not only for them, but also among my friends and companions of yesteryear in the mathematical world, and sometimes even among scientific colleagues who knew me only by hearsay.

It must also be said that resolving a conflict of any depth is one of the rarest things in the world. More often than not, notwithstanding all the surface truces and reconciliations, the growing procession of our conflicts follows us, barely leaving our side for the rest of our lives, only to leave us in the sullen hands of the undertaker. I have occasionally seen a conflict resolved to some extent, and sometimes even resolved with knowledge - but so far this has not happened in the course of my relationship with one of my students, or with one of my old friends in the mathematical world. And I also know that it is by no means certain that such a thing will ever happen, even if I were to live another hundred years.

It is remarkable that the very moment of my break with a certain past, by which I mean the episode of my departure from the IHES (from the institution that represented something like the 'matrix' of the mathematical microcosm that had formed around me) - that this decisive episode was at the same time the first occasion on which one of my students expressed profound antagonism towards me. It was surely this circumstance that made this episode particularly painful, like a birth that had taken place under particularly difficult conditions. Of course, at the time I couldn't see this episode, the meaning of which escaped me, in the light in which I have since learned to see it. This painful surprise remained with me for a long time to come. And yet, in the summer of that same year, that bitter departure felt like a liberation - like a door that had suddenly opened wide (all I had to do was push it!) onto an unsuspected world, beckoning me to discover it. And every new awakening since then has also been a new liberation: the discovery of a subjection, an inner hindrance,

and the rediscovery of the presence of an immense unknown, hidden behind the familiar appearance of what was supposed to be 'known'. But throughout these fifteen years and right up to the present day, this stubborn, discreet and unwavering antagonism has followed me, as the one great and lasting source of frustration I have known in my life as a mathematician (23<sup>¶</sup>). Perhaps I could say that it was the price I paid for that first liberation, and for those that followed. But I'm well aware that liberation and inner maturation are things that have nothing to do with a 'price to pay', that they're not a matter of 'profits' and 'losses'. Or to put it another way: when the harvest is completed, when it is finished, there is no loss - the very thing that seemed like 'loss' has become 'profit'. And it's becoming clear that I haven't yet been able to bring this harvest to completion, and it remains, even as I write these lines, unfinished.

#### 29. The Enemy Father (1).

The kind of students who started to work with me after the turning point in 1970, in the completely different environment of a provincial university, was also very different from the students before. Only two of them went on to work with me on a state doctorate thesis. The work of the others was at DEA or post-graduate doctorate level. I should also include a good number of students who have taken to certain introductory research courses, which have given them the opportunity to ask themselves mathematical questions that were often unforeseen, and sometimes to devise original methods for solving them. I found the most active participation in certain 'option courses' for first-year students. On the other hand, for students who have already been exposed to the university environment for a few years, a certain freshness, a capacity for interest and personal vision are already more or less extinguished. Many of the students in the optional courses clearly had the makings of an excellent mathematician. Given the current situation, I was careful not to encourage any of them to go down that path, even though it could have attracted them and where they could have excelled.

With the students who were taking some of my 'courses' to prepare for Masters degrees, the relationship didn't usually last beyond the year. On each occasion, I had the impression that they quickly became cordial and relaxed, on the whole. With the exception of one student afflicted with invasive 'stage fright' (23"), the same was true of the students who were officially supposed to be preparing a research paper under my direction.

tion, at one level or another. One difference (among many!) with my previous students was that our relationship was not so much limited to joint mathematical work. Often the exchange between the student and me involved our persons in a less superficial way (23v). So it's not surprising that in this second period of my teaching career, the conflictual elements in the relationship with certain pupils came out more clearly and directly, even vehemently. Two of my ex-students from the first period subsequently displayed attitudes of systematic and unequivocal antagonism (which I've had occasion to mention in passing), although these remained at an informal, and perhaps even unconscious, level. In the second, longer period, there were three students with whom I was confronted by antagonism. In two of them it manifested itself acutely.

In the case of one of these pupils, antagonism appeared overnight in a relationship that had been most friendly, many years after this friend had ceased to be my pupil. I suspect that the cause of the conflict was not so much my unsettling behaviour and personality, but a long-suppressed dissatisfaction at not having received the recognition for his work (which had been excellent) that he had a right to expect. This was the downside of the dubious privilege of having had me as his boss 'after 1970', and he must have resented me for it, without really admitting it even to himself.

With the other student, an acute antagonism had already emerged after a year and a half of work, in an atmosphere that had seemed very cordial. This is the first and only time that a relational difficulty between a student and myself has arisen at a time when he was still a student. It made it impossible for us to continue working together, even though we had started off on the right foot, with the utmost enthusiasm, on what was, it has to be said, a magnificent subject. I had the feeling that there was an insidious lack of confidence in this young researcher's ability to do good work (an ability which I had no doubt about), and that the high-pitched manifestation of this lack of confidence in his ability to do good work was a sign of a lack of confidence in his ability to do good work (an ability which I had no doubt about).

of the antagonism was a kind of "headlong rush" to get ahead of a dreaded failure, and blame it in advance on the person of an odious boss (23<sup>100</sup>).

One aspect common to all these appearances of conflict between students and myself, in the nearly twenty-five years that I have been teaching mathematics, is a strong *ambivalence*. In all these cases, without exception, the antagonism manifests itself after the fact, often insidiously, in a relationship of sympathy that can be left in no doubt. I can

I would even go so far as to say that in all these cases, as in many others where a frankly antagonistic component has not manifested itself, my person has exerted and still exerts a strong attraction. It is surely the very strength of this attraction that also feeds the strength of the antagonism and ensures its continuity. This is surely also the case in instances where antagonism takes the form of violent antipathy, of outraged rejection; as it is also in such other cases, at the opposite extreme, where under the rigorous flag of friendly respect is expressed (when the occasion is right) an affectation of casual and delicately measured disdain...

Such situations of ambivalence, it has to be said, are not peculiar to my relationship with some of my students or ex-students. In fact, they have abounded throughout my adult life, since at least the age of thirty (i.e. since the death of my mother). This has been true both in my love life and in my relationships with men, and more specifically with men who are much younger than I am. I've come to realise that something in me, whether innate or acquired I can't say, seems to predispose me to play the father figure. You'd think I'd have the ideal build and the right vibe to make the perfect adoptive father! It has to be said that the role of Father fits me like a glove - as if it had been mine from birth. I won't try to count the number of times I've taken on such a role vis-à-vis another person, with perfect tacit agreement on both sides. Most often this distribution of father-son or father-daughter roles remained unspoken, even unconscious, but it also happened to be formulated more or less clearly. In some cases, I also acted as a father without even playing the game, I think, in ignorance of what was going on, both consciously and unconsciously.

I first became aware of the role of adoptive father in 1972, at the time of 'Survivre et Vivre', when I was suddenly confronted with an attitude of violent rejection on the part of a young friend (interesting coincidence, he was a maths student on the verge of dropping out of school).

Something in my behaviour towards other people had disappointed him. I would have had no difficulty, I think, in recognising that his disappointment was justified, that I had shown a lack of generosity in this instance - but the violence of the reaction literally blew me away. It was like a sudden flare-up of vehement hatred, which died down almost immediately, when it became clear that he hadn't really managed to throw me off balance. (It was close, but I kept that to myself...). I don't know how I got the intuition at the time that he was projecting onto me, duly idealised, unresolved conflicts with his father. This sudden intuition, which was forgotten, didn't stop me from continuing for years to come,

I continued to take on the role of father with the same conviction, without being the least bit suspicious. And, of course, with the same painful astonishment, not believing my eyes or the rest of it, when I was later confronted with signs of conflict, insidious or violent.

It was after six or seven months of intense, solitary work on my parents' lives, which made me see them in an unsuspected light, that I realised how illusory is this role of adoptive parent who would replace (for the better, it's understood in advance!) a real parent who does exist, and who would be declared (if only by tacit agreement) 'failing'. It's helping others to avoid the conflict where it exists, in their relationship with their father, let's say, and projecting it onto a third person (myself in this case) who is entirely alien to it. Since this meditation, which took place between August 1979 and March 1980, I've been vigilant about myself, so that I don't allow myself to indulge in my misguided paternal vocation with my eyes closed. This has not prevented the false situation from recurring (as in my relationship with that student with whom I had to stop working) - but now, I believe, without any connivance on my part.

If I put aside the case of the pupil frustrated in these legitimate expectations, there is no doubt in my mind that in all the other cases where I have been confronted with antagonism in a pupil or ex-pupil, it has been the reproduction of the same archetype of conflict with the father: the Father both admired and feared, loved and hated - the Man you have to confront, defeat, supplant, perhaps humiliate. . . but also the One you secretly want to be, stripping him of a strength to make it your own - another Self, feared, hated and shunned. . .

### 30. The Enemy Father (2).

It wasn't the great turning point of 1970 that created antagonisms between some ex-students and me, against the backdrop of an idyllic and unclouded past. It merely made visible antagonisms that could hardly be expressed within the more conventional framework of a typical boss-student (or ex-boss-ex-student) relationship. I suspect that such conflicts are not uncommon in scientific circles, but that they are usually expressed in a more roundabout and less recognisable way than in the relationships in which I was involved.

When I think about it, I don't have the impression that, in my relationships with my students, I've had such a tendency to take on a paternal role - in fact, I can't seem to accept it.

I can't think of a single memory that goes anywhere near that. As far as *I'm concerned*, it seems to me that almost all the energy I invested in a relationship with a pupil was the same energy that I also invested in mathematics, and in carrying out a vast programme. In the first period, I can think of only one case where there was an interest in me in the person of a student, in the nature of an affinity or sympathy, which had a strength comparable (if not equal) to that of the mathematical interest. But even in that case, I don't have the impression that I took on a paternal role towards him. As for the influence I may have exerted on him or on other students, at one level or another, that's the kind of thing I didn't pay any attention to in my relationship with my students. (Even today, I tend not to pay attention to it, either with the students who have worked with me in recent years, or even with other people). Of course, in all these cases, the relationship between the pupil and myself was by no means 'symmetrical', in the sense that for at least the duration of the teacher-pupil relationship (and probably even beyond that, more often than not), the importance a pupil had in my life was not comparable to the importance I had to assume in his, nor the psychic forces that the relationship brought into play in my person and in his. Except in the five or six cases where these forces manifested themselves in clearly recognised signs of antagonism, I realise that the nature of the relationships with me of my various pupils and then ex-pupils, over more than twenty years of teaching activity, remain a total mystery to me! In fact, it's not really my job to fathom these mysteries, but rather that of each of them in their own right. But as long as you're interested in yourself, there may be more burning issues to re-keep in mind than the ins and outs of your relationship with your ex-boss... Be that as it may, even though I showed no inclination towards my pupils to take on a paternal role, it can't have been rare for me to have nevertheless acted more or less as an adopted father to them, given my particular psychological 'profile', which I mentioned earlier, and also given the dynamics inherent in a situation where I could not fail to act as the eldest, to say the least.

In any case, in several of the cases I have mentioned, there is not the slightest doubt in my mind about this particular colouring of the relationship between a pupil and myself. Outside my professional life, there have been many other cases where, with or without connivance on my part, I have visibly acted as an adopted father to younger men or women, attracted by me and linked to me initially by mutual sympathy,

but by no means by family ties. As for my own children, the paternal fibre in me towards them was strong, and from an early age they played an important role in my life. By a strange irony, however, none of my five children accepted the fact that I was their father. In the lives of the four of them that I have been able to know closely, especially in recent years, this division in their relationship with me reflects a deep division within themselves, a refusal in particular of everything in them that makes them related to me, their father. ... But this is not the place to explore the roots of this division, which go back to a childhood torn apart, to my own childhood and that of my parents, as well as to the mother's childhood and that of her parents. Nor is this the place to measure its effects, in their own lives, or in those of their children...

### 31. The power to discourage.

To conclude this summary tour of the relationships I had in the mathematical world between 1948 and 1970, it remains for me to talk about my relationships with younger mathematicians, more or less beginners and therefore without the status of 'colleague' strictly speaking, without my playing the role of 'boss' vis-à-vis them. These were young researchers whom I met for a year or two in my seminar at the IHES, or on the occasion of a course or seminar at Harvard or elsewhere, or sometimes on the occasion of a correspondence, for example when I had received a piece of work from a young author for which he or she was awaiting comments, and certainly also encouragement.

Dealing with junior researchers is part of a role that is less apparent than that of 'boss' of such students, but just as important, as I have since come to realise. At the time, I didn't realise, as I have for the last six or seven years, that this role represents considerable *power* for a leading mathematician. First of all, it is the power to *encourage*, to stimulate, which exists just as much in the case of work that is visibly brilliant (but perhaps hampered by clumsiness of presentation or a lack of 'craft'), as in the case of work that is simply solid; it exists even in the case of work that represents only a very modest contribution, or even negligible or even nil according to the criteria of a senior mathematician in full possession of powerful means, proven experience of the subject, and extensive information. The power to encourage is there, as long as the work submitted to us has been written seriously - something which is generally discernible from the very first pages.

And the power to *discourage* exists just as much, and can be exercised at discretion whatever the work. It is the power that Cauchy used against Galois, and Gauss against Jacobi - it is not new that it exists and that eminent and feared men make use of it.

! If history has recorded these two cases, it is because the men who bore the brunt of them had sufficient faith and confidence to continue on their way, despite the unsympathetic authority of those who were then calling the shots in the mathematical world. Jacobi found a journal in which to publish his ideas, and Galois found the pages of his last letter to act as a 'diary'.

Today, it is certainly more difficult for an unknown or little-known mathematician to make a name for himself than it was in the last century. And the power of the prominent mathematician is not just psychological, but practical too. He has the power to accept or refuse a work, in other words: to give or refuse his support for a publication. Rightly or wrongly, it seems to me that 'in my day', in the fifties and sixties, rejection was not a foregone conclusion - if the work presented results 'worthy of interest', it had a chance of finding the support of another eminence. Today, this is certainly no longer the case, as it has become difficult to find even one influential mathematician who will agree to review (with whatever willingness he or she may have) a work in his or her field, unless the author has already acquired a reputation or is recommended by a well-known colleague.

Over the last few years, I have seen influential and brilliant mathematicians use their power to discourage and refuse, both with regard to such solid work that clearly needed to be done, and with regard to such large-scale work that clearly shows the power and originality of its authors. On several occasions, the person who used his discretionary power in this way happened to be one of my former students. This is without doubt the most bitter experience I have had in my life as a mathematician.

But I am straying from my subject, which was to examine the way in which, at the time when I lent myself with conviction to the role of 'mathematician in the limelight', I used the power to encourage and discourage that I had at my disposal. I should add that at the more modest level at which my scientific activity continued after 1970, as one of several lecturers at a provincial university, this power did not cease to exist, either vis-à-vis my students or pupils, or (admittedly rarely) vis-à-vis occasional correspondents. But for my present purpose, it is the first period of my life as a mathematician that is most relevant.

is all that matters.

As far as my relationship with my pupils is concerned, from the first one I had to the present day, I think I can say without restriction of any kind that I have done everything in my power to encourage them in the work they have chosen (<sup>23iv</sup>). It must be rare, even today, for it to be otherwise in the relationship between 'boss' and pupil, and especially so in the case of a boss who has the means to train brilliant pupils and, with their help, clear vast tracts of land ready for ploughing. Hardly believable, but true, is the fact that there is even that extreme case of the prestigious boss who takes pleasure in extinguishing in brilliantly gifted pupils the mathematical passion which had animated him at a younger age.

But I'm digressing again! It's my relationship with the young researchers who were *not* my students that we now need to examine. In such relationships, the egotistical forces in the person of the man in the spotlight would be less likely to push him in the direction of encouragement, while the successes of the young stranger who approaches him will contribute little or nothing to his own glory. On the contrary, I think that the mere interplay of egotistical forces, in the absence of genuine benevolence, would almost invariably tend to push in the opposite direction, to use the power to discourage, to refuse. This, it seems to me, is no more and no less than a general law that can be observed in all sectors of society: that the egotistical desire to prove one's own importance, and the secret pleasure that accompanies its gratification, are generally stronger and more appreciated when the power at one's disposal finds occasion to cause the discomfort of one's neighbour, or even his humiliation, rather than the other way round. This law expresses itself particularly brutally in certain exceptional contexts, such as war, the world of concentration camps, prisons or psychiatric asylums, or even just the all-purpose hospitals in a country like ours... But even in the most everyday contexts, each of us has had occasion to be confronted with attitudes and behaviour that attest to this law. The correctives to these attitudes are first of all *cultural* correctives, stemming from a consensus, in a given environment, on what is considered to be 'normal' or 'acceptable' behaviour; they are also forces of a non-egotistical nature, such as sympathy towards a particular person, or sometimes, a spontaneous attitude of benevolence independent even of the person to whom it is addressed. Such benevolence is undoubtedly rare in any environment. As for the cultural corrective in the mathema-

It seems to me that it has eroded considerably over the past two decades. This is certainly the case, at least in the circles I've known.

Decidedly, I persist in straying from my point, which was not a discourse on the century, but a meditation on myself and my relationship with the more or less novice researchers who were not my students. I don't think that the 'law' I referred to found expression in these relationships. For reasons that need not be examined here, it would seem that the egotic forces, just as strong in me as in anyone else, have not taken this path in my life to manifest themselves at the expense of others (apart from a few cases dating back to my childhood). I think I can even say, having had the opportunity to examine the matter, that the basic tone of my disposition towards others is one of benevolence, a desire to help when I can help, to relieve when I can relieve, to encourage when I am in a position to encourage. Even in a relationship as deeply divided as that with this 'tireless friend' I've had to talk about, I've never been so fatuous that I would have thought (albeit unconsciously) of harming him. (I would have had the opportunity to do so, and 'with the best conscience in the world' of course). And I think that in most cases this general benevolence (even if it was only a little thin-skinned) also marked my relations in the mathematical world, including with beginner mathematicians who, although not among my students, might have needed my support or encouragement.

I believe that this was the case without exception, at least during the fifties and into the early sixties. It seems to me that in those days at least, this benevolence was not limited to visibly brilliant young people like Heisuke Hironaka or Mike Artin (even though they were not yet renowned for their abilities). But it is possible that it faded to a greater or lesser extent during the sixties, under the effect of egotistical forces. I would be particularly grateful for any testimony on this subject.

My memory only recalls one specific case, which I'm going to talk about, and beyond this case, this famous 'fog' which is not condensed into any other specific case or fact, but rather reveals to me a certain inner attitude. I used to feel a certain irritation when another mathematician would 'step on my toes' without even pretending to ask, as if he were the young white boy at home! It must have been mostly cases of young people who weren't really up to speed and who thought they'd come back to me, sometimes in very special cases.

uliers ma foi, things that I had known for years and still knew from above. It can't have happened very often, I don't think, but maybe two, three, maybe four times, I'm not sure. As I've just said, I can only remember one case in point, perhaps because the situation occurred several times with the same young mathematician, in one form or another. I can say that in every respect this young researcher, whose university of attachment was abroad, was perfectly correct in sending me, w h o w a s supposed to be the person most in the loop, the work he had just done. Each time, I reacted very coolly, for the reason I said. I can't even say for sure if I was telling him straight out that what he was doing had been known to me for ages, and that for that reason it bothered me that he was publishing it without at least giving me a little bow in the introduction. Of course, if he'd been my pupil, this authorial fatuity wouldn't have come into play so much, partly because of a relationship of sympathy that had already been established with the pupil, but also because it went without saying that the pupil's work also contained the boss's ideas, unless otherwise stated! I think this must have happened twice, maybe even three times, with the same researcher, and each time my attitude was just as cool, just as discouraging. If I remember correctly, I never agreed to recommend a work by this researcher for publication in a particular journal, nor to sit on a thesis jury (I think I remember the question being asked). It's almost as if I'd decided to make him my target. The best thing is that his work was always perfectly valid - I think it was carefully written, and I have no reason to suppose that he didn't come up with the ideas he was developing himself, which at the time weren't that widely known, and were (more or less) only 'well known' to a handful of people in the know, like Serre, Cartier, me and one or two others. What's incomprehensible to me is that this young colleague (he ended up, of course, with a thesis and a well-deserved job) never got tired of addressing me, who 'beat him cold' every time, and that he apparently never held it against me. Still, I remember the surprise he once expressed at my reticence; he obviously didn't understand what was going on. He would have had a hard time if he'd been waiting for me to explain! He had a beautiful face, a bit classic Greek, very youthful - rather soft, peaceful features, evoking an inner calm... . Now that I'm trying for the first time to put my finger on the impression of his person and physiognomy, I suddenly realise that he really did look a lot like that 'tireless friend' I've spoken about; they could have been

brothers, this friend of my age in a smiling mood, and this researcher, twenty years younger, in a slightly serious but by no means sad mood. It's not impossible that this resemblance played a part, that I projected onto one a disdain that had not found an opportunity to express itself with the other, disarmed as he was by the signs of such a faithful friendship! And indeed, I had to have developed a really thick shell not to be disarmed by the obvious good faith and desire to do the right thing in this young man, who was certainly endearing, and who never tired of coming back to me without my deigning to give him even a smile!

### 32. The mathematician's ethic.

The case I reported yesterday, now that I've finally taken the trouble to write it down in black and white, seems to me to have considerable significance, greater in some respects than the other three cases (doubtless also typical) reported previously, where forces of fatuity deeply disturbed in me a natural attitude of benevolence and respect. This time, using a position of real power (even though I pretended, like everyone else, to be unaware of this power), I used it to discourage a researcher of good will, and to refuse a work that deserved to be published. That's what we call *abuse of power*. It is no less blatant for not falling under an article of the penal code. It is fortunate that the situation at the time was less difficult than it is today, so that this researcher was able, without too much difficulty I believe, to have his work published with the support of a few colleagues more benevolent than myself, and that his career as a mathematician was not seriously disrupted, let alone destroyed, by my abusive behaviour. I'm happy about this in retrospect, but I don't want to see it as an 'extenuating circumstance'. It's possible that in tougher times, I would have been more careful - but that's just a guess, and has little to do here. All the same, I think I can say that there was no secret malice in me, no desire to do harm caused by the irritation I mentioned. I reacted to this irritation in a 'visceral' way, without the slightest hint of criticism towards myself, and even less without the slightest hint of looking at what was going on inside me, or even the impact my reaction could have on the other person's life. I didn't appreciate the power I had, and the thought of any responsibility that went with that power (even if it was only the power to encourage or discourage) never occurred to me during that relationship. It was a textbook case of *irresponsible behaviour*, as we all know.

They are everywhere, in the scientific world and elsewhere.

It's possible that the only case of his kind that I can remember is a very extreme one, among a few others like it. What triggers this unkind attitude is the irritation of vanity, impatient to see 'the first comer' arrogate to himself the right to walk into guarded hunting grounds and take some small game that belongs only to the masters of these places.... . This irritation has its own rationalisations, which look nobler, no doubt. It's not my modest self that's at stake, but no, it's the love of art and mathematics, this young man who doesn't even have the excuse of being brilliant, the clumsy type, rather he's going to ruin everything, woe betide us, if only he could do things better than I can, but the beautiful arrangements I had planned have all fallen by the wayside, you have to be a bit shameless, frankly...! There's a constant undercurrent of the meritocratic leitmotiv: only the very best (like me) have the right to work for me, or those who put themselves under the protection of one of those! (As for the less common case of another great leader stepping on my toes, that's a different kettle of fish - one day at a time!) In the case in point, there was (I have little doubt about this) another force moving in the same direction, entirely unconscious, which had already played a major role in my relationship with the indefatigable friend of my early days: an automatic rejection of a certain type of person, not corresponding to the canons of 'virility' that I had taken over from my mother. But this circumstance, which has its own significance and interest for an understanding of myself, is relatively irrelevant for my present purpose: that of finding in myself, in attitudes and behaviours that were mine when I was still part of a certain milieu, the typical signs of a profound deterioration that I see there today.

If this case, which I have just examined, seems to me to be of greater significance than the others in which I lacked kindness and respect, it is because it is the one in which a certain *elementary ethic* in the profession of mathematician is violated (<sup>24</sup>). In the milieu where I was welcomed in my early days, the Bourbaki milieu and those close to Bourbaki, this ethic I want to talk about was generally implicit, but it was nevertheless present, alive, the object (it seems to me) of an intangible consensus. The only person who expressed it to me in clear and unambiguous terms, as far as I can remember, was Dieudonné, probably one of the first times I was his guest in Nancy. He may have returned on other occasions. He obviously felt that this was an important thing, and I must have felt

I remembered the importance he attached to it at the time, and I still remember it today, thirty-five years later. Simply because of the moral authority of the group of my elders, and Dieudonné, who clearly expressed a consensus of the group at the time, I had to tacitly adopt this ethic, without ever having given it a moment's thought, or understood why it was important. To tell the truth, it didn't even occur to me that it might be worth giving it a moment's thought, convinced as I had been for a long time that my parents and myself each represented a perfect embodiment (or very close to it) of an ethical attitude, responsible and all-encompassing ( ).<sup>25</sup>

Dieudonné didn't give me a long speech - it was no more his style than that of any of his friends in Bourbaki. He must have mentioned it in passing, and as something that was taken for granted. He was simply insisting on a very simple rule, seemingly harmless, which is this: *anyone who finds a result worthy of interest must have the right and the opportunity to publish it, on the sole condition that this result is not already the subject of a publication.* So even if this result was known to one or more people, as long as they didn't take the trouble to put it down in black and white and publish it, so as to make it available to (hm!) the 'mathematical community', any other person (innuendo: including the famous 'first comer'!) who finds the result by his own means (innuendo: whatever his means, his points of view and insights, and whether or not they seem 'narrow' to people supposedly more in the know than he is. ...) has the right to publish it. . ) must have the possibility of publishing it, according to his own means and insights. I seem to remember that Dieudonné added that if this rule was not respected, it opened the door to the worst abuses - it is possible that it was on this occasion and through his mouth that I learned of the historical case of Gauss refusing Jacobi's work, on the pretext that Jacobi's ideas had been known to him for a long time.

This simple rule was the essential corrective to the 'meritocratic' attitude that existed in Dieudonné (and in other members of Bourbaki) as well as in myself. Respect for this rule was a guarantee of *probity*. I am happy to be able to say, from everything that has reached me to date, that this essential probity has remained intact in each of the members of the original Bourbaki group (<sup>26</sup> ). I note that this was not the case for other mathematicians who were part of the Bourbaki group or milieu. It has not remained intact in my own person.

The ethics that Dieudonné spoke to me about in down-to-earth terms are dead.

as the ethics of a certain milieu. Or rather, this milieu itself died at the same time as the probity that was its soul. This probity has been preserved in certain isolated persons, and it has reappeared or will reappear in certain others where it had deteriorated. Its appearance or disappearance in some of us is one of the crucial episodes in the spiritual adventure of each of us. But the stage on which this adventure takes place is profoundly transformed. An environment that had welcomed me, that I had made my own, of which I was secretly proud, is no more. What made it worthwhile died within me, or at least was invaded and supplanted by forces of a different nature, long before the tacit ethics that governed it were openly disavowed in customs and professions of faith. If I have been surprised and offended since then, it has been through deliberate ignorance. What came back to me from this milieu that was once mine had a message to bring me about myself, which I have been happy to avoid until now.

### 33. The note - or the new ethic.

Of course, a rule of professional conduct only takes on its meaning through an inner attitude, which is its soul. It cannot create the attitude of respect and fairness that it seeks to express; at most, it can contribute to the permanence of such an attitude in an environment where the rule enjoys general consensus. In the absence of an inner attitude, even if the rule is professed by the lips, it loses all meaning and value. No amount of exegesis, no matter how scrupulous or meticulous, will change that.

One of my friends and companions of yesteryear kindly explained to me recently that these days, alas, with the inordinate influx of mathematical production as we know it, 'we' are absolutely obliged, whether we like it or not, to make a severe selection from the papers that are written and submitted for publication, to publish just a small part of them. He said this with a sincerely sorry look on his face, as if he himself were a bit of a victim of this inescapable inevitability - a bit like the look he had when he said that he himself was one of the 'six or seven people in France' who decide which articles will be published and which will not. Having become less talkative with age, I confined myself to listening in silence. There was a lot to say on the subject, but I knew it would be wasted effort. A month or two later I learned that this colleague had refused a few years ago to recommend the publication of a certain note to the CRs, whose author as well as the theme (which I had suggested to him seven or eight years ago) had been the subject of an article that I had published in the journal.

years) are close to my heart. The author had spent two years of his life developing this theme, which is admittedly not fashionable (although it still seems as topical as ever to me). I think he has done an excellent job (presented as a 3<sup>e</sup> cycle thesis). I wasn't the 'boss' of this young researcher, who happens to be brilliantly gifted (I don't know whether he'll continue to apply his gifts to mathematics, given the reception... . ), and he did his work without any contact with me. But it's also true that there could be no doubt about the origin of the theme developed; the poor guy was in a bad way, and he certainly didn't suspect a thing! This colleague went out of his way to do so, and I wouldn't have expected anything less from him: "I'm really sorry, but you understand...". Two years' work by a highly motivated junior researcher for a three-page note to the CR - how much would it have cost in public money? The absurdity of this enormous disproportion between the two is obvious. This absurdity surely disappears if we take the trouble to examine the underlying motivations. Only this colleague and former friend is in a position to fathom his own motivations, just as only I am in a position to fathom mine. But without having to go very far, I'm well aware that it's *not* the inordinate influx of mathematical production, you know, nor the public purse (or the patience of an imaginary 'unknown reader' of the CRs) that we're trying to spare...

This same draft note to the CRs had already had the honour of being submitted to another of the 'six or seven people in France...', who sent it back to the author's 'boss', because this maths 'didn't amuse him' (verbatim!). (The boss, disgusted but cautious, himself in a rather precarious position, preferred on both occasions to back down rather than displease... . ) Having had the opportunity to discuss the matter with this colleague and ex-student, I learned that he had taken the trouble to read the note submitted carefully and to reflect on it (it must have brought back many memories for him...), and that he had found that some of the statements could have been presented in a more user-friendly way. But he didn't deign to waste his pre-heavenly time submitting his comments to the person concerned: fifteen minutes from the illustrious man, against two years' work from an unknown young researcher! The maths 'amused' him enough to seize the opportunity to get back in touch with the situation studied in the note (which could not fail to arouse in him, as in myself, a rich fabric of various geometric associations), to assimilate the description given, and then, without difficulty given *his* background and means, to detect the clumsinesses or gaps. He didn't waste any time: his knowledge of a certain mathematical situation was clarified and enriched, thanks to two years of conscientious work by a researcher taking his first steps; work that the Master would certainly have done himself.

was able to do (in broad outline and without demonstration) in just a few days. That acquired, we remember who we are - the case is judged, two years of Monsieur Personne's work are good for the bin...

Some people don't feel a thing when that wind blows - but it still takes my breath away today. I'm sure that was one of the intended effects in this case (given the exquisite form of the refusal), but certainly not the only one. In the same interview, this friend of yesteryear confided in me, with an air of modest pride, that he only agreed to submit a note to the CRs when "the results stated astonished him, or he didn't know how to demonstrate them" (27). This is undoubtedly one of the reasons why he rarely publishes. If he applied his own criteria to himself, he wouldn't publish at all. (It's true that in his current situation, he doesn't need to.) He knows everything, and it must be as difficult to astonish him as it is to find something demonstrable that he doesn't know how to demonstrate. (This has only happened to me two or three times in the space of twenty years, and not even in the last ten or fifteen years!) He is clearly proud of his 'quality' criteria, which make him the champion of the highest standards in the mathematical profession. What I saw was an unfailing self-indulgence, and on more than one occasion an unrestrained contempt for others, behind the appearance of smiling, good-natured modesty. I've also seen that it gives him great satisfaction.

This colleague's case is the most extreme I have encountered among representatives of the 'new ethics'. It is no less typical. Here again, both in the incident I have reported and in the profession of faith that rationalises it, there is an ubiquitous absurdity, in terms of simple common sense - of such enormous dimensions that this former friend with such an exceptional brain, and surely also many of his colleagues with less prestigious status (who will be content not to approach him to submit a note to the CRs) no longer see it. To see it, you have to at least look at it. When you take the trouble to look at the motivations (and first and foremost his own), then the absurdities appear in full light, and at the same time they cease to be absurd, by revealing their humble and obvious meaning.

If in recent years I have often found it so painful to be confronted with certain attitudes and, above all, certain behaviours, it is surely because I could discern in them, obscurely, a caricature taken to the extreme, to the point of grotesqueness or odiousness, of attitudes and behaviours that had been mine and that were coming back to me through one or other of my own experiences.

my former students and friends. More than once I've been triggered by the old reflex to denounce, to fight the 'evil' that's clearly been pointed out - but if I've given in to it here and there, it's been with divided conviction. Deep down, I know that to fight is to continue to skate on the surface of things, to evade the issue. My role is not to denounce, or even to 'improve' the world in which I find myself, or to 'improve' myself. My vocation is to learn, to know this world through myself, and to know myself through this world. If my life can bring any benefit to myself or to others, it will be insofar as I am faithful to this vocation, insofar as I am in tune with myself. It's time to remind myself of this, to cut short those old mechanisms in me, which here would like to push me to plead a cause (of a certain dead ethic, let's say), or to convince (of the supposedly 'absurd' nature of this ethic that has replaced it, perhaps), rather than to *probe* in order to discover and know, or to *describe* as a means of probing. In writing the preceding two or three pages, with no more precise aim than to say a few words about the current attitudes that have replaced those of yesterday, I felt continually on my guard towards myself, in the mood of someone who would be prepared at any moment to cross out with a broad stroke everything he has just written and throw it in the bin! But I'm going to keep what I've written, which isn't wrong but nevertheless creates a false situation, because I'm involving others more than I'm involving myself. Deep down I felt that I wasn't learning anything by writing, and that's probably what created this unease in me. It's definitely time to get back to thinking about things in a more substantial way, in a way that educates me rather than trying to educate or convince others ( ).<sup>28</sup>

#### 34. Silt and spring.

It seems to me that, for the most part, I have come to terms with my relationships with other mathematicians of all ages and ranks, when I was part of their world, the world of mathematicians; and at the same time, and above all, with the part I have played, through my own attitudes and behaviour, in a certain spirit that I see there today, and which is certainly not new. In the course of this reflection, or journey to put it more accurately, I came across four situations which struck me as typical of certain attitudes and ambiguities in myself, where spontaneous dispositions of benevolence and respect towards others were disrupted, if not totally swept away, by egotistical forces, and above all (in three of these cases at least) by *fatuity*. This fatuity claimed

above all the supposed superiority conferred on me by a certain cerebral power, and the inordinate investment I made in my mathematical activity. It was confirmed and supported by a general consensus that valued, almost without reservation, this cerebral power and this disproportionate investment.

It is the last of the situations examined, that of the 'young misfit who stepped on my toes', which seems to me to be the most important of the four for my present purpose. The first three are typical of me, or of certain aspects of me, at a certain time (in a certain context too, it's true) - but, as I've had occasion to say over and over again, I don't consider them in any way typical of the milieu of which I was a part. Nor do I think they are typical of the current mathematical milieu in France, let's say - it's probable that the sort of chronic bewilderment which characterised the relationship I had with 'l'ami infatigable', for example, is as uncommon nowadays as it must have been then. My attitude and behaviour in the case of the 'young misfit', on the other hand, is typical of what happens every day in the mathematical world, wherever you look. It is the attitude of kindness and respect of the influential mathematician towards the young stranger that becomes the rare exception, when the said stranger does not have the good fortune to be his pupil (and yet...), or the pupil of a colleague of comparable status and recommended by him. This is no doubt what I was already aware of in the aftermath of my 'awakening' in 1970, which had loosened silent tongues - but the first-hand accounts I heard at the time remained remote for me, because they didn't directly concern me or my dearest friends in my milieu. I was affected more than superficially from the moment (around 1976) when the echoes that came back to me, or the events I witnessed, involved some of these friends, or even former pupils who had become important, and even more so when those who were the target of malice were people I knew well, pupils on more than one occasion (post-1970 pupils, needless to say!), whose fate therefore affected me. What's more, in some cases there was no doubt that the lack of benevolence, or even an attitude of ostentatious contempt, was at the very least reinforced, if not provoked, by the mere fact that a particular young researcher was my pupil, or that he was taking the risk (without necessarily being my pupil) of doing what my friends of yesteryear and other colleagues also like to call 'Grothendieckeries'...

The 'young misfit' wrote to me again in the early 70s, asking me very courteously (although he was under no obligation to ask me anything at all!) whether I saw-

I had no problem with him publishing a proof that he had found for a theorem that he had been told I had written, and which had never been published. I remember that I replied to him in the same bad-tempered mood as before, without saying yes or no I think and implying, without knowing his demonstration (which he was of course prepared to communicate to me but which I didn't care about, busy as I was with my militant tasks!), that it would certainly not add anything to mine (yet it would have at the very least been better to have it written down in black and white and made available to the mathematical public, as well as the statement itself!) This just goes to show the extent to which this famous 'awakening' was still superficial, without any impact on certain behaviours rooted in a fatuity and in 'meritocratic' attitudes, which I was surely denouncing at the same time in well-intentioned articles in *Survivre et Vivre*, in public debates, etc. .... .

This is a very concrete answer to a question I had left unanswered earlier. I might as well admit this humble truth, that such attitudes of fatuity are by no means overcome 'once and for all' in my person, and I doubt that they ever will be, except at my death. If there has been a transformation, it is not through the disappearance of vanity, but through the appearance (or reappearance) of a curiosity about myself and the true nature of certain attitudes, behaviours etc. .... in me. It's through this curiosity that I've become somewhat sensitive to the manifestations of vanity in myself. This profoundly modifies a certain inner dynamic, and in so doing modifies the effects of 'vanity'; that is to say, of that force which often pushes me to es- camote or counterfeit the healthy and fine perception I have of reality, for the purpose of enlarging my person and putting myself above others while pretending the opposite.

Perhaps such a reader will feel bewildered, as I once did, at the apparent contradiction between the insidious and tenacious presence of *vanity* in my life as a mathematician (which he may also have glimpsed at times in his own), and what I call my *love*, or *passion*, for mathematics (which perhaps also echoes in his own experience of mathematics, or of some other person or thing). If he is confused indeed, he has within him everything he needs to get back in touch (as I once did) with the reality of things themselves, which he can experience at first hand, rather than spinning around like a squirrel trapped in an endless cage of words and concepts.

Will anyone who sees muddy water say that water and mud are one and the same thing? To know which water is not mud, all you have to do is go up to the spring, look and drink. To know the mud that is not water, all you have to do is go up to the bank, dried by the sun and the wind, and detach a ball of grainy clay in your hand. Ambition and vanity can more or less regulate the proportion of one's life devoted to a particular passion, like mathematical progress, and can make it all-consuming if the returns satisfy them. But the most devouring ambition is powerless in itself to discover or know the least of things - quite the contrary! In the moment of work, when little by little an understanding begins, takes shape, deepens; when in a confusion little by little an order appears, or when what seemed familiar suddenly takes on unusual aspects, then troubling ones, until finally a contradiction bursts out and overturns a vision of things that seemed unchanging - in such work, there is no trace of ambition, or vanity. What then leads the dance is something that comes from much further away than the 'I' and its hunger to constantly expand (be it through 'knowledge' and 'knowing') - from much further away, surely, than our person or even our species.

This is the source, which is within each one of us.

### 35. My passions.

Three great passions have dominated my adult life, alongside other forces of a different nature. I have come to recognise in these passions three expressions of the same profoundational drive, three paths that the drive for knowledge has taken in me, among an infinite number of paths open to it in our infinite world.

The first to manifest itself in my life was my passion for mathematics. At the age of seventeen, just out of secondary school, I let go of a simple inclination and turned it into a passion, which directed the course of my life for the next twenty-five years. I 'knew' mathematics long before I knew the first woman (apart from the one I knew from birth), and today in my middle age I can see that it still hasn't burnt out. She no longer runs my life, any more than I claim to run it. Sometimes it slumbers, sometimes to the point where I think it's extinguished, only to reappear unannounced, as fiery as ever. It no longer devours my life as it once did, when I gave it my life to devour. It continues to leave a deep imprint on my life, like the imprint in a lover of the woman he loves.

The second passion in my life was the quest for a woman. This passion often presented itself to me in the guise of the quest for a companion. I wasn't able to distinguish one from the other until the latter came to an end, when I realised that what I was pursuing was nowhere to be found, or that I was carrying it within myself. My passion for women only really developed after my mother's death (five years after my first love affair, from which a son was born). It was then, at the age of twenty-nine, that I started a family, from which three other children were born. My attachment to my children was originally an indissoluble part of my attachment to my mother, a part of the power emanating from the woman who attracted me to her. It's one of the fruits of this passion for love.

I didn't experience the presence of these two passions in me as a conflict, either at the beginning or later on. I must have had an obscure sense of the profound identity of the two, which became clear to me much later, after the appearance in my life of the third. Yet the effects of the two passions on my life were bound to be very different. The love of mathematics drew me into a certain world, that of mathematical objects, which surely has its own 'reality', but which is not the world in which human life unfolds. The intimate knowledge of mathematical things taught me nothing about myself, let alone about others - the impulse of discovery towards mathematics could only distance me from myself and from others. Two or more people can sometimes come together in the same impulse, but this is communion on a superficial level, which in fact distances each of them from themselves and from others. This is why my passion for mathematics has not been a force for maturation in my life, and I doubt that such a passion can encourage maturation in anyone (<sup>29</sup>). If I gave this passion such a disproportionate place in my life, for a long time, it was surely also precisely because it allowed me to escape the knowledge of conflict and the knowledge of myself.

The sex drive, on the other hand, whether we like it or not, launches us straight into the encounter with others, and straight into the knot of conflict in ourselves and in others! The quest for 'the companion' in my life was the quest for bliss without conflict - it wasn't the drive for knowledge, the drive for sex, as I liked to believe, but an endless flight from the knowledge of the conflict in the other and in myself. (This was one of the two things I had to learn, so that this illusory quest would come to an end, and the anxiety that accompanies it like its inseparable shadow...) Fortunately, no matter how much we run away from conflict, sex quickly brings us back to it!

One day I gave up trying to deny the teaching that the conflict stubbornly brought me, through the women I loved or had loved, and through the children born of those loves. When I finally started to listen and learn, and for years to come, it turned out that everything I learned was from the women I had loved or loved <sup>(30)</sup>. Until 1976, at the age of forty-eight, it was the quest for women that was the only great maturing force in my life. If this maturation only took place in the years that followed, that is to say over the last seven years, it's because I protected myself (as I had learned to do from my parents and the people around me) by all the means at my disposal. The most effective of these means was my investment in my passion for mathematics.

The day the third great passion appeared in my life - a certain night in October 1976 - the great fear of learning vanished. It was also the fear of simple reality, of the humble truths about myself first and foremost, or about people I cared about. Strangely enough, I had never perceived this fear in myself before that night, at the age of forty-eight. I discovered it on the very night that this new passion, this new manifestation of the passion to know, appeared. It took the place, so to speak, of the fear that had finally been recognised. For years I had seen this fear clearly in others, but by some strange blindness I had not seen it in myself. The fear of seeing prevented me from seeing this very fear of seeing! I was strongly attached - like everyone else - to a certain image of myself, which for the most part had not changed since I was a child. The night I'm talking about is also the night when, for the first time, that old image collapsed. Other images like it followed, holding on for a few days or months, or even a year or two, thanks to stubborn forces of inertia, only to collapse in their turn under scrutiny. The laziness of looking often delayed such a new awakening - but the *fear* of looking never reappeared. Where there is curiosity, there is no room for fear. When I am curious about myself, there is no more fear of what I am going to find than when I want to know the final word of a mathematical situation: there is then a joyful expectation, impatient at times and yet obstinate, ready to welcome whatever comes its way, foreseen or unforeseen - a passionate attention on the lookout for the unequivocal signs that make it possible to recognise the true in the initial confusion of the false, the half-true and the maybe.

In curiosity about oneself, there is love, untroubled by any fear that what is

And to tell the truth, the love of myself had blossomed silently in the months preceding that night. And to tell the truth, my love for myself had silently blossomed in the months leading up to that night, which was also the night when that love took on an active, enterprising form, if you like, ruthlessly shaking up costumes and sets! As I said, other costumes and sets soon reappeared as if by magic, to be shaken up in their turn, without invective or gnashing of teeth...

The manifestations of this new passion in my life over the last seven years have come to seem to me like the moving up and down of waves following one another, like the breaths of a vast and peaceful breath. This is not the place to try and trace the sinuous and changing lines of this life, or the counterpoint of the manifestations of mathematical passion. I have given up trying to regulate the course of one or the other - it is rather this double movement of one and the other which today regulates the course of my life - or to put it better, which *is* its course.

In the months that had already preceded the appearance of the new passion - months of management and fulfilment - the woman's quest began to change its face. It began to separate itself from the anxiety with which it had been imbued, like a 'breath' that had freed itself from the oppression that had weighed it down, and regained its amplitude and rhythm. Or like a fire that had been smouldering, half-stifled for lack of an escape route, and which, under a breath of fresh air, suddenly spread out in crackling, agile, lively flames!

The fire burned to satiation. A hunger that seemed unquenchable was satisfied. For the last two or three years, it seems that this quest has been consumed without a trace of ashes, leaving the field open to the song and counter-song of two passions. One, the passion of my youth, served for thirty years to separate me from a disowned childhood. The other is the passion of my middle age, which led me to rediscover both the child and my childhood.

### 36. Desire and meditation.

The night I mentioned, when a new passion took the place of an old fear that had vanished forever, was also the night I discovered meditation. It was the night of my first 'meditation', which came about under the pressure of an urgent need, after I had been overwhelmed by waves of anxiety in the days before. Like any anxiety, perhaps, it was a 'take-off anxiety', warning me insistently that I was about to take off.

a collage between a humble and obvious reality about myself, and a forty-year-old image of myself that I had never questioned. Surely there must have been a great thirst for knowledge, alongside considerable forces of flight, and a desire to escape anguish, to be at peace as before. So there was intense work, which continued for several hours until it came to an end, without me yet knowing the meaning of what was happening, let alone where I was going. In the course of this work, the red herrings were recognised one after the other; or to put it better, it was this work that made these red herrings appear one by one, each in the guise of an intimate conviction that I finally took the trouble to write down in black and white, as if to get a better grasp of it, whereas until then it had remained in a favourable blur. I wrote it down quite happily, without mistrusting it in the slightest; it must surely have seduced me - in the mood of someone who doubts nothing, and for whom the mere fact of having written down an informal conviction in black and white was the irrefutable sign of its authenticity, the proof that it was well-founded. If I hadn't had this indiscreet, not to say indecent, desire to know, I mean, I would have stopped every time at this 'happy ending', and it was with this happy ending that the stage ended. Then, woe betide me! I got the whim, God knows how and why, to look a little closer at what I had just written to my complete satisfaction: it was there in black and white, all I had to do was reread it! And as I reread it carefully, naively, I sensed that there was something a little bit wrong, that it wasn't quite so clear! Then, taking the trouble to look a little more closely, it became clear that it wasn't that at all, that it was all bogus, in other words, that I'd just been fooled! Each time, this partial discovery came as a famous surprise: "Wow, that's a good one!", a joyful surprise that rekindled my thinking with a surge of new energy. We're going to get to the bottom of this, and I'm sure it's going to come out no later than now, so let's keep up the momentum! We're going to make a note of it anyway, out of a clear sense of conscience, and it's a pleasure even to note such judicious and well-intentioned things. You'd really have to be wrong-headed not to agree, such obvious good faith, you can't do better than that, it's perfect as it is!

That was the new end of the stage, the new happy ending, and I would have stopped there happy, if it hadn't been for the bad boy who was as polite as could be, and who once again started to "get into the act".

He was incorrigible enough to stick his nose into this last happy ending. There was no stopping him, he was off again for a new stage.

!

And so, for four hours, one stage followed another, like an onion whose layers I had peeled off one after the other (that's the image that came to me at the end of that night), to arrive at the end of the ends at the *heart* - at the very simple and obvious truth, a truth that was staring me in the face, but which I had managed for days and weeks (and my whole life, in fact) to hide under this accumulation of 'layers of onion' hiding one behind the other.

The appearance at last of the humble truth was an immense relief, an unexpected and complete deliverance. I knew at that moment that I had touched the crux of anguish. The anguish of the last five days was well and truly resolved, dissolved, transformed into the knowledge that had just formed within me. The anguish had not only disappeared from my sight, as it had throughout the meditation, and several times during the previous five days; and the knowledge into which it had been transformed was in no way in the nature of an idea, of a concession that I would have made, let's say, to be even and at peace (as had happened to me here and there during the same night); it was not an external thing that I would then have adopted or acquired to add to my person. It was *knowledge* in the full sense of the word, first-hand, humble and obvious, which was now part of me, just as my flesh and blood are part of me. What's more, it was formulated in clear and unequivocal terms - not in a long speech, but in a simple little sentence of three or four words. This formulation had been the final stage of the work that had just been carried out, which remained ephemeral, reversible as long as this final step had not been taken. Throughout this work, the careful, even meticulous formulation of the thoughts that were being formed, the ideas that were being presented, had been an essential part of this work, in which each new departure was a reflection on the stage that I had just been through, which was known to me through the written testimony that I had just given (with no possibility of hiding it in the mists of a failing memory!).

In the minutes that followed the moment of discovery and deliverance, I also knew the full significance of what had just happened. I had just discovered something even more precious than the humble truth of the last few days. That something was the power within me, if only I was interested, to know the final word of what was going on within me, of all that was going on within me.

the ability to resolve entirely, by my own means, any conflict within me of which I became aware. The resolution does not come about through the effect of some *grace*, as I had tended to believe in previous years, but through intense, obstinate and meticulous *work*, making use of my ordinary faculties. If there is such a thing as 'grace', it is not in the sudden and definitive disappearance of a conflict within us, or in the appearance of an understanding of the conflict that comes to us ready-made (like the chickens in the land of plenty!) - but it is in the presence or appearance of this desire to know (<sup>31</sup>). It was this desire that guided me to the heart of the conflict in the space of a few hours - just as the desire to love leads us unfailingly to the path that leads to the innermost depths of the woman we love.

Whether we're talking about self-discovery or mathematics, in the absence of desire, all so-called 'work' is just a sham that leads nowhere. At its best, it's an endless 'beating about the bush' for those who indulge in it - the contents of the bush are reserved for those who are hungry enough to eat! Like everyone else, I sometimes find that desire and hunger are absent. When it comes to the desire for self-knowledge, then my knowledge of myself and the situations I'm involved in remains inert, and I act not with full knowledge of the facts, but at the whim of simple inveterate mechanisms, with all the consequences that implies - a bit like a car driven by a computer, not by a person. But whether it's meditation or mathematics, I wouldn't dream of pretending to 'work' when there's no desire, when there's no hunger. That's why I've never meditated for even a few hours, or done maths for even a few hours (<sup>32</sup>), without learning something, and more often than not (not to say always) something unexpected and unforeseeable. This has nothing to do with any skills that I might have that others don't, but simply stems from the fact that I don't pretend to work without really wanting to. (It's the strength of this 'desire' that in itself also creates the *requirement* I've mentioned elsewhere, which means that when you work you're not content with a little more, but are only satisfied once you've reached the end of your understanding, however humble it may be). Where discovery is concerned, work without desire is nonsense and a sham, just as much as making love without desire. To tell the truth, I haven't experienced the temptation to waste my energy pretending to do something I have no desire to do, when there are so many exciting things to do, if only to sleep (and dream...) when it's time to sleep.

It was on that same night, I think, that I understood that the *desire* to know and the *power* to know and discover are one and the same thing. As long as we trust it and follow it, it is desire that leads us to the heart of the things we want to know. And it is desire that helps us to find, without even having to look for it, the most effective method of knowing these things, and the one best suited to us as individuals. As far as mathematics is concerned, it would seem that writing has always been an indispensable means, regardless of who is 'doing maths': doing maths is first and foremost *writing* (<sup>33</sup>). The same is undoubtedly true of any work of discovery in which the intellect plays a major role. But this is certainly not necessarily the case with 'meditation', by which I mean the work of self-discovery. In my case, however, and up to now, writing has been an effective and indispensable means of meditation. As in mathematical work, it is the material support that sets the pace of reflection, and serves as a reference point and rallying point for an attention that otherwise tends to scatter to the four winds in my case. Writing also gives us a tangible trace of the work that has just been done, to which we can refer at any time. In long-term meditation, it's often useful to be able to refer back to written records of a particular moment in meditation in the days before, or even years before.

Thought, and its meticulous formulation, therefore play an important role in meditation as I have practised it up to now. However, it is not limited to the work of thought alone. Thought alone is powerless to grasp life. It is effective above all in detecting contradictions, often enormous to the point of grotesqueness, in our vision of ourselves and our relationships with others; but often it is not enough to grasp the meaning of these contradictions. For those driven by the desire to know, thought is often a useful, effective and even indispensable tool, as long as we remain aware of its limits, which are quite obvious in meditation (and more hidden in mathematical work). It is important for thought to be able to fade away and disappear on tiptoe at sensitive moments when something else appears - perhaps in the form of a sudden and profound emotion, while the hand perhaps continues to run over the paper to give it a clumsy and stammering expression at the same time...

### 37. The wonder.

This retrospective on the discovery of meditation came about in an entirely new way.

It was not at all what I set out to examine when I began. I wanted to talk about *wonder*. This night, so rich in so many things, was also rich in wonder at these things. Already in the course of the work, there was a kind of incredulous wonder at every new red herring that came to light, like a crude costume sewn from thick white thread that I had been willing - it was scarcely believable! - to take for real as seriously as possible! Many times since then, in the years that followed, I've found myself marvelling as I did on that first night of meditation, at the enormity of the facts I was discovering, and the crudeness of the subterfuges that had made me ignore them until then. I began to discover the unsuspected world I carry within me through its burlesque aspects, a world that over the days, months and years has revealed itself to be prodigiously rich. On that first night, however, I had more to marvel at than vaudeville episodes. It was the night when for the first time I got back in touch with a forgotten power that had been sleeping inside me, the nature of which still escaped me, except that it is a power, and which is at my disposal at any moment.

And the previous months had already been filled with a silent wonder at something I'd carried within me, probably for as long as I could remember, but with which I'd only just regained contact. I felt this thing not as a power, but rather as a secret sweetness, as a beauty that was both very peaceful and troubling. Later, in the exultation of discovering my long-ignored power, I forgot those months of silent gestation, to which only a few scattered poems bore witness - love poems, which perhaps would have stood out more often than not in the midst of my meditation notes...

It was only years later that I remembered those times of wonder at the beauty of the world and the beauty I felt resting within me. I knew then that the gentleness and beauty I had felt within me, and the power I discovered shortly afterwards that profoundly changed my life, were two inseparable aspects of one and the same thing.

And I also see now that the gentle, collected, silent aspect of this multiple thing that is creativity in us is expressed spontaneously in wonder. And it is also in the wonder of an indescribable beauty revealed by the beloved that the man knows the woman he loves and that she knows him. When wonder in the thing being explored or in the being loved is absent, our embrace of the world is mutilated of the best that is in us.

It - it is mutilated of what makes it a blessing for oneself and for the world. The embrace that is not wonder is an embrace without force, a mere reproduction of a gesture of possession. It is powerless to engender anything other than yet more reproductions, bigger or fatter or thicker perhaps, who cares, never a renewal (<sup>34</sup>). It is when we are children and ready to marvel at the beauty of things in the world and in ourselves, that we are also ready to renew ourselves, and ready as supple and docile instruments in the hands of the Worker, so that by His hands and through us beings and things may perhaps be renewed.

I well remember that in this group of informal friends who, for me, represented the mathematical milieu at the end of the 1940s and in the years that followed, a milieu that was at times noisy and self-confident, where a somewhat peremptory tone was not uncommon (but without any hint of smugness) - in this milieu there was always room for wonder. The one in whom wonder was most visible was Dieudonné. Whether he was giving a talk, or just listening, when the crucial moment came and a sudden breakthrough opened up, Dieudonné would be seen beaming and ecstatic. It was pure, infectious, irresistible wonder - where every trace of 'me' had disappeared. As I recall it now, I realise that this wonder itself was a power, that it exerted an immediate action all around him, like a radiance from which he was the source. If I've ever seen a mathematician use a powerful and elementary 'power of encouragement', it's him! I never thought about it before that moment, but I remember now that it was also in this way that he welcomed my very first results in Nancy, solving questions that he had asked with Schwartz (on the spaces ( $F$ ) and ( $LF$ )). They were very modest results, nothing great or extraordinary, you could say that there was nothing to marvel at. Since then I've seen things of a completely different scale rejected by the unanswerable disdain of colleagues who think they're great mathematicians. Dieudonné was in no way encumbered by such pretensions, justified or not. There was nothing of the sort that prevented him from being delighted even by small things.

There is a *generosity* in this capacity for delight, which is a benefit to those who are willing to let it blossom within them, and to those around them. This benefit is exercised without the intention of pleasing anyone. It is as simple as the fragrance of a flower or the warmth of the sun.

Of all the mathematicians I have known, it is in Dieudonné that this 'gift' has appeared to me in the most striking, the most communicative, the most active too perhaps, I cannot say (35). But in none of the mathematician friends with whom I enjoyed meeting was this gift absent. It found occasion to manifest itself, perhaps in a more restrained way, at any time. It manifested itself every time I came to one of them to share something that I had just found and that had enchanted me.

If I have experienced frustration and sorrow in my life as a mathematician, it is above all in not finding, in some of those I have loved, that generosity I had known in them, that sensitivity to the beauty of things, 'small' or 'great'; as if what had made up the quivering life of their being had died out without a trace, smothered by the smugness of someone for whom the world is no longer beautiful enough for him to deign to rejoice in it.

Of course, there has also been the other pain of seeing one of my friends of yesteryear treat another of my friends of today with condescension or contempt. But this pain is inflicted by the same closure, basically. Anyone who is open to the beauty of a thing, however humble, when he has felt that beauty, cannot help but also feel respect for the person who conceived or made it. In the beauty of something made by human hands, we feel the reflection of a beauty in the person who made it, of the love he put into making it. When we feel this beauty, this love, there can be no condescension or disdain in us, any more than there can be condescension or disdain for a woman, in a moment when we feel her beauty, and the power in her of which this beauty is the sign.

### 38. The urge to return and renew.

The rapture that radiated from time to time in Dieudonné's person must have touched something deep and strong in me, so that the memory comes back to me now with such intensity, such freshness, as if I'd just witnessed it again just now. (Although it's been nearly fifteen years since I've had much of an opportunity to meet Dieudonné, except once or twice in a flash). Of course, I didn't pay any particular attention to it on a conscious level - it was just a slightly touching, at times almost comical, peculiarity of the expansive personality of my older colleague and friend. What was important to me, however, was that I had found in him the perfect collaborator, a dream collaborator I might say, to lay down in black and white, with meticulous care, loving care, the foundations for the vast prospects I saw opening up before me.

me. It is only at this moment when I mention both that the link suddenly appears to me: what made Dieudonné the ideal servant for a great task, whether within Bour- baki or in our collaboration on another great foundation project, was his *generosity*, the absence of any trace of vanity, in his work and in the choice of his major investments. I have constantly seen him take a back seat to the tasks he has made himself the servant of, lavishing inexhaustible energy on them without seeking any return. There is no doubt that without looking for anything in return, he found in his work and in the very generosity he put into it a fulfilment and fulfilment that all those who knew him must have felt.

The rapture of discovery that I have so often felt radiating from her person is immediately associated in me with a similar rapture, which I happened to witness in a very young child. There are two memories that come flooding back - both of which take me back to my very young daughter. In the first image, she must be a few months old, she must have just started crawling. She must have dragged herself from the piece of grass where she was sitting to a gravel path. She was discovering the little gravels in silent ecstasy - and in action, grabbing them with her hands and putting them in her mouth! In the other picture, she must have been a year or two old, someone had just thrown some pellets into a goldfish bowl. The fish swam towards them, mouths wide open, to gobble up the tiny yellow crumbs that were slowly sinking into the water in the jar. The little girl had never realised before that fish eat the way we do. It was like a sudden dazzle for her, expressed in a cry of pure delight: "Look, Mummy, *they're eating!*" There was indeed much to marvel at - she had just discovered in a sudden flash a great mystery: that of our kinship with all other living beings...

In the delight of a small child, there is a communicative force that escapes words, a force that radiates from him and acts on us, even though we do our best, more often than not, to hide from it. In moments of inner silence, we feel this force present in the child at all times. Only at certain moments is its action stronger than at others. It is in newborn babies, in the first days and months of life, that this sort of "force field" around the child is most powerful. More often than not, it remains sensitive throughout childhood, unravelling over the years until adolescence, when there often seems to be no trace of it left. Yet it can be found shining through

around people of all ages, at special moments for some, or for others as a sort of breath or halo that surrounds them at all times. I was very lucky to have known such a person when I was a child, a man who has now passed away...

I'm also thinking of that other strength, or power, that you can sometimes feel radiating from a woman, especially at times when she is fulfilled in her body, in communion with it. The word that often comes to mind is 'beauty', which evokes one aspect of it. It's a beauty that has nothing to do with canons of beauty or so-called 'perfection'; it's not the privilege of youth or maturity. Rather, it is the sign of a deep accord within the person. This agreement often remains fragmentary, and yet it manifests itself in this radiance, a sign of power. It's a force that draws us towards the centre from which it emanates - or rather, it calls within us a profound impulse to *return to* the body of the Mother Woman from which we emerged at the dawn of our lives. Its action is sometimes irresistibly powerful, overwhelming when it emanates from the woman we love. But for those who don't deliberately close themselves off to it, it can be felt in any woman who lets this beauty, this profound harmony, blossom within her.

The strength that radiates from the child is closely related to the strength that emanates from the woman who loves herself in her body. The one is constantly born of the other, just as the child is constantly born of the Mother. But the nature of the force of childhood is neither attraction nor repulsion. The humble and discreet action that this force exerts on those who do not shrink from it is one of *renewal*.

### 39. Beautiful by night, beautiful by day (or: Augias' stables).

The memory of wonder in one of my children dates from the very late fifties and early sixties. If I don't have a similar memory for the other children who were born later, it may be that my own capacity for wonder had dulled, that I had become too distant to share in the delight of one of my children, or even to witness it.

I've never yet thought of tracking the vicissitudes of this ability in my life, from childhood to the present day. Surely there would be a common thread there, a 'detector' of great sensitivity. If I've never thought of following this thread, it's surely because this ability is of such a humble nature, almost insignificant in appearance, that the idea would hardly occur to me.

I was absorbed in discovering and probing what I called 'the great forces' in my life (which continue to manifest themselves in my life to this day). And yet, this capacity to look so humble provides a sign, of all signs, of the presence or absence of the rarest and most precious 'force' within us. . .

Throughout my adult life, I was never entirely cut off from this force. However arid my life may have become, I found in love the wonder of the child, the rapture of discovery. Through many deserts, the passion of love remained the living, vigorous link with something I had left behind, an umbilical cord that silently continued to nourish me with warm, generous blood. And for a long time, the wonder of the woman I loved was inseparable from the wonder of the new beings she gave birth to - these brand new, infinitely delicate, intensely alive beings who bore witness to and inherited her power.

But my purpose here is above all to follow the vicissitudes of this "force of innocence" through my life as a mathematician, during the period when I was part of the "world of mathematicians", from 1948 to 1970. Surely, wonder has never permeated my mathematical passion to the same extent as the passion of love. Strangely enough, if I try to remember a particular moment of delight or wonder in my mathematical work, I can't find any! My approach to mathematics, from the age of seventeen when I began to invest myself fully in it, has been to set myself big *tasks*. Right from the start, they were always tasks of 'tidying up', of cleaning up. I saw an apparent chaos, a confusion of heterogeneous things or mists that were sometimes unimaginable, but which clearly had to have a common essence and conceal an order, a hidden harmony that had to be brought out through patient, meticulous and often lengthy work. It was often a job of mopping and sweeping, for the big jobs that already absorbed considerable energy, before coming to the finishing touches with a feather duster, which I was less passionate about but which also had their charm and, in any case, an obvious usefulness. There was an intense satisfaction in the day-to-day work, seeing little by little the order that had been guessed at emerge, which always turned out to be more delicate, with a richer texture than what had been glimpsed and guessed at. The work was constantly rich in unforeseen episodes, most often arising from the examination of what might have seemed an infinitesimal detail that had hitherto been neglected. Often the fine-tuning of a particular 'detail' would shed unexpected light on work done years before. Sometimes, too, it led to new insights.

which was to become the subject of another "major task".

So, in my mathematical work (apart from the 'difficult year' around 1954 that I've already mentioned), there was constant suspense, and my attention was constantly held in suspense. Fidelity to my 'tasks' prevented me from escaping too far, and I gnawed my teeth in impatience to have reached the end of them all and to be embarking at last on the unknown, the real unknown - even though the scale of these tasks had already become such that to bring them to a successful conclusion, even with the help of the good people who eventually came to the rescue, the rest of my days would not have been enough!

My main guide in my work has been the constant search for a perfect coherence, a complete harmony that I could see behind the turbulent surface of things, and which I patiently tried to uncover, never tiring of it. It was surely a keen sense of 'beauty' that was my flair and my only compass. My greatest joy was not so much to contemplate it when it appeared in the full light of day, as to see it gradually emerge from the cloak of shadow and mist in which it was constantly hiding. Of course, I didn't stop until I had succeeded in bringing it into the clearest light of day. Sometimes I experienced the fullness of contemplation, when all audible sounds contribute to a single, vast harmony. But even more often, what was brought into the light of day immediately became the motivation and the means for a new plunge into the mists, in pursuit of a new incarnation of the One who remained forever mysterious and unknown.

- constantly calling me, to get to know her again...

Dieudonné's pleasure and delight was above all, it seems to me, in seeing the beauty of things manifest themselves in full light, and my joy was above all in pursuing it in the dark recesses of the mists and the night. This is perhaps the profound difference between Dieudonné's approach to mathematics and mine. The sense of the beauty of things, for a long time at least, must have been no less strong in me than in Dieudonné, although it may have dulled during the sixties, under the influence of a fatuity. But it would seem that my perception of beauty, which manifested itself in wonder in Dieudonné, took on different forms in me: less contemplative, more en-treptive, and also less manifest in terms of the emotion felt and expressed. If this is the case, then my aim would be to follow the vicissitudes of this openness in me to the beauty of mathematical things, rather than the mysterious 'gift of wonder'.

#### 40. Sports mathematics.

It is quite clear that openness to the beauty of things mathematical never entirely disappeared in me, even in the sixties until 1970, when fatuity gradually took a growing place in my relationship to mathematics and to other mathematicians. Without a minimum of openness to the beauty of things, I would have been quite incapable of 'functioning' as a mathematician, even on the most modest of terms - and I doubt that anyone could do useful work in mathematics if this sense of beauty did not remain alive in them to some extent. It is not so much, it seems to me, a supposed 'brain power' that makes the difference between one mathematician and another, or between one work and another by the same mathematician; but rather the quality of finesse, of greater or lesser delicacy of this openness or sensitivity, from one researcher to another or from one moment to another in the same researcher. The most profound and fruitful work is also that which demonstrates the most delicate sensitivity for grasping the hidden beauty of things ( ).<sup>36</sup>

If this is so, then this sensitivity must have remained alive in me right up to the end, at least at times, since it was at the end of the 1960s(\*) that I began to catch a glimpse of the most hidden and mysterious mathematical thing I had ever discovered - the thing I called 'pattern'. It is also the thing that has held the greatest fascination for me in my life as a mathematician (apart from certain reflections in recent years, which are intimately linked to the reality of patterns). There's no doubt that if my life hadn't suddenly taken an entirely unexpected course, taking me far away from the serene world of mathematical things, I would have ended up following the call of this powerful fascination, leaving behind the 'tasks' that had until then held me captive!

Perhaps I can say that, in the solitude of my work room, my sense of beauty remained unchanged until I had my first 'awakening' in 1970, unaffected by the fatuity that so often marked my relations with my fellow creatures? A certain 'flair' must even have been refined over the years, through daily and intimate contact with mathematical things. The intimate knowledge that we can have of things, which sometimes allows us to apprehend beyond what we know in the moment and penetrate further into knowledge - this knowledge or this maturity, and this 'flair' which is the sign of it the most

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(\*) (8 August) Checked, it appears that my thinking on motifs began in the early sixties, not the late sixties.

is closely related to openness to the beauty and truth of things. It encourages and stimulates such openness, and it is the sum and fruit of all the moments of openness, of all the 'moments of truth' that have gone before.

What remains for me to examine, therefore, is the extent to which a spontaneous sensitivity to beauty has been disturbed to a greater or lesser extent, at the moments when it had the opportunity to manifest itself in my relationship with this or that colleague.

What memory gives me on this subject is not condensed into a tangible, precise fact that I could relate here in a more or less circumstantial way. Here again, memory is limited to a kind of fog, which nevertheless gives me an overall impression that I must try to define. It's the impression left on me by a certain *inner attitude*, which must have become like second nature, and which manifested itself every time I received mathematical information about something that was more or less 'up my street'. To tell the truth, in some relatively harmless way, this attitude must have always been mine, it's part of a certain temperament, and I've had the opportunity to touch on it in passing. It's about this reflex of first agreeing to read only a *statement*, never its demonstration, to try first of all to situate it in what is known to me, and to see if in terms of what is known the statement becomes transparent, obvious. This often leads me to reformulate the statement in a more or less profound way, in the sense of greater generality or greater precision, often both at the same time. It's only when I can't manage to 'fit' the statement in terms of *my* experience and *my* images, that I'm ready (almost unwillingly at times!) to listen to (or read . . .) the ins and outs that sometimes give 'the' reason for the thing, or at least a demonstration, understood or not.

This is a peculiarity of my approach to mathematics, which, it seems to me, set me apart from all the other members of Bourbaki when I was part of the group, and which made it practically impossible for me to fit into a group effort like them. This peculiarity was certainly also a handicap in my teaching activity, a handicap that must have been felt by all my students until today when (with the help of age) it has finally eased somewhat.

This trait in me is surely already indicative of a lack of openness. It implies only a partial openness, ready to welcome only what 'comes at the right time', or at least very reluctant to welcome anything else. In my choice of investments

mathematics, and the time I'm willing to devote to this or that unexpected information, this deliberate intention of 'partial closure' is now stronger than ever. It is even a necessity, if I want to be able to follow the call of what fascinates me most, without giving up 'my life to devour' to the mathematical lady!

However, the 'fog' gives me more than just this particularity, which I came to realise a few years ago (better late than never!). At a certain point, this reflex became a *point of honour*: it would be the devil if I didn't manage to 'get' this statement (assuming it wasn't already quite familiar to me) in less time than it takes to say it! If it was an illustrious stranger who had made the statement, there would be the added nuance that *I* (who am supposed to be in the know, after all!) wouldn't already have all that up my sleeves! And very often I did have it, and more than that - my attitude then would have tended to go along the lines of: "OK, you can go and get dressed - you'll come back when you've done a bit better!"

That was precisely my attitude in the case of the 'young white boy who was stepping on my toes'. I couldn't even swear that there weren't interesting details in what he was doing that weren't covered by what I'd done in my 'secret notes' - which is incidental(\*). Finally, this episode also sheds light on the question I am examining here, that of a profound disturbance in this openness to the beauty of mathematical things. It was as if from the moment I had 'done' such and such a thing, its beauty had disappeared for me, and all that remained was a vanity that claimed credit and profit. (Although I didn't deign to take the time to publish it - it's true that there would have been too much of that). It was a typical attitude of possession, analogous to that of a man who, having known a woman, no longer feels her beauty and runs after a hundred others without suffering for all that that another knows her. It was an attitude that I disapproved of in love life, believing myself to be far above such vanity, while being careful not to notice the obvious fact that it was indeed *my* attitude towards mathematics!

I have the impression that these crude competitive tendencies, 'sporting' tendencies if you like, which I have just pointed out in my own person, must have started to become common in 'my' mathematical environment, at about the same time as they were common in me. I'd be hard-pressed to place in time the moment of

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(\*) (8 August) It has since occurred to me that this thing is not so 'accessory' as all that, that it constitutes the line from 'sporting attitude' to the beginnings of dishonesty, a line that I may have crossed...

The only thing I can say is that it must have been in the sixties, perhaps in the early sixties or late fifties. The only thing I can say is that it must have been in the sixties, perhaps the early sixties, or the late fifties. (If that's the case, all my pupils were entitled to it - it was a case of take it or leave it for them!) In order to place it, I would need other specific cases, which at the moment escape my memory completely.

This humble reality was, of course, in complete contrast to the noble image I had of my relationship with mathematics, and with young researchers in general. The crude subterfuge that I used to fool myself was meritocratic in inspiration: for this image, all I retained was the relationship with my students (who contributed to my prestige, of which they were the noblest jewels!), and to the particularly brilliant young mathematicians whose merits I had been able to recognise and whom I treated on an equal footing, just like my students, without waiting for their heads to be crowned with laurels (which of course didn't take long - you either have 'flair' or you don't!). As for the young people who didn't happen to be among my pupils, or among those of one of my friends, or to be young geniuses, I didn't care what my relationship with them was. *They didn't matter.*

I think that this reality was more often than not softened, tempered, when I found myself in a personal relationship with the young researcher, either because I met him at my seminar, or because he had written to me. It may be that the case of the 'young white boy' is, from this point of view, something of an exception. It seems to me that in the case of the researchers I've just mentioned, I must have regarded them as having put themselves 'under my protection', and that must have awakened in me a more benevolent attitude. In this case too, my desire to put myself forward could find an outlet, by giving my comments to the person concerned and making suggestions for taking up his work in a broader perspective, perhaps, or by getting to the bottom of things. In such a case, there's a good chance that the young researcher, who for a limited time took on the role of a pupil, would also find this to his advantage, and that he would have fond memories of his relationship with me (any feedback on this subject would be most welcome).

I was thinking here mainly of younger researchers, although the 'sporting' attitude was by no means limited to my relationship with them, it goes without saying. But it is certainly in the relationship with young researchers that the impact, both psychological and practical, of a mathematician in the limelight tends to be the strongest, the most fraught with consequences for their careers.

future professional life.

#### 41. No more merry-go-round!

I stopped last night with a feeling of relief, of great satisfaction, the contentment of someone who hasn't wasted his time! I suddenly felt light and happy.

- a slightly mischievous joy at times, bursting into mischievous laughter - the laughter of a joking rascal. And yet I hadn't actually done very much, I'd just watched an episode I'd already 'seen', the one about the famous 'white boy who . . "from a slightly different angle. An angle showing *my relationship with mathematics itself*, in certain circumstances, not just my relationship with mathematicians. That's all it took for a cherished myth to go up in smoke.

To tell the truth, this isn't the first time I've looked at my relationship with mathematics. Two and a half years ago I had already spent a few weeks or months on it. At that time I realised (among other things) the importance of egotistical forces, forces of self-aggrandisement, in my past investment in maths. But last night I had just put my finger on an aspect that had escaped me at the time. Now that I'm coming back to it, I realise that this aspect, the aspect of *the jealous attitude* in my relationship to maths, ties in with the 'very simple' discovery that came at the end of the first night when I 'meditated' (meditating without knowing it, like Mr Jourdain writing prose...). It's quite possible that this had something to do with the joyful exultation that followed. Even if it wasn't consciously perceived, it was a bit like the reconfirmation, in a new light, of something I'd discovered earlier - and the pleasure then is the same as in mathematics, when without having looked for it you come across, by an entirely different means, something you know, that you've found perhaps years before. Each time, there is a feeling of intimate satisfaction, as the harmony of things is revealed once again, and our knowledge of them is more or less renewed.

What's more, I think I've really 'come full circle' this time! I'd been feeling for days that there was still something I wanted to bring to light, but I couldn't quite put my finger on what. I didn't try to force it, I felt I just had to let it happen, letting the thread I was following unfold freely, through landscapes that were both familiar and unexpected. Unexpected, because until now I'd never bothered to take them into account.

look. I approached the remaining 'hot spot' at a leisurely pace. And I do believe that this is the last in the journey I've just made, which is coming to an end.

And I had the impression, as soon as I reached this point, of someone who arrives at a belvedere, from which he can see the unfolding landscape he has just travelled through, of which at any given moment he could still only perceive a portion. And now there is this perception of expanse and space, which is a liberation.

If I try to put into words what the landscape in front of me is giving me, I come up with this: everything that has come to me, and often unwelcome and unwelcome, in my life as a mathematician in recent years, is the harvest and message of what I *sowed* when I was part of the world of mathematicians.

Of course, I've said this to myself over and over again over the years, and even in the notes I've just written. I've said it to myself, somewhat by analogy with other harvests that have come to me insistently, that I've rejected for a long time and that I've ended up welcoming and making my own. From the first one I accepted, even before I knew anything about meditation, I understood that every harvest had to have a meaning, and that to be reluctant was only to evade a meaning and put off the deadline for a conclusion. This knowledge has been invaluable to me, because it has often kept me from feeling pity for myself, and from the righteous indignation that is often a disguised form of it. This knowledge is in me like half a maturity, which still doesn't put an end to the inveterate reflex of refusing the harvest when it seems bitter. When I say to myself "there's no point in begrudging", it doesn't mean that the harvest is welcomed. I don't pity myself, or perhaps feel indignant, and yet I 'balk'! As long as the food is not eaten, it is not welcomed - and not to eat is to begrudge.

Welcoming and eating is *work*: a certain energy "works", a job is done in broad daylight or in the shadows, something is transformed... But to be reluctant is to waste energy that is dispersed - to be "reluctant"! And we can't do without the work of eating, digesting and assimilating. The mere fact of going through events, of 'doing' or 'acquiring' an experience, has nothing in common with work. It's simply possible *material* for work that you are free to do, or not to do. In the thirty-six years since I first encountered the world of mathematicians, I have made use of this freedom that I have, by *avoiding* a job, while the material, the substance to be eaten and digested, increased from year to year. This feeling of joyful liberation that I've been experiencing since yesterday is surely a sign that the work that was in front of me, which I was constantly putting off in favour of other things, is now over.

work or tasks, has finally been done. It's about time!

It's still too early to be sure that this is indeed the case, that there isn't still some obscure and stubborn corner that has escaped my attention, to which I'll have to return. But it's also true that this feeling of liberation is not misleading - every time I've felt it in my life, I've been able to see afterwards that it was indeed a sign of *liberation*; of something lasting, something acquired, the fruit of an understanding, a knowledge that has become part of myself. I am free, if I wish, to ignore this knowledge, to bury it where I wish and how I wish. But it is not in my power or anyone else's to destroy it, any more than you can destroy the ripeness of a fruit, make it return to a state of greenness that is no longer its own.

It's a great relief to have it confirmed once again that I'm not 'better' than the others. Of course, that too is something I repeat to myself quite often - but *repeating* and *seeing* are not the same thing! Lacking the innocence and mobility of a child, who sees as he breathes, it often takes work to see the obvious - and now I've finally *seen* it: I'm not 'better' than those colleagues or ex-students who, just a few days ago, 'took my breath away'! Just think of the weight I've been relieved of! It may be gratifying in a way to think you're better than the others, but it's also very tiring. It's an extraordinary waste of energy even - as it is every time you have to maintain a fiction. You rarely realise it, but it takes a lot of energy just to maintain the fiction against all the odds, while the evidence screams in my carefully plugged ears that it's all a fake, look at that idiot! It may be a job sometimes to see, but when it's done it's done. It saves me, once and for all, having to walk around like this, plugging my eyes and ears at every turn - that's got to be done too! and having to suffer an intolerable outrage every time something falls on me that I've inadvertently put there.

Fed up with this merry-go-round! Once you've seen the ride, you're already off it. You've paid for it, all right, I've got the right to ride it forever, and even the duty to do so, as everyone will tell me: right, duty - it's up to you. It's also very tiring to have all these rights that are duties and all these duties that are rights, sticking to me when I think I'm better than the others. It's normal, after all, when you're better, you cash in discreetly (that's what 'rights' are for) and you 'pay', you do your duty to

l'honneur de l'esprit humain et de la mathématique - it's very beautiful, it's true, honour, spirit, mathematics, who could say it better, bravo! bis! It's very beautiful, all right, but it's also very tiring, it ends up giving you a stiff neck. I've had my torticollis and now that's enough - I leave room for others to stand stiffly.

It's also normal (since I was talking about pupils) for the pupil to surpass the teacher. I took offence at that, I had a lot of energy to waste! No more of that!

What a relief!

#### 42. The child.

It's even certain that there must be nooks and crannies where the broom hasn't been. Don't worry, they'll come to my attention and I'll always have time to take care of them. But as far as my famous 'mathematician past' is concerned, the big clean-up is done, no doubt about it.

Now that I've seen once again that I'm no better than anyone else, I mustn't fall back into the same old trap of thinking I'm *better than myself*! To think I'm better *now*, off the merry-go-round and all that, than I was fifteen years ago, or a fortnight ago. I've learnt something over the last fifteen years, that's for sure, and over the last fortnight too, and even since yesterday. When I learn something I mature, I'm not quite the same person. I'm not 'better' when I've learnt something than when I was still learning it. A riper fruit is not 'better' than a less ripe or green fruit. A season is not 'better' than the one before it. The taste of the ripest fruit may be more pleasant, or less pleasant, depending on taste. I feel better about myself from one year to the next, so I guess the changes I'm going through are 'to my liking' - but they're not to the liking of all my friends and family. Every time I go back to doing maths, I get compliments from all sides, saying: "What an idea he had to do something else! Everything's back in order, it's about time! It's worrying to see someone change..."

I learn, I mature, I change - so much so that sometimes I find it hard to recognise myself in the person I was and am rediscovering, through a memory or the unexpected testimony of others. I change, and there's also something that remains 'the same'. It's always been there, probably since I was born, and perhaps even before. I seem to have been able to recognise it quite well in recent years. I call it 'the child'. I'm no better at this than I was before I was born.

He was there, even if it would often have been difficult to guess his presence. In this, too, I am no better than anyone else, and no one is better than me. At certain moments or in certain people, the child is more present. And that's a very good thing. It doesn't mean that someone is 'better' than someone else, or than themselves at another time.

Often, when I'm doing maths, or making love, or meditating, it's the child who's playing. He's not always the only one 'playing'. But when he's not there, there's no maths, no love, no meditation. There's no point pretending - and I've rarely acted that way.

It's not just the child, that's for sure. There's the 'me', the 'boss' or the 'big boss', call him what you will. Surely the boss is indispensable to the running of the company. If there's a boss, it must be for something. He's in charge of everything, and like all bosses, he has an annoying tendency to become intrusive. He takes himself terribly seriously, and in the end wants to be better than the boss opposite. Intrusive or not, he's just the boss, not the worker. He organises, he orders, and he cashes in, that's for sure! - He takes the profits as his due, and suffers the losses as an outrage. But he creates nothing. Only the worker has the power to create, and the worker is none other than the child.

It's rare to find a company where boss and worker get along. More often than not, the worker is nowhere to be seen, locked away in God knows where. It's the boss who pretends to take his place in the workshop, with the results you can guess. And often, when the worker is actually there, the boss wages war on him, either violently or through skirmishes - not much comes out of the workshop! Sometimes, too, the boss is suspiciously tolerant of the worker, and lets him get on with it, grumbling, without taking his eyes off him. It's like a constantly renewed truce in a war that has never stopped. And the worker is able to get some work done thanks to the truce.

It's not at all certain that, by virtue of the meditation I've just done, my possessive attitude towards mathematics has disappeared as if by magic! At the very least, I'd have to take a much closer look at the manifestations of possessiveness, one of which I've just touched on by name. This is not the place for this 'introduction', which has become an 'introductory chapter', which in turn is already getting long! One thing did 'click' last night, though, and I'd like to come back to it a little now, something I noted with some surprise a while back.

two or three years.

I was working on a mathematical question, I don't know what it was, and at one point (through some circumstance) it occurred to me that the question I was looking at had perhaps already been looked at, that it might well be dealt with in black and white in some book that I had to consult in the library. The mere mention of this possibility had a lightning effect that stunned me: from one moment to the next, the desire had disappeared. Suddenly, the question on which I had perhaps spent weeks, and was prepared to spend weeks more, had lost all interest for me! It wasn't spite, it was a sudden and total lack of interest. If I'd had the book in my hands, I wouldn't have bothered to open it.

In fact, the possibility wasn't confirmed, so the desire returned and I carried on as if nothing had happened. I was still taken aback. Of course, if I'd really *needed* what I was doing to do *something else*, there wouldn't have been such a spectacular drop in interest. I've often gone back to familiar things, knowing or suspecting that they were familiar, without bothering in the least. At the time I was on a path where it was more economical, and above all much more interesting, to do things my own way, as they presented themselves to me, than to go digging through books or articles. I'd do it 'in the stride' towards something else, towards which my desire was leading me. And of course, I was 'in the know' enough to know that what was at the end was not in any book or article.

This reminds me that mathematical work, even if done alone for years on end, is *not* purely personal, individual work, like meditation is - at least not for me. "The 'unknown' that I pursue in mathematics, for it to attract me with such force, must not only be unknown to me, but unknown to *everyone*. What is written in mathematical books is not unknown, even if I myself have never heard of it. Reading a book or an article has never attracted me; I have avoided it whenever I could. What it can tell me is never the unknown, and the interest I take in it does not have the quality of desire. It's a circumstantial 'interest', an interest in *information* that can be useful to me, as the instrument of a desire of which it is in no way the object.

On reflection, it doesn't seem to me that the event I reported was the sign of jealous, possessive dis-positions, the sign of a vanity that had been disappointed. There was nothing in me

There was no spite, no disappointment, just the sudden disappearance of a desire that, just a moment before, had been intense. This was at a time when I had absolutely no thought of publishing anything, nor of one day taking it into my head to publish something again. This desire was not an expression of vanity, of the craving to accumulate knowledge, titles and credits - it was a real desire, the desire of a child who is passionate about playing. And suddenly - nothing! Understand who can, I don't. ... Sorry !

#### 43. The troublemaker boss - or the pressure cooker.

I feel that I have finally completed this retrospective of my life as a mathematician. Of course, I haven't exhausted my subject - it would take volumes, assuming that such a subject could be 'exhausted'. That wasn't my point. My point was to get to the bottom of whether or not I had been a stakeholder and co-actor in the appearance of a certain 'air' that I now feel in puffs, and if so, in what way. Now I know for sure, and it feels good. It could be fascinating to go further, to delve deeper into what has only been glimpsed or touched upon. There are so many exciting things to look at, do and discover! As far as my past as a mathematician is concerned, it seems to me that what I *needed* to look at, to take on that past, has been seen.

I'm sure that if I went deeper into this meditation, I would learn many interesting things about my present. One thing that this work has made me feel almost every step of the way is the extent to which I have remained attached to this past, the importance it has had to this day in my self-image, and also in my relationship with others; especially in my relationship with those I have, in a certain sense, left behind. My relationship with this past has undoubtedly changed in the course of this work, in the direction of detachment, or a greater lightness. The future will tell me more. But it is likely that an attachment will remain, as long as my mathematical passion is not burnt out and quenched - as long as I 'do maths'. And I don't care to guess or predict whether it will die out before I do...

For more than ten years I had believed this passion to be extinct. It would be truer to say that I had *decreed* it extinct. That was the day I stopped doing maths for a while, and rediscovered the world! For three or four years, I was absorbed in such an intense activity that my old passion must not have found the slightest hint of a home.

a gap where it could slip through to manifest itself. Those were years of intense learning, at a certain level that remained fairly superficial. In the years that followed, my mathematical passion manifested itself in sudden, totally unexpected bursts. These would last a few weeks or months, and I would persist in ignoring their fairly clear meaning. I'd decided once and for all that the urge to do maths, which was decidedly useless, was now a thing of the past, full stop! But the 'good-for-nothing' didn't hear it that way - and I remained deaf.

Paradoxically, it was after I discovered meditation (in 1976), with the arrival in my life of a new passion, that the old one began to reappear in a particularly strong, almost violent way - as if each time a lid blew off under too much pressure. It was only five years later, under the pressure of events, so to speak, that I took the trouble to examine what was happening. It was the longest meditation I had ever done on a seemingly well-defined issue: it took me six months of stubborn and intense work to get round a kind of iceberg, the visible tip of which had ended up becoming embarrassing enough to force me, almost unwillingly, to look into it. I was forced into a situation of *conflit*, which to all appearances was the conflict of two forces or desires: the desire to meditate, and the desire to do maths.

In the course of this long meditation, I learnt step by step that the desire to do maths, which I treated with disdain, was, just like the desire to meditate, which I valued to the hilt, a child's desire. The child has nothing to do with the disdain or modest pride of the big boss! The child's desires follow one another, as the hours and days go by, like the movements of a dance arising from one another. That is their nature. They are no more opposed than the stanzas of a song, or the successive movements of a cantata or a fugue. It is the bad conductor who declares that one movement is "good" and another "bad" and who creates conflict where there is harmony.

After this meditation, the boss has calmed down and is less inclined to stick his nose where it doesn't belong. The work this time was long, whereas I thought it would be done in a few days. Once the work is done, the 'result' seems obvious, and can be summed up in a few words (<sup>37</sup>). But if someone perceptive had said these words to me before or during the work, it probably wouldn't have done me any good. If the work took so long, it's because the resistance was strong and deep-rooted. The boss got a kick out of it, by the way, and

he never batted an eyelid, because it was all done in an atmosphere where there was no way he'd get angry. One thing's for sure, it's been six months well spent, and I couldn't have done without them; any more than a woman can do without the nine months of pregnancy to finally give birth to something as 'obvious' as a baby.

#### 44. We're turning the tide!

I hadn't meditated for a year and a half, apart from a few hours in December, to get to the bottom of an urgent question. And I've been spending most of my energy doing maths for a year now. This 'wave' came like the others, maths-waves or meditation-waves: they come without announcing their arrival. Or if they do, I never hear them! The boss has a slight preference for meditation, it seems: each time the meditation wave is already followed by a maths wave, whereas I thought it would last forever; and the maths wave, which (it seemed to me) was a matter of a few days or weeks at most, lingers on and extends over months and perhaps even, who knows, years. But the boss has come to understand that it's not he who makes these rhythms and that he has nothing to gain by trying to regulate them.

But perhaps there has finally been a change in the boss's 'little preference', because it's been almost a year since it was agreed and decided, and I've left for at least a few years to 'do maths again', officially so to speak: I've even applied for a job at the CNRS! More importantly, and completely unexpected even a year ago, I'm starting to publish again. Even after the 1981 meditation I mentioned earlier, when the desire to do maths ceased to be treated as a poor relation, the idea would never have occurred to me that I might start publishing maths again. Something else at a pinch, a book where I'd talk about meditation, or dreams and the Dreamer - and even then, I was far too busy with what I was doing to want to write a book about it! And what for?!

So it was a rather important decision, one that would affect the course of my life for years to come, and one that was taken somewhat on the spur of the moment, I'm not sure when or how. One day, when there started to be a lot of typed notes (I'll say! until then I'd just handwritten my mathematical cogitations... .<sup>(38)</sup>), on fields and homotopic models, etc. .... then it was decided: we're publishing this! And while we're at it, we might as well pull out all the stops and start a little series of mathematical reflections, the name of which was a no-brainer: all we had to do was put

capital letters: 'Mathematical Reflections'! That's more or less what this famous 'fog', which so often takes the place of a memory, is telling me at the moment. A memory that is surely very shortened, in this case. The remarkable thing, in any case, is that this thing happened without even pausing to *look at* where I was going, what was pushing me, or carrying me.... . That's what I'd like to do again, to build on this unforeseen meditation, to feel that it's really finished.

The question that immediately springs to mind is this 'remarkable thing' I've just noticed: is it a sign of the (so-called?) 'discretion' of the boss, who wouldn't dream of interfering (even with an indiscreet glance... ) in such a beautiful spontaneous movement that has no need of him etc. ... ; or is it a sign, on the contrary, that he's taken sides outright, and that his so-called 'little preference' is pushing him all the way in the direction of maths?

It was enough to put the question in black and white for the answer to appear! It wasn't the kid, who had embarked on a longer game than others, perhaps, who decided that he was going to continue for  $X$  years without a second thought, and wisely black out the number of pages needed to make a reasonable number of volumes of a fine series with capital letters! The boss has planned and organised everything, and all the kid has to do is get on with it. Maybe the kid won't ask for anything better, there's no way of knowing in advance - but that's a secondary question. What the kid wants depends, to a certain extent at least, on the *circumstances*, which depend above all on the boss.

The boss has clearly decided. In fact, he has just shown a certain amount of suppleness, since a meditation has been going on under his benevolent eye for over a month now. It's also true that his benevolence is by no means disinterested, since the tangible product of the meditation, the notes I'm in the process of writing, will be the most beautiful cornerstone of the tower he already sees himself building, with the stones graciously cut by the child-worker, apparently well-disposed. Decidedly, it's a little early to be complimenting him on his 'flexibility'! A few hours of meditation three months ago, and all in all a year and a half from now, would be rather meagre indeed!

However, I don't get the impression that during all that time there was a desire for mediation that had been repressed or frustrated. In the few hours in December, I took stock and saw what I had to see; that was enough to transform a situation that hadn't been clear. I resumed the thread of my interrupted mathematical work, without having to cut short anything else.

It doesn't seem to me that a conflict has reappeared on the sly, by which I mean the one that was resolved more than two years ago and which has now reappeared in reverse form. It's in the boss's nature to have preferences, and that's his right - it would be silly for him to pretend not to (although more silly things happen than that. . . ). This is not the sign of a conflict, even if it is often the cause. As things stand, there really doesn't seem to be any blame to go around for lack of flexibility!

With that out of the way, all that remains is for me to try and pinpoint the boss's 'motivations' for this steam-raising operation, which was carried out as discreetly as possible but which, on closer inspection, is quite spectacular.

#### 45. The Guru-pas-Guru - or the three-legged horse.

This brings me back to the meditation that I had been doing from July to December 1981, after a period of four months that I had just spent in a kind of mathematical frenzy. This slightly insane period (which, incidentally, was very fruitful from a mathematical point of view <sup>(39)</sup> ) had ended, from one day to the next, following a dream. It was a dream that described, in a parable of irresistible savage force, what was happening in my life - a parable of this frenzy. The message was dazzlingly clear, yet it took me two days of intense work to accept its obvious meaning <sup>(40)</sup> . Once I'd done that, I knew what I had to do. I didn't come back to this dream in the course of my work for the next six months, but all I was doing was penetrating further into its meaning and fully assimilating its message. The day after the dream, this message was understood on a level that remained superficial and crude. What I needed to go deeper into, above all, was 'my' relationship; that of the boss, I mean, to the two desires involved, which appeared to me to be antagonistic.

So much has happened in my life since that meditation that it seems to me to be in the very distant past. If I try to formulate what I retained from what it taught me about the motivations of the 'boss', it comes down to this: during the twelve years that had passed since the 'first awakening' (in 1970), the boss had bet on what was obviously 'the wrong horse': *between mathematics and meditation* (which he liked to pit one against the other) *he had opted for meditation.*

That's one way of putting it, since the thing and the name 'meditation' had only entered my life in October 1976, five years earlier. But in the dear image of me who in 1970

had been given a new coat of paint, the meditation came at just the right time, six years later, to add lustre to a certain attitude or pose that I had spotted for a long time but never examined until this meditation in 1981. I called it the 'master's syndrome', and some have also called it (quite rightly) my 'Guru pose'. If I adopted the first designation rather than the second, it was undoubtedly because it encouraged confusion about the nature of the thing, which I liked to maintain. From my earliest childhood there was a spontaneous pleasure in teaching which was in no way opposed to the spontaneous pleasure in learning, and which had nothing of the nature of a pose. It was this force above all that was at play in my relationship with my students; this relationship was superficial, but it was strong and good-natured, by which I mean: without pose. It was after what I called my 'awakening' in 1970, when a world that had been familiar to me was receding to the point of almost disappearing, and with it the pupils and the opportunities I had 'to teach', to share things I knew and which for me had meaning and value - it was then that 'the boss' took his revenge as best he could: Instead of teaching maths, which was just a good way of earning a living, but otherwise unworthy of my new greatness, I saw myself teaching a certain 'wisdom' by my life and example. I was careful, of course, not to say anything of the sort to myself or to others, and when I received echoes in this direction, I was bound to recuse myself, saddened by so much incomprehension on the part of such friends or relatives. No matter how hard I tried to explain it to them, they just wouldn't understand - a sorry bunch of students if ever there was one!

I'd read a book or two by Krishnamurti that made a big impression on me, and in no time at all my head had assimilated a certain message and certain values <sup>(41)</sup>. That's all it took to believe that everything had happened (while pretending it hadn't, of course). I didn't need to read any more, I was capable of improvising the purest Krishnamurti in speech and writing, in a speech of flawless coherence. But no matter how beautiful and flawless the discourse, at no time did it seem to be of any use to me or to anyone else. This went on for years without me even pretending to learn anything from it. With the discovery of meditation, the jargon left me overnight, without a trace. That's when I realised the difference between talk and knowledge.

The big boss immediately rectified the situation: Krishnamurti out of the picture, meditation in the spotlight

! Discreetly, it goes without saying, he now had to play with a completely different touch. Times had changed, with this kid who was now running between his legs, and who was a

bit sharp-eyed at times. I guess the kid was busy elsewhere. In any case

It was only five years later, when a certain pot had exploded and the kid had run to see what was going on, that the great chef's scheme was uncovered.

It wasn't so long ago after all, just over two years ago, that the Guru- sans-en-avoir-l'air was finally exposed - one more disguise down the drain! The poor boss was about to be stripped naked. Or to put it another way: the horse 'Méditation', which had taken the place of the horse with no name (which should certainly not have been called 'Krishnamurtien!'), is making really derisory returns on his bets, especially if you compare them with the co-returns of the horse 'Mathématique' in the old days when the boss was still betting on him. If he maintained the wrong bet for so long, it was out of sheer inertia - he had already changed his bet once, which isn't all that common, and it took all the impact of a striking event to do so<sup>(42)</sup>. Bosses don't really like to change their stakes - and in this case it was a sort of going back to the previous stake.

It was from 1973 onwards, when I retired to the countryside, that the returns from the new horse began to be really meagre compared with those of yesteryear. The unexpected appearance of meditation three years later gave them a bit of a boost. There was even a vertiginous episode from March to July 1979, which I won't go into here, when I once again took on the role of apostle, this time apostle of a wisdom that was both immemorial and new, sung in a poetic work of my own composition, which I finally refrained from entrusting to the hands of a publisher<sup>(43)</sup>. But two years later, with the Guru definitively out of action, it was a bit as if the Meditation horse had broken a leg (as far as returning to the boss was concerned) - there was no longer any way, fingering or no fingering, of playing the Gurus!

After that, it didn't last long - the three-legged horse down the hatch, along with the Apostle-Poet, The Guru-not-Guru and Krishnamurti-who-dare-not-say-his-name. And long live Mathematics

!

We look forward to what happens next...

#### 46. The forbidden fruit.

I had to stop writing for two days. After a careful re-reading, it seems to me that the above scenario is indeed, roughly speaking, a description of reality, a description that now needs to be explored a little further. In particular, I'd have to identify more closely the respective merits of the two 'horses' meditation and mathematics; and also try to

to understand which events or circumstances ultimately triggered the 'switch' in the boss's stake, as opposed to the forces of inertia that would lead him to keep a losing stake indefinitely.

Perhaps we should also sound out the kid's preferences. It's common knowledge by now that he wants to change games from time to time, and the boss apparently has a modicum of flexibility so as not to force him to always play this game and never that one. Over the last few years he's learnt to take the kid into account, to work with him, without waiting for things to explode. It's not complete harmony, but it's no longer war, more a kind of entente cordiale, where occasional tensions tend to soften rather than harden.

When he's not too harshly opposed, the kid is by nature quite flexible in his preferences. (Unlike the boss, who eventually learnt a modicum of flexibility only unwillingly and in his old age... .) But the fact that the kid is flexible doesn't mean that he doesn't also have a preference, that he isn't more strongly attracted to one thing than another.

It's often hard to see clearly, to distinguish between the child's desires and the boss's preferences, or even what the boss has decided once and for all. When I used to say to myself: meditation is better, more important, more serious and all that than mathematics, for such and such reasons (the most relevant, no doubt), it was the boss who gave himself good reasons afterwards to convince himself that the bet he was making was indeed 'the right one'. The kid doesn't say that one thing is 'better' or 'more important' than another. He's not one for speeches. When he feels like doing something, he just goes ahead and does it if no one is in his way, without questioning whether it's "important" or "better". His desires vary from one thing to another and from one moment to another. To detect his preferences, there's no point in listening to the boss's explanatory speeches, when he claims to speak for the child when he can only speak for himself. It's only by observing the child at play that we can perhaps detect his predilections. And even then it's not so obvious: when he plays this with gusto, it doesn't always mean that he wouldn't play something else with delight, if the boss hadn't given him a helping hand.

Clearly, what attracts him above all else is the *unknown* - to pursue into the nebulous recesses of the night and bring into the light of day that which is unknown both to him and to others.

all of them. And I have the impression that when I added "and everyone", I was referring to the child's desire, and not to the boss's vanity, who wants to impress the gallery and himself. It's also a well-known fact that what the child brings back every time from the darkness of inexhaustible attics and cellars are 'obvious', childish things. The more obvious they seem, the happier he is. If they're not, it's because he hasn't done his job to the end, that he's stopped halfway between darkness and daylight.

In maths, the 'obvious' things are also the things that sooner or later someone is *bound to* come across. They are not 'inventions' that you can do or not do. They're things that are already there, that have always been there, that everyone comes into contact with without paying any attention to them, even if it means making a long diversions around them, or tripping over them every time. After a year or a thousand, someone will inevitably take notice of the thing, dig around it, dig it up, look at it from all sides, clean it up, and finally give it a name. This kind of work, my favourite, could always be done by someone else, and what's more, someone else was bound to *do it sooner* or later ( ).<sup>44</sup>

It's not at all the same when it comes to discovering myself, in the not at all collective game of 'meditation'. What I discover, no other person in the world, today or at any other time, can discover for me. It's up to me alone to discover it, and that means *taking it on*. This unknown is not destined to be known, almost by force of circumstance, whether or not I take the trouble to be interested in it. If it waits in silence for the moment when it will be known, and if sometimes, when the time is ripe, I hear it calling, it is only I, the child in me, who is called to know it. He is not a stranger on borrowed time. Of course, I am free to follow his call, or to evade it, to say "tomorrow" or "one day". But the call is addressed to me and to no one else, and no one other than me can hear it, no one else can follow it.

Every time I've followed this call, *something has changed in the 'company'*, more or less. The effect has been immediate, and felt immediately as a blessing - sometimes as a sudden liberation, an immense relief from a weight I was carrying without even realising it, and whose reality is manifested in this relief, this liberation. On a lesser scale, such experiences are common in any work of discovery, and I've had occasion to talk about them. However, the thing that distinguishes the work of self-discovery (whether it takes place in the open or remains underground) from any other work of discovery is precisely that it really changes something in the 'company' itself.

itself. It is not a quantitative change, an increase in output, or a difference in the size or even the quality of the products leaving the workshop. It's a change in the *relationship between the boss and the worker-child*. Maybe there's even a change in the boss himself, if that means something other than his relationship with the worker-child. For example, he may look less at production - but this is also an aspect of his relationship with the worker, through the emergence of a concern or respect that was perhaps foreign to him before. In all the cases where I meditated, the change was in the direction of *clarification* and *appeasement* in the relationship between boss and worker. Except in certain cases where the meditation remained superficial, meditations 'of circumstance' under the sole pressure of an immediate and limited need, the clarification has lasted until today, and so has the appeasement.

This gives the work of self-discovery a different *meaning* from any other work of discovery, even though many essential aspects are the same. There is a dimension to self-knowledge, and to the work of self-discovery, that sets it apart from all other knowledge and work. Perhaps this is the '*forbidden fruit*' of the Tree of Con- birth. Perhaps the fascination that meditation has exerted on me, or rather the fascination of the mysteries whose existence it has revealed to me, is the fascination of the forbidden fruit. I have crossed a threshold where fear has disappeared. The only obstacle to knowledge is inertia, sometimes considerable, but finite and by no means insurmountable. I felt this inertia at almost every step, insidious and omnipresent. It sometimes exasperated me, but never discouraged me. (No more so than in mathematical work, where it is also the main obstacle, but of incomparably lesser weight). This inertia becomes one of the essential ingredients of the game; one of the protagonists, to put it more accurately, in this delicate and by no means symmetrical game that comprises two - or three, to put it more accurately: on the one hand the child who dashes forward, and the boss (made of inertia) who puts the brakes on everything he can (while pretending not to be there), and on the other the glimpsed form of the beautiful unknown, rich in mystery, at once close and distant, who both evades and calls out...

#### 47. The solitary adventure.

This fascination with 'meditation' has been of considerable power for me - as powerful as the attraction of 'woman', whose place it seems to have taken. The fact that I have just written 'has been' does not mean that this fascination has now been extinguished. Over the past year

that I have invested in mathematics, it has only faded into the background. Experience tells me that this situation can be reversed overnight, just as this situation is itself the effect of an entirely unforeseen reversal. In fact, during each of the four long periods of meditation that I went through (one of which lasted almost a year and a half), it was a given that I would keep going until I breathed my last, to probe as far as I could into the mysteries of life and human existence. When the notes piled up so impressively that they threatened to overwhelm my workroom, I even ended up having a piece of furniture made to measure to accommodate them, with plenty of room (by a quick arithmetic progression calculation) to accommodate those that would soon be added over the years; I had allowed for a margin of about fifteen years if I remember correctly (which was already starting to happen!). The boss had done a good job here, and it was a fine job of stewardship! That, and a large-scale tidying up of all the personal papers closely or remotely linked to the meditation work, was in fact the last task he undertook and brought (almost) to a successful conclusion, just before the switch of preferences and bets. It makes you wonder whether he didn't have an ulterior motive, and whether he didn't already see tomes of 'Mathematical Reflections' filling the empty shelves supposedly intended for the 'Notes' to come.

It's true that the passion for meditation and self-discovery is vast enough to fill my life for the rest of my days. It's also true that the passion for mathematics is not over, but perhaps that hunger will be satisfied in the years to come. Something in me wants this, and feels that mathematics is a hindrance to a solitary adventure that only I can pursue. And it seems to me that this 'something' inside me is *not* the boss, nor one of the boss's desires (which, by its very nature, is divided). It seems to me that the mathematical passion still bears the mark of the boss, and in any case that following it makes my life move in a closed circle; in the circle of an *ease*, and in a movement that is that of *inertia*, certainly not of renewal.

I wondered about the meaning of this stubborn persistence of mathematical passion in my life. When I follow it, it doesn't really fill my life. It gives me joy, and it gives me satisfaction, but it doesn't in itself bring true fulfilment. Like any purely intellectual activity, intense, long-term mathematical activity is rather *mind-numbing*. I see this in

This activity is so fragmentary, it involves such a tiny part of our faculties of intuition and sensitivity, that they become dulled by not being used. This activity is so fragmentary, it only uses such a tiny part of our faculties of intuition and sensitivity, that they become dulled by not being used. For a long time I didn't realise this, and obviously most of my colleagues don't realise it any more than I did. It seems to me that it's only since I've been meditating that I've become aware of this. As long as you pay attention, it's obvious - *maths in large doses thickens*. Even after the meditation two and a half years ago, when my mathematical passion was recognised as a passion indeed, as something important in my life - when I give myself over to this passion now, there's still a reserve, a reticence, it's not a total gift. I know that a so-called 'total gift' would in fact be a kind of abdication, it would be following inertia, it would be a flight, not a gift.

There is no such reserve in me for meditation. When I give myself to it, I give myself totally, there is no trace of division in this giving. I know that in giving myself, I am in complete harmony with myself and with the world - I am faithful to my nature, "I am the Tao". This gift is beneficial to myself and to everyone. It opens me up to myself and to others, by lovingly untying what remains knotted within me.

Meditation opens me up to others; it has the power to untie my relationship with them, even if the other remains tied up. But it is very rare that I have the opportunity to communicate with others in any way whatsoever about the work of meditation, about this or that thing that this work has made me aware of. This is by no means because things are 'too personal'. To take an imperfect image, I can only communicate about maths that interests me at a given moment with a mathematician who has the necessary background, and who at the same time is willing to take an interest in it too. It can happen that for years I'm fascinated by such and such mathematical things, without meeting (or even trying to meet) another mathematician with whom to communicate about them. But I know that if I looked for them, I would find them, and that even if I didn't find them, it would simply be a matter of luck or circumstance; that the things that interest me cannot fail to interest someone, or even a few people, whether ten years from now or a hundred years from now, it doesn't really matter. That's what gives meaning to my work, even if it's done in solitude. If there were no other mathematicians in the world, and if there were to be none, I don't think that doing maths would make any sense to me - and I suspect that it's no different for any other mathematician, or any other 'researcher' of any kind.

it is. This ties in with my earlier observation that, for me, the 'mathematical unknown' is that which *nobody* yet knows - it's something that doesn't depend on me alone, but on a collective reality. *Mathematics is a collective adventure* that has been going on for thousands of years.

In the case of meditation, in order to communicate about it, the question of 'baggage' doesn't arise; not at the point I'm at, at least, and I doubt it ever will. The only question is that of an interest in others that matches the interest in me. So it's a question of curiosity about what's really going on in oneself and in others, beyond the facades of rigour, which don't hide much as long as you're really interested in seeing what they cover up. But I've learnt that the moments when such interest appears in a person, the 'moments of truth', are rare and fleeting. It is not uncommon, of course, to meet people who are 'interested in psychology', as they say, who have read Freud and Jung and many others, and who would like nothing better than to have 'interesting discussions'. They have this baggage that they carry with them, more or less heavy or light, what we call a 'culture'. It's part of the image they have of themselves, and reinforces that image, which they are careful never to examine, just like someone else who is interested in maths, flying saucers or angling. It's not this kind of 'baggage', nor this kind of 'interest', that I was referring to earlier - although the same words here designate things of a different nature.

To put it another way: *meditation is a solitary adventure*. Its nature is to be solitary. Not only is the *work* of meditation solitary - I think this is true of any work of discovery, even when it is part of a collective effort. But the *knowledge* that arises from the work of meditation is a 'solitary' knowledge, a knowledge that cannot be *shared*, let alone 'communicated'; or if it can be shared, it is only in rare moments. It's a task, a knowledge that goes against the grain of the most inveterate consensus, and worries each and every one of us. This knowledge can certainly be expressed simply, in simple, clear words. When I express it, I learn by expressing it, because expressing it is part of a job, driven by intense interest. But these same simple, clear words are powerless to communicate meaning to others, when they come up against the closed doors of indifference or fear. Even the language of dreams, which has an entirely different power and infinite resources, constantly renewed by a tireless and benevolent Dreamer, cannot get through those doors. ...

There is no meditation that is not solitary. If there is the shadow of a concern for anyone's approval, confirmation or encouragement, there is no work of meditation and no self-discovery. The same is true, it will be said, of any real work of discovery, at the very moment of the work itself. This is true. But outside the work itself, the approval of others, be it a close friend, a colleague, or a whole community of which we are a part, is important for the meaning of this work in the life of the person who gives himself to it. This approval, this encouragement, is one of the most powerful incentives, making the 'boss' (to use that image) give the green light without reservation for the kid to give it his all. Above all, they determine the boss's investment. It was no different in my own investment in mathematics, encouraged by the kindness, warmth and confidence of people like Cartan, Schwartz, Dieudonné, Godement, and others after them. When it came to meditation, on the other hand, there was no such incentive. It's a passion of the young worker that the boss is kind enough to tolerate, more or less, because *it doesn't 'earn' anything*. It bears fruit, of course, but it's not the kind of fruit a boss wants to see. When he's not fooling himself about it, it's clear that he's not going to invest in meditation. Bosses are gregarious by nature!

Only children, by nature, are solitary.

#### 48. Donation and welcome.

As I was talking yesterday about the solitary essence of meditation, I was struck by the thought that the notes I have been writing for nearly six weeks, which have ended up becoming a kind of meditation, are nevertheless intended for publication. Inevitably, this has influenced the form of the meditation in many ways, notably through the need for brevity and discretion. One of the essential aspects of meditation, namely constant attention to what is going on inside me at the very moment of the work, only manifested itself very occasionally, and in a superficial way. All this must surely have influenced the course of the work and its quality. I feel, however, that it has the quality of meditation, above all by the nature of its fruits, by the appearance of a knowledge of myself (in this case, that of a certain *past*) that I had evaded until now. Another aspect is spontaneity, which has meant that for none of the nearly fifty 'sections' or 'paragraphs' into which the reflection has spontaneously been grouped, could I have said at the outset what the substance would be; each time it was revealed only along the way, and each time the work led to the creation of a new 'section' or 'paragraph'.

brought new facts to light, or shed new light on previously neglected facts.

The most immediate sense of this work was that of a dialogue with myself, a meditation. However, the fact that this meditation is destined to be published, and moreover, to serve as an 'overture' to the 'Mathematical Reflections' that are to follow, is by no means an incidental circumstance, which would have been a dead letter in the course of the work. For me, it is an essential part of the meaning of this work. If I implied yesterday that the boss is surely getting something out of it (he's a master at 'getting something out of everything', or very close to it!), that in no way means that its meaning can be reduced to that - to a belated, almost posthumous 'return' of the famous three-legged horse! More than once I've also felt that the deeper meaning of an act sometimes goes beyond the motivations (apparent or hidden) that inspire it. And in this 'return to mathematics' I can see another meaning as well, other than that of being the result-sum of certain psychic forces that were present in my person at such and such a time and for such and such a reason.

This 'meditation' that I am pursuing in order to offer it to those I have known and loved in the mathematical world - if I feel that it is an important part of this glimpsed meaning, it is not in the expectation that the gift will be welcomed. Whether it is accepted or not does not depend on me, but only on the person to whom it is addressed. I am certainly not indifferent to whether it is accepted. But that is not *my* responsibility. My only responsibility is to be true to the gift I give, which also means being myself.

What I learn from meditation are the things that are humble and obvious, the things that don't pay much attention. They are also the things that I won't find in any book or treatise, however learned, profound or brilliant - the things that no one else can find for me. I questioned a 'fog', I took the trouble to listen to it, I learned a humble truth about a 'sporting attitude' and its obvious meaning, in my relationship to mathematics as in my relationship to others. I would have read the Holy Scriptures, the Koran, the Upanishads, and Plato, Nietzsche, Freud and Jung on top of it all - I would have been a prodigy of vast and profound erudition - but all that would have done was *take me further away* from that one truth, a childlike, self-evident truth. And I would have repeated Christ's words a hundred times, "Blessed are those who are like little children, for theirs is the kingdom of heaven", and commented on them in fine detail, and it would only have served to keep me away from the child in me, and from the humble truths that bother me and that only a child can see. These are the best *things* I have to offer.

And I'm well aware that when such things are said and offered, in simple, clear words, they are not always welcomed. Welcoming is not simply receiving information, with embarrassment or even interest: "Well, who would have guessed...!", or: "It's not so surprising after all....". Welcoming often means recognising yourself in the person who is offering. It means getting to know yourself through someone else.

#### 49. Constant of a division.

This short reflection on the meaning of the present work, and on giving and receiving, comes as a digression in the thread of the reflection; or rather as an illustration of certain aspects that distinguish 'meditation' from any other work of discovery, and in particular from mathematical work. Yesterday I realised that these aspects have a double effect, namely two effects *in opposite directions*: a unique fascination with 'the kid', and a total lack of interest in 'the boss'. It seems that this double effect is in the nature of things, and that it cannot be mitigated by any compromise or arrangement. Whatever is done, when the kid follows his true predilection, the boss is not happy, not at all!

There's no doubt that this is the meaning of the shift that has taken place, which could well wipe out meditation in my life in the years to come (with the exception of 'occasional meditations', like three months ago). I don't think these years have to be entirely barren for that, any more than last year was barren. But it's also true that what I learnt there (apart from maths) is minimal, if I compare it to what I learnt in any of the four years before that. The strange thing is that each of the four long periods of meditation I experienced were times of great fulfilment, with nothing to suggest that something inside me remained frustrated. And yet, if pots exploded, it was because somewhere there was pressure, and that pressure must not have been there that day; it must have been there, somewhere out of my sight, for weeks or months, while I was intensely and totally absorbed in meditation.

But now I'm getting carried away by the momentum of the pen (or rather, the typewriter). The reality is that (except in the last period of meditation, which was cut off in midstream by a combination of events and circumstances), the intensity of the meditation gradually diminished from one moment onwards, like a wave that was about to be followed by another.

by another preparing to take its place. ... The feeling of fullness, to tell the truth, followed this same movement, with the difference that it was only present at the time of the meditation waves, and not the 'mathematical' waves.

The situation I'm trying to define is no longer, it seems to me, a situation of conflict, but it's becoming apparent that it still contains the seed, the potential for conflict. For me, it is now perhaps the most visible sign of a *division* within me, through its impact on the course of my life. This division is none other than the boss-child division.

I can't put an end to it. All I can do, now that it's well and truly decelerated, is to be attentive to it, to follow its signs and its evolution over the months and years ahead. Perhaps this passion for maths, a little misguided it has to be said, will burn itself out (as another passion in me has already burned itself out...), to make way for the passion of discovering myself and my destiny.

This passion is vast enough, as I said, to fill my life - and surely my whole life won't be enough to exhaust it.

## 50. The weight of a past.

It's been a few days since I finished putting the finishing touches to "Harvest and Mesh" - after believing, for over a month, that I was on the verge of completing it in the next few days. Even this time, having put the 'finishing touches' to it, I wasn't entirely sure whether I'd actually finished it - there was still one question I'd left unanswered. It was to 'understand what events or circumstances had finally triggered the 'tipping' in favour of mathematics o v e r meditation, against considerable forces of inertia. Without any deliberate plan, my thoughts have returned with some insistence to this question, in these last few days when I had already begun to branch off into other matters of a completely different order, including mathematical questions (of conformal geometry). I might as well make the most of this meditative 'end of the run', to dig a little deeper and clear the decks.

A number of associations arise when I try to answer 'off the top of my head' why 'I'm getting back into maths' (in the sense of a major investment that is expected to be long-term, of the order of at least a few years). Perhaps the strongest of all relates to the feeling of chronic frustration that I've come to experience in my work.

I've been teaching for six or seven years. There's this increasingly strong feeling of being '*under-employed*', and even, quite often, of investing myself and giving the best of myself for morose pupils who don't care what I have to give.

I see wonderful things to do everywhere, just waiting to be done. These things themselves tell us what language to develop to understand them, and what tools to acquire to explore them. I can't help seeing them, simply because of regular contact with maths (at however modest a level) as a result of teaching, even at times in my life when my interest in maths is at its most marginal. Behind each thing you see, if you look hard enough, there are other beautiful things, which in turn cover and reveal others... Whether it's maths or anything else, wherever you look with genuine interest, you'll see a richness revealed, a depth opened up that you'd guess is inexhaustible. The frustration I'm talking about is that I can't manage to communicate this feeling of richness and depth to my students - even if it's only a spark of *desire* to explore at least what's right at their fingertips, to give it their all during the few months or years that they've decided to invest in a so-called 'research' activity, in order to prepare for some degree or other. Except for two or three of the students I've had over the last ten years, it seems that the very idea of 'giving it their all' frightens them, and that they prefer to sit around for months and years doing nothing, or painstakingly doing mole's work for which they know neither the ins and outs, as long as there's a diploma at the end. There's a lot to be said for this kind of paralysis of creativity, which has nothing to do with the existence or non-existence of 'gifts' or 'faculties' - and this goes back to the very beginning of my thinking, when I touched in passing on the underlying cause of such blockages. But that's not my point here, which is rather to note the state of chronic frustration that these situations, constantly repeated throughout these last seven years of teaching, have ended up creating in me.

The obvious way of 'resolving' such frustration, at least insofar as it is that of the 'mathematician' in me and not that of the teacher, is to do for myself at least some of those things that I despised of seeing any of my students grasp at the end of the day. And that's what I've done here and there, whether it was an occasional reflection lasting a few hours, or even a few days, on the fringes of my teaching activity, or during periods of intense mathematical hunger (which I'm sure I'll never forget).

This kind of occasional, intermittent work usually only led to the first rough sketch of an issue. Such occasional and intermittent work could usually only give rise to a very first rough sketch of a question, and to a most fragmentary vision - it was rather a clearer vision of the work in perspective, whereas this work itself always remains to be done and, to be better seen, only appears all the more burning. Two months ago I gave an overall sketch of the main themes that I had begun to take some measure of. It is the "Outline of a Programme", to which I have already had occasion to allude, and which will finally be attached to the present reflection, to constitute together volume 1 of "Mathematical Reflections".

It's quite clear that this ('private' so to speak) canvassing work alone wasn't enough to resolve my frustration. This feeling of being 'underemployed' surely reflected a *desire* (egotistical in origin, I think, i.e. 'the boss's' desire) *to take action*. It's less a question of acting on others (on my students, let's say, getting them moving, 'communicating something' to them, or helping them to get a certain diploma which might enable them to apply for a certain job, etc. . . ) than 'mathematician' action: contributing to the discovery of such and such unsuspected facts, to the emergence of such and such a theory, etc. . . . This goes hand in hand with the observation made earlier that mathematics is a 'collective adventure'. If I ask myself how I felt when I was doing maths over the last ten years, at a time in my life when it would never have occurred to me that I might one day go back to publishing, and when it was also more or less clear that none of my present or future students would have anything to do with my prospecting work - it immediately became clear to me that these were by no means the dispositions of someone who would do something for personal pleasure alone, or driven by an inner need that concerned only himself, with no relationship to others. When I do maths, I believe that somewhere inside me it is clearly understood that this maths is meant to be communicated to others, to be part of a wider thing to which I am contributing, a thing that is in no way individual in nature. I could call this 'thing' 'mathematics', or better still 'our knowledge of mathematical things'. The term 'our' here undoubtedly refers, first and foremost, in concrete terms, to the group of mathematicians whom I know and with whom I have interests in common; but there is also no doubt that it goes beyond this restricted group just as much as it goes beyond me personally. This 'our' refers to *our species*, insofar as some of its members throughout the ages have been, and are, interested in the realities of the world.

mathematical objects. Before I write these lines, I have never thought about the existence of this 'thing' in my life, and even less about its nature and its role in my life as a mathematician and teacher.

The desire to take action to which I have alluded seems to me to take the following form in my life as a mathematician: to bring out of the shadows what is *unknown to everyone*, not just to me (as I saw earlier), and this, moreover, for the purpose of being made *available to everyone*, thus enriching a common 'heritage'. In other words, it's the desire to contribute to the enlargement, the enrichment of this 'thing', or 'heritage', which goes beyond my person.

In this desire, certainly, the desire to enlarge my person through my works is not absent. In this aspect, I find the craving for 'growth', for enlargement, which is one of the characteristics of the self, of the 'boss'; this is its invasive and ultimately destructive aspect (<sup>44</sup>). However, I also realise that the desire to increase the number of things which (for a short or long time) will more or less bear my name, is far from exhausting or covering up this desire or this wider force, which drives me to want to contribute to enlarging a common heritage. It seems to me that such a desire could be satisfied (if not 'in my company', where the boss is still rather invasive, at least by a mathematician of greater maturity) while the role of my own person would remain anonymous. This might be a 'sublimated' form of the tendency to enlarge the ego, through identification with something greater than oneself. Unless this kind of force is not in itself egotistical, but more delicate and profound in nature, expressing a deep need, independent of any conditioning, that attests to the profound link between the life of a person and that of the whole species, a link that is part of the meaning of our individual existence. I don't know, and it's not my purpose here to explore such far-reaching questions.

Instead, my aim is to examine (in a more modest way) a situation that I myself was in: a situation of frustration, with a partial and temporary outlet in the form of sporadic mathematical activity. The logic of the situation meant that sooner or later I would have to *communicate* what I found. Since, until last year, I was in no way prepared to make the large-scale, long-term investment in my mathematical passion that would have been necessary to 'exploit' the mines that I was uncovering for publication purposes, by means of detailed 'work on documents', I decided to take the initiative.

was the alternative of communicating to certain mathematician friends who were sufficiently 'in the know' at least the things that were closest to my heart.

I think that if, over the last ten years, I had found a mathematician friend to play the role of *interlocutor* and source of information for me (as Serre did to a very large extent for many years in the 50s and 60s), as well as a *relay* for passing on 'information' that I could pass on to him (a role that Serre didn't have to play in the past, because I took care of it myself!), my desire 'to do something with maths' would have found sufficient satisfaction to resolve my frustration, while contenting myself with an episodic and moderate investment of energy in mathematics, leaving the lion's share to my new passion. The first time I approached a mathematician friend with such an expectation (at least implicit in me) was in 1975, and the last time was in 1982, a year and a half ago. It's a funny coincidence that both times it was to try to 'place' (so that it could be passed on and, who knows, developed at the end of the ends!) the same 'programme' of homological and homotopic algebra, the first seeds of which go back to the fifties, and which was perfectly 'mature' (according to the intimate conviction I had of it) before the end of the sixties; a programme of which a preliminary development and in broad outline is the very theme of this *Poursuite des Champs* whose Introduction I am supposed to be writing at the moment! The fact remains that, for reasons that undoubtedly vary from one case to another, my attempts to rediscover a relationship of 'privileged interlocutor', as there had been (before 1970) with Serre, and then with Deligne, came to nothing. One common circumstance, however, was the relatively limited time I was prepared to devote to maths. On the two occasions I've mentioned (in 1975 and 1982), this certainly contributed to making communication difficult. In fact, I was mainly trying to 'place' something, without worrying too much about making the necessary effort to 'get back up to speed' in order to be a satisfactory interlocutor for my correspondent, who was much more 'in the loop' than I was (to say the least).

!) for common homotopy techniques.

I could consider the 'Letter to . . .' which serves as the first chapter of the *Poursuite des Champs* (letter from February last year, just over a year ago) as my last attempt to find an echo, in one of my friends of yesteryear, for some of my ideas and concerns of today. The continuation of the reflection begun (or rather, taken up again) in that letter was to become (without my even suspecting it for weeks) the first

mathematical text since 1970 promised to be published. It was only almost a year later that I received an indirect reaction to this substantial letter (compare note <sup>(38)</sup>). It was more eloquent than any other letter received to date from a fellow mathematician, in making me feel certain attitudes towards my modest person, which have become common among my mathematician friends since I left the milieu of which I was a part with them. There is in this letter, coming from someone to whom I had addressed myself as a friend, in a mood of warm sympathy, a deliberate intention of derision, which reminded me in a particularly violent way of something I had come to realise more and more clearly over the last few years. Previously, I had had occasion to notice a distancing from myself in the mathematical 'big world', and above all among those who had been my friends, more or less close <sup>(45)</sup>. It's no longer a question of distancing oneself from people, but rather of a consensus, in the nature of a fashion and as it presents itself as something to be taken for granted, between people who are 'in the know' to some extent: that the kind of thousand-page packets of maths, and the notions with which I've been harping on people's ears for a decade or two <sup>(46)</sup><sup>(47)</sup>, aren't very serious at all ; that there's a lot of bombast here for very little good, and that apart from a bit of 'general nonsense' about the notion of schema and staggered cohomology (which do have their uses sometimes, alas, we must admit), it's more charitable to forget at least the rest ; that those who would nevertheless pretend to still be singing this kind of grothendieck- ian trumpet, despite good taste and the obvious canons of seriousness, are to be lumped in with their Master, avowed or not, and that they have only themselves to blame if they are treated as they deserve to be...

Surely, the many echoes of this (which I have just transcribed 'in plain English') that have reached me since 1976 <sup>(50)</sup>, and especially over the last two or three years, have finally awakened in me a fighting spirit that had become somewhat dormant over the last ten years. It's like a reflex that makes me want to jump into the fray, to put a stop to these whitewashers who haven't understood a thing - a completely idiotic reflex, in fact, like that of a bull to whom all you have to do is show him a piece of red cloth and wave it in front of his nose, and he'll immediately go into a frenzy, forgetting the path he was following and which was his own! I still think that this reflex is quite epidermal, and that it wouldn't have been enough on its own to shake me up. Fortunately, doing

doing maths is a lot more appealing than rushing at a piece of cloth and getting larded from all sides. But doing maths, pursuing against all odds a style of work, an approach to things that is my own, also means 'throwing myself into the fray'; it means asserting myself in the face of signs of disdain, of rejection - which come to me, no doubt, in response to the disdain that my former friends have felt or thought they felt in me, if not towards them, at least towards a milieu with which they continue to identify unreservedly. So it's also, in a small way, following the piece of red cloth, instead of following *my* path.

This idea has occurred to me on several occasions over the last few weeks, and it is perhaps this aspect in particular that has prompted today's reflection. Along the way, another aspect has come to the fore, one in which the forces of the ego surely also play a large part, but which is not a simple combative reflex. Rather, a desire within me, the nature of which I cannot yet clearly discern, to give meaning to the mathematical work I have done over the last ten or twelve years, or to see it take on its full meaning; a meaning which (I am firmly convinced) cannot be reduced to that of private pleasure or personal adventure. But even if the nature of this desire remains misunderstood, since I haven't taken the time to examine it more closely, this reflection is enough to show me that it is indeed here, in this desire, that the force that weighs on me and forces my hand, so to speak, in favour of a mathematical investment - the force of 'tipping' - really lies. It would work just as well, red fabric or not. If it's a sign of attachment to a past, it's the past of the last ten years, the 'post-1970' past, and not the past of things already written in black and white, things done, things before 1970.

Basically, I'm not at all worried about these things, about the fate that the future, "posterity", will reserve for them (although it's doubtful that there will even be a posterity...). What interests me in this past is not at all what I did (and the fortune that is or will be its), but rather what was *not* done, in the vast programme that I had before my eyes at the time, and of which only a very small part has been achieved, through my efforts and those of the friends and students who have sometimes been willing to join me. Without having planned or sought it, this programme itself has been renewed, along with my vision and approach to mathematics. Over the years, the emphasis has shifted both in terms of the themes and in terms of what I am trying to do: instead of accomplishing the great *tasks* of meticulous foundations, my primary aim now is to fathom the *mysteries of mathematics*.

that have fascinated me the most, such as 'motifs', or the 'geometric' description of the Galois group of  $\mathbb{Q}$  over  $\mathbb{Q}$ . Along the way, of course, I can't help at least sketching out the foundations here and there, as I began to do (among others) in 'La longue Marche à travers la théorie de Galois', or as I am in the process of doing in 'La Poursuite des Champs'. But the subject has changed, and so has the style that expresses it.

To put it another way: in the last ten years I have glimpsed mysterious things of great beauty in the world of mathematics. These things are not personal to me, they are meant to be communicated - the very meaning of having glimpsed them, as I see it, is to communicate them, to be taken up, understood, assimilated... . But communicating them, even if only to yourself, also means going deeper into them, developing them a little - that's a *job*. I'm well aware, of course, that there's no question of my completing this work, even if I had a hundred years left to devote to it. But I don't have to worry about that today, about how many years or months I'm going to devote to this work out of the time I have left to live and discover the world, when there's *another* job waiting for me that only I can do. It's not in my power, and it's not my role, to regulate the seasons of my life.

## NOTES for "Harvest and Sowing

(<sup>1</sup>) (Added in March 1984) It is probably an exaggeration to say that my 'style' and 'method' of working have not changed, whereas my style of expressing myself in mathematics has been profoundly transformed. Most of the time devoted over the last year to 'La Poursuite des Champs' has been spent on my typewriter typing out reflections which are destined to be published virtually as they are (apart from the addition of relatively short notes added later to make reading easier by cross-referencing, correcting errors, etc. . ). No scissors or glue to painstakingly prepare a 'definitive' manuscript (which, above all, must reveal nothing of the process that led to it) - that's a lot of changes in 'style' and 'method'! Unless you dissociate the mathematical work itself from the work of writing and presenting the results, which is artificial, because it doesn't correspond to the reality of things, since mathematical work is indissolubly linked to writing.

(<sup>2</sup>) (Added in March 1984) When I reread these last two paragraphs, I had a certain feeling of unease, due to the fact that in writing them, I implicate others and not myself. Visibly, the thought that my own person might be involved didn't occur to me as I wrote. I certainly didn't learn anything when I confined myself to putting down in black and white (no doubt with a certain satisfaction) things that for years I have perceived in others, and seen confirmed in many ways. As I reflect further, I am led to remember that there has been no shortage of contemptuous attitudes towards others in my life. It would be strange if the link I have grasped between contempt for others and contempt for oneself were absent in the case of myself; sound reason (and also the experience of similar situations of blindness towards myself, which I have come to realise) tell me that this must surely not be the case! For the time being, however, this is no more than a simple deduction, the only possible use of which would be to encourage me to see with my own eyes what is going on, and to see and examine (if it does indeed exist, or has existed) this still hypothetical contempt for myself, so deeply buried that it has totally escaped my gaze until now. It's true that there has been no shortage of things to look at! This one suddenly strikes me as one of the most crucial, precisely because it is so hidden...(\*)

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(\*) (August 1984) On this subject, however, see the last two paragraphs of the note "The massacre", no.<sup>o</sup> 87.

(<sup>3</sup>) I'm thinking in particular of the famous conjectures of Mordell, Tate and Chafarevitch, all three of which were demonstrated last year in a forty-page manuscript by Faltings, at a time when the well-established consensus of those "in the know" was that these conjectures were "out of reach"! As it happens, 'the' fundamental conjecture that serves as the keystone of the 'Anabelian algebraic geometry' programme that is dear to me, is precisely close to Mordell's conjecture (it would even seem that the latter is a consequence of the former, which just goes to show that this programme is not a story for serious people... . )

(<sup>4</sup>) Even today, moreover, we come across 'demonstrations' of uncertain status. For years this was the case with Grauert's proof of the finiteness theorem that bears his name, which no one (and there was no shortage of good will!) could read. This perplexity was resolved by other, more transparent demonstrations, some of which went further, which took over from the initial demonstration. A similar, more extreme situation is the 'solution' to the so-called 'four-colour problem', the computational part of which was solved using a computer (and a few million dollars). This is a 'demonstration' that is no longer based on an intimate conviction derived from an understanding of a mathematical situation, but on credit given to a machine that has no capacity for understanding, and whose structure and operation are unknown to the mathematician user. Even supposing that the calculation is confirmed by other computers, using other calculation programmes, I do not consider that the problem of the four colours is over. It will just have changed its face, in the sense that it will no longer be a question of looking for a counter-example, but only a demonstration (readable, of course!).

(<sup>5</sup>) This fact is all the more remarkable given that until about 1957, I was regarded with a certain reserve by more than one member of the Bourbaki group, which had ended up co-opting me, I believe, with some reluctance. A good-natured joke ranked me among the 'dangerous specialists' (in Functional Analysis). I sometimes sensed in Cartan a more serious reserve - for a few years, I must have given him the impression of someone inclined towards gratuitous and superficial generalisations. I saw him quite surprised to find in the first (and only) rather long essay I wrote for Bourbaki (on differential formal- ism on varieties) a reflection that was even remotely substantial - he had not been

when I offered to take it on. (This thought came in handy again years later, when I developed the residue formalism from the point of view of coherent duality). I was more often than not left behind during the Bourbaki congresses, especially during the joint readings of the essays, being unable to keep up with the readings and discussions as they went along. It's possible that I'm not really cut out for collective work. The fact remains that the difficulty I had in fitting into the joint work, or the reservations I may have aroused for other reasons in Cartan and others, never attracted sarcasm or rebuff, or even a shadow of condescension, except at most once or twice from Weil (decidedly a special case).  
!). At no time did Cartan deviate from his equal kindness towards me, imbued with cordiality and also with that very special touch of humour that for me remains inseparable from his person.

#### (<sup>6</sup>) My friends at Survivre et Vivre.

Among these friends, I should probably also count Pierre Samuel, whom I had previously known mainly through Bourbaki, just like Chevalley, and who (like Chevalley) played an important role in the Survivre et Vivre group. It doesn't seem to me that Samuel was much given to this illusion of the superiority of the scientist. Above all, I feel that he made a great contribution, through the common sense and smiling good humour that he brought to joint work, discussions and relations with others, and also by gracefully taking on the role of 'ugly reformist' in a group that was inclined towards radical analyses and options. He remained in Survivre et Vivre for some time after I withdrew, acting as editor of the newsletter of the same name, and he left with good grace (to join Friends of the Earth) when he felt that his presence in that group had ceased to be useful.

Samuel belonged to the same restricted milieu as I did, but that didn't stop him from being one of my friends from those heady years, from whom I think I learnt something (as bad a pupil as I was . . . ). These ways of being, like those of Chevalley, although they hardly resemble each other, were a better antidote for my 'meritocratic' tendencies than the most incisive analysis!

It now seems to me that for all the friends from that period from whom I learnt something, it was more through their way of being and their sensitivity, which was different from mine, and from whom 'something' ended up being communicated, than through explanations, discussions, etc. . . . I

In addition to Chevalley and Samuel, I particularly remember Denis Guedj (who had a great influence on the Survivre et Vivre group), Daniel Sibony (who kept his distance from the group, while pursuing its evolution with a half-disdainful, half-snideyed eye), Gordon Edwards (who was a co-actor in the birth of the 'movement' in June 1970 in Montreal, and who for years did prodigious feats of energy to maintain an 'American edition' of the Survivre et Vivre newsletter in English), Jean Delord (a physicist about my age, a fine, warm-hearted man who took a liking to me and the Survrien microcosm), Fred Snell (another physicist based in the United States, from Buffalo, whose country house I stayed in for a few months in 1972). Of all these friends, five were mathematicians, two were physicists, and all were scientists - which seems to show that the environment closest to me in those years was the "scientific community".

remained a milieu of scientists, especially mathematicians.

(<sup>7</sup>) The preceding paragraph is the first in the entire introduction to be heavily crossed out in my initial manuscript, and to be overwritten in many places. The description of the incident and the choice of words initially went against the grain, against the current - a force was clearly pushing me to get over the incident quickly, as if by conscience, to 'get down to business'. These are the familiar signs of *resistance*, here against the elucidation of this episode, and its significance as a revelation of an inner attitude. The situation is very similar to that described at the beginning of this introduction (par. 2), that of the "crucial" moment of the discovery of a contradiction and its meaning, in a mathematical task: it is then the *inertia of the mind*, its reluctance to part with an erroneous or inadequate vision (but in which our person is in no way involved), which plays the role of "resistance". This resistance is active in nature, inventive if need be to succeed in drowning a fish even without water, whereas the inertia I mentioned is simply a passive force. In this case, even more than in the case of mathematical work, the discovery that has just appeared in all its simplicity, in all its obviousness, is followed in the moment by a feeling of relief from a weight, a feeling of *liberation*. It's not just a feeling - it's rather an acute and grateful perception of what has just happened, which *is* a liberation.

(<sup>8</sup>) As will become clear in what follows, this ambiguity in no way "dissipated in the aftermath of the 1970 awakening". This is a typical strategic retreat of the "I", which writes off the period "before the awakening", which immediately becomes "after the awakening".

the dividing line for an impeccable 'after'!

(<sup>9</sup>) This is not entirely true; there is at least one exception among my closest colleagues, as will become clear later. There has been a typical 'laziness' of memory, which often tends to 'overlook' facts that do not 'fit' with a familiar and long-established view of things.

(<sup>10</sup>) For example, I have lost count of the number of letters, on mathematical as well as practical or personal matters, sent to colleagues or former students whom I considered to be friends, and which have never received a reply. It seems that this is not just special treatment for me, but a sign of a change in morals, according to echoes in the same vein. (Admittedly, these concern cases where the person sending a mathematical letter was not known to the recipient, who was a well-known mathematician...)

(<sup>11</sup>) Aldo Andreotti, Ionel Bucur.

Of course, it's not impossible that I've forgotten - not to mention that my particularly 'polar' disposition at the time would hardly encourage anyone to talk to me about such things, nor would it lead me to remember any such conversation that might well have taken place. What is certain is that it must have been very exceptional, to say the least, for the question of fear to be addressed (without even calling it by that name...), and it must be just as exceptional today, especially in the 'beau monde'.

Of my many friends in this world, apart from Chevalley, who must have been aware of this atmosphere of fear at least during the sixties, the only other person I can think of who must have perceived it clearly was Aldo Andreotti. I met him, his wife Barbara and their twin children (still very young) in 1955 (at a party at Weil's in Chicago, I think). We remained very close until the 'great turning point' in 1970, when I left the milieu that had been ours and lost sight of them for a while. Aldo had a very keen sense of humour, which hadn't been dulled by his dealings with mathematics and 'thrillers' like me. He had a gift for spontaneous sympathy for those he came into contact with. This set him apart from all the other friends I knew in the mathematical world, or even outside it. In his case, friendship always took precedence over shared mathematical interests (which were not the only ones).

He is one of the few mathematicians with whom I have spoken at all about my life, and he about his. His father, like mine, was Jewish, and he had suffered in Mussolini's Italy, as I had in Hitler's Germany. I saw him always available to encourage and support young researchers, in a climate where it was becoming difficult to be accepted by the establishment. His spontaneous interest always focused on the person, not on mathematical 'potential' or fame. He was one of the most engaging people I have ever had the good fortune to meet.

This mention of Aldo brings back memories of Ionel Bucur, who also died unexpectedly and before his time, and like Aldo, was missed even more (I think) as a friend whom we loved to meet again, than as a partner in mathematical discussions. We sensed in him a kindness, alongside an uncommon modesty, a propensity to constantly take a back seat. It is a mystery how a man so little inclined to take himself for granted or to impress anyone ended up as Dean of the Faculty of Sciences in Bucharest; no doubt because he did not feel like challenging offices that he was far from coveting, but which his colleagues or the political authorities placed on his shoulders, which were robust it must be said. He was the son of peasants (which must have been a joy in a country where 'class' is an important criterion), and had the common sense and simplicity of one. Surely he must have been aware of the fear that surrounds the man of notoriety, but surely it must also have seemed to him to go without saying, as the natural attribute of a position of power. Yet I don't think that he himself ever inspired fear in anyone, certainly not in his wife Florica or their daughter Alexandra, nor in his colleagues or students - and the feedback I've been able to get is very much along those lines.

(<sup>12</sup>) The word "tomorrow" is to be taken literally, not as a metaphor.

(<sup>13</sup>) It is clear that the above description has no pretension other than to try to render as best I can, in concrete words, what this 'fog' of memory gives me, which has not condensed into any case of a kind that is even remotely precise, of which I could have given a description here that was even remotely 'realistic' or 'objective'. It would be a misrepresentation to suggest from this passage that colleagues who are reluctant to sit in the front rows, or who do not have star or eminence status, are necessarily tied up in anguish when talking to one of them. This was clearly *not the* case for most of the friends I met in this milieu, even among those who sometimes haunted conferences and seminars. This

What is unreservedly true is that the status of 'eminence' creates a barrier, a gulf vis-à-vis those without such status, and that this gulf rarely disappears, even if only for the space of a discussion. I would add that the subjective distinction (which nevertheless seems very real to me) between the 'first ranks' and the 'swamp' cannot be reduced to sociological criteria (of social position, posts, titles, etc. . . ) or even of 'status' or renown, but that it also reflects psychological particularities of temperament or disposition that are more difficult to pin down. When I arrived in Paris at the age of twenty, I knew that I was a mathematician, that I'd *done* maths, and despite the disorientation I've already mentioned, I basically felt like 'one of them', although I was the only one who knew it, and I wasn't even sure at the outset that I would continue to do maths. Today I'd be more inclined to sit in the back rows (on the rare occasions when the question arises).

(<sup>14</sup>) One might think that this contradicts the assertion that there was no leader, but in fact this was not the case. For the Bourbaki alumni, it seems to me that Weil was perceived as the soul of the group, but never as a 'leader'. When he was there and when he liked it, he became a 'playmaker' as I said, but he didn't lay down the law. When he was in a bad mood, he could block discussion on a subject he disliked, even if it meant taking up the subject again at another congress when Weil wasn't there, or even the next day when he wasn't obstructing. Decisions were taken unanimously by the members present, given that it was by no means out of the question (nor even rare) for one person to be in the right against the unanimity of all the others. This principle may seem absurd for group work. The extraordinary thing is that it actually worked!

(<sup>15</sup>) I did not have the impression that this 'allergy' to the Bourbaki style gave rise to communication difficulties between these mathematicians and myself or other Bourbaki members or sym-pathisants, as would have been the case if the spirit of the group had been that of a chapel, of an elite within the elite. Beyond styles and fashions, all the members of the group had a keen sense of mathematical substance, wherever it came from. It was only in the 1960s that I remember one of my friends referring to mathematicians whose work did not interest him as 'troublemakers'. When it came to things about which I knew virtually nothing, I tended to take such remarks at face value, impressed by such casual assurance - until one day I discovered that this 'pain in the arse' was an original and profound mind, who had not had the pleasure of pleasing a lot of people.

my brilliant friend. It seems to me that among certain Bourbaki members, an attitude of modesty (or at least reserve) in the work of others, when one is unaware of that work or understands it imperfectly, was eroded at first, whereas there still remained that 'mathematical instinct' which makes one feel a rich substance or a solid work, without having to refer to a reputation or a renown. From the echoes that reach me here and there, it seems to me that both modesty and instinct have become rare things today in what used to be my mathematical milieu.

(<sup>16</sup>) To tell the truth, several Bourbaki members surely had their own microcosm 'of their own', more or less extensive, apart from or beyond the Bourbakian microcosm. But it is perhaps no coincidence that, in my own case, such a microcosm did not form around me until after I had ceased to be part of Bourbaki, and all my energy had been invested in tasks that were personal to me.

(<sup>17</sup>) It was above all outside the scientific community that I encountered warm echoes of the action to which I had committed myself, and active help. Apart from the friendly support of Alain Lascoux and Roger Godement, I must mention here above all that of Jean Dieudonné, who came to Montpellier to attend the court hearing, to add his warm testimony to others in favour of a lost cause.

(<sup>18</sup>) I believe that this lack of discernment was not due to negligence on my part on those two occasions, but rather to a lack of maturity, an ignorance. It wasn't until about ten years later that I began to pay attention to blocking mechanisms, whether in my own person, in those close to me or in students, and to appreciate the immense role they play in everyone's life, and not just at school or university. Of course, I regret not having had the discernment of greater maturity on those two occasions, but not for having expressed my impressions clearly, whether well-founded or not. When, in a particular case, I found that work had not been done seriously, it seemed to me necessary and beneficial to name things for what they were. If, in yet another case, the conclusion I drew was hasty and unfounded, I was not the only one whose responsibility was engaged. The pupil who had been shaken up in this way still had the choice of either learning from it (which is perhaps what happened on the first occasion), or allowing himself to be discouraged, and perhaps then changing profession (which is not necessarily a bad thing either).

more!).

#### (<sup>19</sup>) Jesus and the twelve apostles

From 1970 to the present day, another student, Yves Ladegaillerie, has prepared and passed a thesis with me. The students of the first period were P. Berthelot and M. Demazure,

J. Giraud, Mme M. Hakim, Mme Hoang Xuan Sinh, L. Illusie, P. Jouanolou, M. Raynaud, Mme M. Raynaud, N. Saavedra, J. L. Verdier. (Six of them completed their thesis work after 1970, at a time when my mathematical availability was extremely limited). Among these students, Michel Raynaud takes a special place, having found for himself the essential questions and notions that are the subject of his thesis, which he moreover developed entirely independently; my role as 'thesis director' properly speaking was therefore limited to reading the finished thesis, constituting the jury and sitting on it.

When I proposed a subject, I was careful to limit myself to those to which I had a sufficiently strong relationship to feel able, if necessary, to support the student's work. One notable exception was Michèle Raynaud's work on local and global Lefschetz theorems for the fundamental group, formulated in terms of 1-fields on suitable scalar sites. This question seemed to me (and indeed turned out to be) difficult, and I had no idea of a proof for the conjectures I was proposing (which, incidentally, could hardly be doubted). This work continued in the early 1970s, and Mme Raynaud (as had previously been the case with her husband) developed a delicate and original method without any assistance from me or anyone else. This excellent work, moreover, opens up the question of extending Mme Raynaud's results to the case of *n*-fields, which seems to me to represent the natural culmination, in the context of schemes, of theorems of the 'weak Lefschetz theorem' type. The formulation of the conjecture relevant here (which can hardly be doubted either) nevertheless makes essential use of the notion of *n*-field, the pursuit of which is supposed to be the main object of the present work(\*), as its name "A la Poursuite des Champs" indicates. We will no doubt come back to this in due course.

Another rather special case is that of Mrs Sinh, whom I first met in Hanoi.

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(\*) This is in fact volume 3 of Mathematical Reflections, not the present volume 1 Harvest and Sowing - see Introduction, p. (v).

in December 1967, during a month-long lecture-seminar I gave at the evacuated university in Hanoi. The following year I offered her the subject of her thesis. She worked in the particularly difficult conditions of wartime, her contact with me being limited to occasional correspondence. She was able to come to France in 1974/75 (on the occasion of the international congress of mathematicians in Vancouver), and to complete her thesis in Paris (before a jury chaired by Cartan, and including Schwartz, Deny, Zisman and myself).

Finally, I should mention Pierre Deligne and Carlos Contou-Carrère, both of whom were somewhat of a pupil, the former around 1965-68, the latter around 1974-76. Both clearly had (and still have) unusual means, which they used in very different ways and with very different fortunes too. Before coming to Bures, Deligne had been a pupil of Tits (in Belgium) - I doubt if he had been a pupil of anyone in mathematics, in the usual sense of the term. Contou-Carrère had been a pupil of Santalo (in Argentina), and for a while of Thom (more or less). Both of them already had the stature of mathematicians when the contact was established, except that Contou-Carrère lacked method and craft.

My mathematical role with Deligne was limited to informing him, on a piecemeal basis, of the little I knew about algebraic geometry, which he learnt as if he had always known it; and also, along the way, to raising questions, to which he usually found answers on the spot or in the days that followed. These were the first works by Deligne that I knew. His work after 1970 (both for him and for my 'official students') is known to me only through very scattered and distant echoes(\*)).

My role with Contou-Carrère, as he himself says at the beginning of his thesis, was limited to introducing him to the language of diagrams. In any case, I only followed from a very distance the work he prepared as a doctoral thesis in recent years, on a very topical subject which is beyond my competence. It was after a few misadventures in the wide world that Contou-Carrère was finally led recently, in extremis and (it now seems to me) unwillingly, to call on my services to act as thesis director and to form a jury. (This exposed him to the risk of appearing as one of Grothendieck's students 'after 1970', in a conjecture where this can present serious disadvantages....). I carried out this task to the best of my ability, and it is probable that

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(\*) In particular, I had the opportunity to look through some separate prints by Berthelot and Deligne, which they were kind enough to send me.

that this is the last time I will have exercised this function (at the level of a state doctorate thesis). I am all the happier, in this rather special circumstance, for the friendly assistance of Jean Giraud, who also took a month or two of his time to do a thorough reading of the voluminous manuscript, of which he wrote a detailed and warm report.

(<sup>20</sup>) That reminds me of the subject Monique Hakim had taken up, which wasn't much more engaging to tell the truth - I wonder how she managed to keep her spirits up! If she was struggling at times, it was certainly not to the point of making her sad or gloomy, and the work between us was done in a cordial and relaxed atmosphere.

(<sup>21</sup>) Perhaps it would be more accurate to say that for my temperament, I still lack the necessary *maturity* to fully assume a teaching role. For a long time my acquired temperament was marked by an excessive predominance of 'masculine' (or 'yang') traits, and one of the aspects of maturity is precisely a 'yin-yang' balance with a predominance of 'feminine' (or 'yin') traits.

(Added later.) Even more than maturity, I see that it's a certain *generosity* that I've lacked in my life as a teacher up to now - a generosity that is expressed more delicately than by availability of time and energy, and which is more essential. This lack did not manifest itself in any visible way (by an accumulation of situations of failure, let's say) in my first period of teaching, no doubt mainly because it was compensated for by a strong motivation in the students who chose to come and work with me. In the second period, on the other hand, from 1970 to the present day, it seems to me that this lack of motivation is at least one of the reasons, and in any case the one that involves me most directly, for the overall failure that I observe in my teaching at research level (from DEA level upwards). On this subject, see "Outline of a programme", par. 8, and par. 9 "Assessment of a teaching activity", where the feeling of frustration that this activity has left me with over the last seven or eight years(\*) comes through.

(<sup>22</sup>) Not for much longer, perhaps, since I have decided to apply for admission to the Centre National de la Recherche Scientifique, thus putting an end to my university teaching activities, which in recent years have become increasingly problematic.

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(\*) Compare also note (23iv), added later.

(<sup>22</sup><sup>✉</sup>) Even after 1970, when my interest in maths became sporadic and marginal in my life, I don't think there was an occasion when I recused myself, when a pupil called on me to work with them. I can even say that, apart from two or three cases, the interest of my post-1970 students in the work they were doing was far less than my own interest in their subject, even in the periods when I didn't care much about maths other than on the days when I went to university. So the kind of availability I had for my pre-1970 students, and the extreme demand for work which was a principal sign of this, would have made no sense to most of my later students, who did maths without conviction, as if by a continual effort they had to make on themselves...

### (<sup>23</sup>) The child and the teacher

The term 'pass on' here does not really correspond to the reality of things, which reminds me of a more modest attitude. This rigour is not something that can be passed on, but at the very most awakened or encouraged, when it is ignored or discouraged from a very young age, by the family environment as well as by school and university. As far back as I can remember, this rigour has been present in my quests, those of an intellectual nature at least, and I don't think it was passed on to me by my parents, and even less by teachers, at school or among my mathematician elders. It seems to me to be one of the attributes of *innocence*, and therefore one of the things that everyone is born with. Very early on, this innocence 'sees a lot of green and a lot of black', which means that it is obliged to plunge more or less deeply, and that often there is hardly a trace of it in the rest of life. In my case, for reasons I haven't yet thought of investigating, a certain innocence has survived at the relatively benign level of intellectual curiosity, whereas everywhere else it has plunged deep, unseen and unheard! like everyone else. Perhaps the secret, or rather the mystery, of 'teaching' in the full sense of the term, is to rediscover this innocence that has seemingly disappeared. But there is no question of rediscovering this contact in the pupil if it is not already present or rediscovered in the person of the teacher himself. And what is 'transmitted' by the teacher to the pupil is by no means this rigour or this innocence (innate in both of them), but a respect, a tacit revaluation of something that is commonly rejected.

(<sup>23</sup><sup>✉</sup>) However, over the last seven or eight years there has been another chronic "source of frustration".

in my life as a mathematician, but which expressed itself over the years in a much more discreet way. It eventually became apparent as a result of repetition, of the stubborn accumulation of the same type of 'frustrating' situation in my teaching activity, and finally exploded into a sort of 'fed up', causing me to put an end to virtually all so-called 'research direction' activity. I touch on this question once or twice in the course of my reflection, and finally examine it at least a little at the very end. At the very least, I describe this frustration, and examine the role it played in my 'return to maths' (cf. par. 50, 'Weight of a past').

#### (<sup>23</sup>) Fear of playing

This student had worked with me on a DEA 'work placement' for a whole year, and remained 'contracted' in his working relationship with me right up to the end. It was a frankly friendly relationship, shot through with a mutual sympathy that could not be doubted. Yet there was this 'stage fright', this fear, the real cause of which was certainly not fear of me, although it looked like it. I might not even have noticed if this student hadn't told me about it himself, no doubt to 'explain' more or less the reason for an almost complete blockage in his work during the year.

As had happened with other students who, like him, had initially taken to a certain geometric substance, the blockage became apparent from the moment it was a question of doing 'work on parts', i.e. putting statements in black and white, or simply grasping the meaning and significance of those I was providing and proposing to accept as the basis of a language, as the 'rules of the game'. School' reflexes almost always lead students faced with a situation where they are supposed to be 'doing research' to adopt, as a 'given' that is both vague and imperative, the implicit 'rules of the game' that are handed down by the teacher, and which it is above all not a question of trying to explain, let alone understand. The concrete form these implicit rules take are 'recipes' for semantics or arithmetic, along the lines of, say, a mole book (or any other common textbook). What's more, the student expects the teacher to perform a task of the form 'demonstrate that...', which has been the only form of mathematical 'thinking' he has encountered in his past experience. (I don't think, incidentally, that the attitudes of most professional mathematicians, and of other scientists too, are essentially different - except that

that the "master" is replaced by the "consensus" which sets the rules of the game at the time and considers it to be an immutable given. This consensus also sets out the 'problems' to be solved, between which everyone feels free to choose as they see fit, even allowing themselves to modify them in the course of their work, or even to invent new ones. . . ). I've noticed that my entirely different attitude towards the mathematical substance that I'm trying to probe, and therefore also towards the student, almost certainly triggers confusion, one of the signs of which is anxiety. Like all anxiety, this will tend to take on a face, to project itself onto an external 'reason', plausible or not. One of the most common faces of anxiety is fear.

Such difficulties hardly arose in the first period of my teaching activity, except perhaps in the two cases where a 'teacher-pupil' relationship didn't continue beyond a few weeks, and perhaps (I can't say) in the case of the 'sad pupil', who perhaps felt 'riveted' to a subject that didn't inspire him at all, even though he had every opportunity to change it. In the case of the student (whom I also mentioned) who remained afflicted by stage fright for a long time, it's clear that the reason lay elsewhere. He was in no way blocked in his work, but on the contrary was perfectly at ease with the theme he had chosen, on which he had done a great deal of groundwork. Most of my students during this period were also former students of the Ecole Normale, and their contact with Henri Cartan had already shown them the example of a 'different' approach to mathematics. At the opposite end of the spectrum (so to speak), in my second period as a teacher, at the University of Montpellier, it was among the first-year students that the anxiety I have mentioned least interfered with the work of reflection. For many of these students, the astonishment of a different approach did not provoke anxiety or closure, but on the contrary openness and enthusiasm to do interesting things for once! From my observations, the effect of a few years at university on a student's creative disposition is radical and devastating. It's a strange thing that in this respect the effect of the long years of high school seems relatively insignificant. Perhaps the reason is that the university years come at an age when the creativity innate in us *must* ultimately be expressed through personal work, otherwise we will be shipwrecked forever, at least as far as creative work of an intellectual nature is concerned. It must have been a healthy instinct that during my student years (also at the University of Montpellier) I practically never set foot in the classroom, devoting almost all of my time to my work.

energy for personal mathematical reflection.

(<sup>23</sup>  ) The two brothers

This pupil's antagonism took the form, from the outset, of a 'class antagonism': I was the 'boss' who had 'power of life and death' over his mathematical future, which I could decide as I pleased. ... Of course, events only served to confirm this vision, since I wasted no time in putting an end to my (now painful) responsibilities towards this student. This put him in a delicate situation, in these times when it's not so easy to find a 'boss', especially when the subject has already been chosen. With the other student, whose legitimate expectations had been frustrated, the antagonism took a similar form. I was seen as a tyrannical 'mandarin' who could not tolerate any contradiction from those (students or lower-ranking colleagues) whom he considered to be his subordinates.

Such a 'class attitude' never manifested itself, if at all, during the relationship with my students of the first period. The obvious reason was that in the pre-1970 context, there was no doubt that the student, once he had passed his thesis, would have a post as a lecturer, and would therefore enjoy a social status identical to mine, that of 'university professor'. The figures are revealing: the eleven students who began working with me before 1970 were appointed to the post of lecturer as soon as they had completed their work, whereas none of the twenty or so students who worked more or less under my direction were appointed to such a post. It is true that only two of them were motivated enough to do a state doctorate thesis (which was excellent for both of them).

So it's not surprising that during this second period, certain ambivalences (whose deep-rooted origin remained hidden) took the form of class antagonism and distrust (presented and felt as 'visceral') towards the 'boss'. For one of those who had more or less been a pupil, friendly relations continued for about ten years without any apparent antagonistic episode, and yet marked by this same ambiguity, expressed in an attitude of mistrust, held 'in reserve' behind manifest sympathy. To tell the truth, I was never fooled by this ordered 'mistrust', which appeared to me above all as a reason that this friend thinks he should give himself for not venturing outside the well-defined domain he has chosen as his own, in his professional life as in his life in general - something he is free to do without anyone (except at most himself!) asking him to account for it...

In fact, these three cases are the only ones, in all my teaching experience, where a certain ambivalence in the relationship between a student (or someone who more or less appears to be a student) and myself has been expressed by a 'class attitude'. Such an attitude appears particularly ambiguous when it manifests itself between colleagues within an academic 'body' where they both enjoy exorbitant privileges compared to the situation of ordinary mortals, privileges which make differences in rank (and salaries) appear relatively insignificant. I have noticed, moreover, that these attitudes disappear as if by magic (and with good reason!), as soon as the person concerned sees himself promoted to the position of which only the day before he had been complaining to others.

Moreover, I detect a similar ambiguity in most, if not all, of the conflict situations I have witnessed within the mathematical world (and often outside it too). Those who are 'cared', whether or not their rank corresponds to their expectations (justified or not), enjoy quite unheard-of privileges that no other profession or career can offer. Those who don't have a job aspire to the same security and the same privileges (which doesn't necessarily prevent them from taking an interest in maths itself, and sometimes doing great things). These days, when the competition to fit in is fierce and the non-competent are often treated like laggards, I have more than once felt the connivance between the person who enjoys humiliating and the person who is humiliated - and who swallows and crushes. The real object of his bitterness and animosity is *not* the one who has used power, but none other than *himself*, who has crushed himself and invested the other with this power that he uses at will. The person who takes pleasure in humiliating is also the one who takes revenge and compensates (without ever erasing it. . . ) for a long period of humiliation that has long since been buried and forgotten. And he who takes pleasure in his own humiliation is his brother and emulator, who secretly envies it and in bitterness buries both the humiliation and the humble message about himself that it brings him.

#### (<sup>23iv</sup>) Teaching failure

Since these lines were written, I have had the opportunity to speak with two of my ex-students from after 1970, to try to probe with them the reason for the failure of my teaching at research level, at the University of Montpellier. They told me that my tendency to underestimate the difficulty that assimilating such techniques, which were familiar to me but not to them, could represent for them, had had a discouraging effect on them, because they constantly felt that I had fallen short of my expectations of them. What's more (something

which seems to me to be even more far-reaching), they have sometimes felt frustrated when I 'sold the cat among the pigeons' by giving them a shaped statement that I had up my sleeves, instead of letting them have the pleasure of discovering it on their own, at a time when they were already very close to it. After that, all they had to do was the 'exercise' (which they weren't otherwise keen on) of proving the statement in question. This is where the 'lack of generosity' in me comes in, which I noted in an earlier note (note 21), without going into further detail on the subject. It is disappointments of this kind, above all, that are my personal contribution to the disappearance of interest in research in both of them, after what was nonetheless an excellent start.

I realise that I was no more generous before 1970 than I was after. If I didn't have the same difficulties then, it's no doubt because the kind of students who came to me at that time were motivated enough to find even a 'long exercise' attractive, which was an opportunity to learn the trade and a whole host of things along the way; and also, for a starter statement that I 'sold the fuse' on, to come up with a whole host of others on their own that went well beyond the first. When I changed teaching location, I made the necessary adjustment in the choice of topics for reflection that I proposed to my new students, by choosing mathematical objects that could be grasped by immediate intuition, independently of any technical baggage. But this essential adjustment was in itself insufficient, because of differences in *attitude* (in my new pupils compared with those of yesteryear), which were even more important than a single difference in *background*. This also ties in with the observation made earlier (beginning of par. 25) about a certain inadequacy in me for the role of 'master', which came out much more strongly in my second period as a teacher than in the first.

(<sup>23v</sup>) A particularly striking sign of this difference occurred on the occasion of the 'foreigners' episode', which I have already mentioned (section 24). At the time I received expressions of sympathy from many people who were complete strangers to me, but I don't remember any of my pre-1970 students thinking of expressing their sympathy, let alone offering me any help in the action I had embarked upon. On the other hand, it seems to me that none of my students or ex-students from the second period did not express their sympathy and solidarity with me, and several of them joined in.

actively involved in the campaign I was running at local level. Beyond this restricted circle, the 1945 ordinance affair also created a certain amount of emotion among many students at the Faculty who knew me by name at most, and a good number of them came to the Palais de Justice on the day I was summoned, to show their solidarity. This last circumstance suggests, moreover, that the difference I observed between the attitudes of my students 'before' and 'after' 1970 is perhaps less an expression of the difference in *relations* between them and me than of a difference in *mentality*. Clearly, my 'before' pupils had become important people, and it takes a lot for important people to consent to be moved... But the episode of my departure from the IHES in 1970 and my involvement in militant action seems to show that it wasn't just that. It was a time when none of them was yet such an important figure, and yet I don't remember any of them showing the slightest interest in the activity I was getting involved in. Rather, I think it must have made them uncomfortable, all of them without exception. This again points to a difference in mentality, but it can't be put down to differences in social status alone.

(<sup>24</sup>) The ethics I am talking about apply just as much to any other environment formed around a research activity, and where the possibility of making one's results known, and taking credit for them, is a matter of 'life and death' for the social status of any member, or even of 'survival' as a member of that environment, with all the consequences that implies for him and his family.

(<sup>25</sup>) Ethical consensus - and control of information

Apart from the conversation with Dieudonné, I can't remember a conversation in which I've taken part or witnessed, in the course of my life as a mathematician, in which the ethics of the profession were discussed, the 'rules of the game' in relations between members of the profession. (I'm excluding here the discussions about scientists collaborating with the military, which took place in the early 1970s around the 'Survivre et Vivre' movement. They didn't really concern the relationships between mathematicians. Many of my friends in Survivre et Vivre, including Chevalley and Guedje, felt that the emphasis I placed at that time, especially in the early days, on this issue to which I was particularly sensitive, distracted me from more essential day-to-day realities, of precisely the kind I am examining in this reflection). There was never any question of these

things between a pupil and myself. The tacit consensus was limited, I believe, to this one rule, not to present as one's own the ideas of others of which one may have been aware. This is a consensus, it seems to me, that has existed since antiquity and has not been challenged in any scientific milieu to this day. But in the absence of this other complementary rule, which guarantees all researchers the possibility of making their ideas and results known, the first rule remains a dead letter. In today's scientific world, men in positions of prestige and power have discretionary control over scientific information. In the environment I knew, this control is no longer tempered by a consensus like the one Dieudonné was talking about, which perhaps never existed outside the restricted group whose spokesman he was. The scientist in a position of power receives practically all the information he deems useful to receive (and often even more), and he has the power, for a large part of this information, to prevent its publication while keeping the benefit of the information received and rejected as 'of no interest', 'more or less well known', 'trivial', etc. . . . I come back to this situation in the note ( ).<sup>27</sup>

(<sup>26</sup>) The 'founding members' of Bourbaki were Henri Cartan, Claude Chevalley, Jean Delsarte, Jean Dieudonné and André Weil. They are all still alive, with the exception of Delsarte, who was taken before his time in the 1950s, at a time when the ethics of the profession were still generally respected.

On re-reading the text, I was tempted to delete this passage, in which I may give the impression of issuing certificates of 'probity' (or non-probity) that the people concerned have no use for, and that it is not my responsibility to issue. The reservations that this passage may arouse are certainly justified. I have kept it, however, out of concern for the authenticity of the testimony, and because this passage does indeed convey my feelings, even if they are misplaced.

(<sup>27</sup>) "Youth snobbery", or the defenders of purity

Ronnie Brown shared with me a thought by J. H. C. Whitehead (of whom he was a pupil) about the "snobbery of the young, who believe that a theorem is trivial because its proof is trivial". Many of my old friends would do well to ponder these words. Today, this 'snobbery' is by no means limited to young people, and I know more than one prestigious mathematician who practises it routinely. I'm particularly sensitive to it, because the best I've done in mathematics (and elsewhere too. . . ), the notions and structures I've introduced that seem to me to be the most fruitful, and the essential properties I have

I think that all the things that I have been able to find out through patient and persistent work fall under the heading of "trivial". (None of these things would nowadays have much chance of being accepted for a grade in the CRs, if the author were not already a celebrity!) My ambition as a mathematician throughout my life, or rather my passion and my joy, have constantly been to *find the obvious things*, and this is my sole ambition in the present book (including in this introductory chapter...). The decisive thing is often already to see the *question* that had not been seen (whatever the answer may be, and whether it has already been found or not) or to come up with a *statement* (even if it is conjectural) that sums up and contains a situation that had not been seen or understood; if it is demonstrated, it doesn't matter whether the demonstration is trivial or not, which is entirely incidental, or even whether a hasty and provisional demonstration proves to be false. The snobbery of which Whitehead speaks is that of the jaded wine-lover who does not deign to appreciate a wine until he is sure that it has cost a lot of money. More than once in recent years, caught up in my old passion, I have offered the best I had, only to see it rejected by that kind of smugness. I have felt a pain that remains alive, a joy that has been disappointed

- but that doesn't mean I'm homeless, and fortunately for me I wasn't trying to fit in an article of my own.

The snobbery of which Whitehead speaks is an abuse of power and a dishonesty, not only an insensitivity or closure to the beauty of things, when it is exercised by a man of power against a researcher at his mercy, whose ideas he has free rein to assimilate and use, while blocking their publication on the pretext that they are 'obvious' or 'trivial', and therefore 'of no interest'. I am not even thinking here of the extreme situation of plagiarism in the ordinary sense of the term, which must still be very rare in mathematical circles. However, from a practical point of view, the situation is the same for the researcher who pays the price, and the inner attitude that makes it possible does not seem to me to be very different either. It is simply more comfortable, while it is accompanied by a feeling of infinite superiority over others, and by the good conscience and intimate satisfaction of the person who poses as the intransigent defender of the intangible purity of mathematics.

(<sup>28</sup>) When I wrote the previous pages, I was initially divided between the desire to 'get it off my chest' and a concern for reserve or discretion. As a result, I remained somewhat

vague, which was surely the main reason for my unease, for my feeling that 'I wasn't learning anything'. Since the lines noting this discomfort were written, I have twice rewritten these pages which

had left me with an inner sense of discontent, by getting more clearly involved and getting to the bottom of things. Along the way I did indeed end up 'learning something', and I also believe that at the same time I managed to put my finger on something important, which goes beyond the case in point as much as my own person.

(<sup>29</sup>) By this I mean an intense, long-term investment in mathematics, or in some other entirely intellectual activity. On the other hand, the unfolding of such a passion - which can be a way of reacquainting ourselves with a forgotten force within us, and an opportunity to measure ourselves against a reluctant substance and, in the process, to renew and enrich our sense of identity with something that is truly personal to us - such an unfolding can very well be an important stage in an inner journey, in a maturing.

(<sup>30</sup>) For some years now, my children have been taking over, teaching their sometimes reluctant pupils about the mysteries of human existence...

(<sup>31</sup>) I am thinking here of the 'yang' form of the desire to know - that which probes, discovers, names what appears... It is having been *named* that makes the knowledge that has appeared irreversible, ineffaceable (even if it is subsequently buried or forgotten, or ceases to be active. . .). The 'yin', 'feminine' form of the desire for knowledge is in an openness, a receptivity, in a silent welcoming of knowledge appearing in deeper layers of our being, where thought has no access. The appearance of such openness, and of a sudden knowledge that for a time erases all trace of conflict, comes as a grace once again, that touches deeply even though its visible effect may be ephemeral. I suspect, however, that this wordless knowledge that comes to us in this way, at certain rare moments in our lives, is just as indelible, and its action continues even beyond the memory we may have of it.

(<sup>32</sup>) A hundred irons in the fire, or: there's no point in drying out!

When I was still doing Functional Analysis, that is, up until 1954, I used to persist endlessly on a question that I couldn't resolve, even though I had no more ideas and was content to go round in circles with old ideas that obviously didn't 'bite' any more. In any case, this was the case for a whole year, particularly for the 'approximation problem' in topological vector spaces,

which was only to be resolved some twenty years later by methods of a totally different kind, which could only have escaped me at the point I had reached. I was driven then, not by desire, but by stubbornness, and by an ignorance of what was going on inside me. It was a painful year - the only time in my life when doing maths had become painful for me! It took that experience for me to realise that there's no point in 'skipping' - that once a piece of work has come to a standstill, and as soon as you realise you've come to a standstill, you have to move on to something else - even if that means coming back to the question at hand at a more propitious moment. This moment almost always comes quickly - the question matures, without me even pretending to touch it, simply by virtue of working enthusiastically on questions that may seem to have nothing to do with it. I'm convinced that if I persisted, I wouldn't get anywhere even in ten years! It was from 1954 onwards that I got into the habit in maths of always having many irons in the fire at the same time. I only work on one of them at a time, but by a kind of miracle that is constantly renewed, the work I do on one also benefits all the others, which are waiting for their time. It was the same, without any deliberate intention on my part, from my first contact with meditation - the number of burning questions to be examined increased from day to day, as the reflection continued...

(<sup>33</sup>) This does not mean that moments when paper (or the blackboard, which is a variant of it) is absent are not important in mathematical work. This is especially true in the 'sensitive moments' when a new intuition has just appeared, when it is a question of 'getting to know' it in a more global, more intuitive way than by 'working on parts', which this informal stage of reflection prepares. In my case, this kind of reflection takes place mainly in bed or on walks, and it seems to me that it represents a relatively modest proportion of the total time devoted to work. The same observations apply to meditation work as I've practised it so far.

#### (<sup>34</sup>) The powerless embrace

The word 'embrace' is by no means a mere metaphor for me, and the language used here reflects a profound identity. It could be said, not without reason, that it is not true that embrace without wonder is powerless - that the earth would be depopulated, if not deserted, if it were so in the literal sense. The extreme case is that of rape, in which wonder is certainly absent, even though a being may be procreated in the woman who has been raped.

lated. Of course, the child born of such an embrace cannot fail to bear the mark of this embrace, which will be part of the 'package' it receives as a share and which it is up to it to assume; this does not prevent a new being from being conceived and born, from being *created*, a sign of *power*. And it's also true that sometimes a mathematician, whom I've seen full of self-importance, finds and proves beautiful theorems, signs of an embrace that was not lacking in strength! But it is also true that if the life of such a mathematician is suffocated by his smugness (as was to some extent the case in my own life, at one time), the fruits of these embraces with mathematics are of no benefit to him or to anyone else. And the same can be said of the father and mother of a child born of rape. When I speak of an 'embrace without force', I mean above all the powerlessness to engender *renewal* in the person who believes he is creating, when in fact he is only creating a *product*, something outside himself, with no resonance pro-ground within himself; a product which, far from liberating him and creating harmony within him, binds him more closely to the fatuity within him of which he is a prisoner, which ceaselessly pushes him to produce and re-produce. This is a form of powerlessness at a deep level, behind the appearance of 'creativity' which is basically just unbridled *productivity*.

I have also had ample opportunity to realise that complacency, the inability to emerge, is in the nature of a true blindness, a blockage of a natural sensitivity and flair; if not a total and permanent blockage, at least a manifest one in certain situations. It is a state in which a prestigious mathematician sometimes reveals himself, in the very things in which he excels, to be as stupid as the most stubborn of schoolchildren! On other occasions he will perform prodigious feats of technical virtuosity. I doubt, however, that he is yet in a position to discover the simple and obvious things that have the power to renew a discipline or a science. They are far too far below him for him to deign to see them! To see what no one deigns to see, he needs an innocence that he has lost, or banished... It is surely no coincidence, given the prodigious increase in mathematical production over the last twenty years, and the bewildering profusion of new results that overwhelm the mathematician who simply wants to 'keep up to date', that there has hardly been (as far as I can judge from the echoes that reach me here and there) any real *renewal*, any far-reaching transformation (and not just by accumulation) of any of the major themes of thought with which I have been at all familiar. Renewal is not a quantitative thing, it is unrelated to a quantity of investment, measurable in a number of mathematician-days devoted to a given subject per

mathematicians of such and such a 'level'. A million mathematician-days is powerless to give birth to something as childlike as the zero, which has renewed our perception of number. Only innocence has this power, a visible sign of which is wonder...

(<sup>35</sup>) This "gift" is no one's privilege; we are all born with it. When it seems to be absent in me, it's because I've chased it away myself, and it's up to me to welcome it back. In me or in such-and-such a person, this 'gift' expresses itself in a different way to another, less communicative, less irresistible perhaps, but it is no less present, and I couldn't say whether it is less active.

(<sup>36</sup>) Such a delicate sensitivity to beauty seems to me to be intimately linked to something I have had occasion to talk about under the name of "demandingness" (with regard to oneself) or "rigour" (in the full sense of the term), which I described as an "attention to something delicate in ourselves", an attention to a quality of *understanding* of the thing being probed. This quality of understanding of a mathematical thing cannot be separated from a more or less intimate, more or less perfect perception of the 'beauty' particular to that thing.

(<sup>37</sup>)<sup>1</sup> I think I hardly need to add that this long-term work has brought out, day by day, much more than the 'result' I have just given in lapidary form. It is no different for a work of meditation than for a mathematical work motivated by a particular question that we set out to examine. Very often, the twists and turns of the road followed (which may or may not lead to a more or less complete clarification of the initial question) are more interesting than the initial question or the 'final result'.

(<sup>38</sup>) These notes were in fact a continuation of the long letter to . . . which became the first chapter. They were typed so as to be legible for this old friend, and for two or three others (Ronnie Brown in particular) whom I thought might be interested. This letter never received a reply, and it was never read by the addressee, who almost a year later (when I asked him if he had received it) expressed sincere astonishment that I had even thought for a moment that he could read it, given the kind of mathematics that was to be expected of me...

(<sup>39</sup>) This was the period, among others, of the "Long Walk through Galois theory", discussed in "Esquisse d'un Programme" (par. 3: "Corps de nombres associés à un dessin d'enfant").

(<sup>40</sup>) The visit

The work on this dream is the subject of a long letter in English to a friend and colleague who had dropped in on me the day before. Some of the materials used by the Dreamer to bring this strikingly realistic dream out of apparent nothingness were obviously borrowed from this short episode about the visit of a dear friend whom I hadn't seen for nearly ten years. So, on the first day of work and against my previous experience, I thought I could conclude that the dream that had come to me concerned my friend more than it concerned me - that it was *he* who should have had the dream and not me! It was a way of evading the message of the dream, which (I should have known from the start from my past experience) concerned no one but me. I finally realised this in the night that followed this first, superficial phase of the work, which I resumed the next day in the same letter. Since that memorable letter, I have received no sign of life from this friend, one of the closest I have ever had. This work was the only meditation that took the form of a letter (and in English to boot), so I no longer have any written trace of it. I was particularly struck by this episode, one of many that show the extent to which any sign of work that goes beyond a certain façade, and brings to light facts that are simple but that we generally make a point of ignoring - the extent to which any such work inspires unease and fear in others. I'll come back to this later (see par. 47, "The solitary adventure").

(<sup>41</sup>) Krishnamurti, or liberation turned hindrance

It would be inaccurate to say that the only thing I took away from this reading was a certain vocabulary, and a propensity to make it my own and ultimately to substitute it, as it should be, for reality. The reason I was so struck by Krishnamurti's first book (and even then I only had time to read a few chapters) was that what he had to say totally overturned a number of things I had taken for granted, and which I immediately realised were *commonplaces that had* always been part of the air I had breathed. At the same time, this reading drew my attention, for the first time, to some very important facts, not least the fact that running away from reality is one of the most powerful and universal ways of conditioning the mind.

This gave me an essential key to understanding situations that until then had been incomprehensible and therefore (without my realising it until I discovered mediation five or six years later) a source of anxiety. I was immediately able to see the reality of this flight all around me. This relieved certain anxieties, without changing anything essential, because I could only see this reality in others, while telling myself (as a matter of course) that it didn't exist in myself, that I was in short the exception that confirmed the rule (and without asking myself any other questions about this truly remarkable exception). In fact, I wasn't at all curious about myself or others. This 'key' can only *open* in the hands of someone with the desire to penetrate. In my hands it had become an exorcism and a pose.

It was at the beginning of 1974 that for the first time I realised that the de- struction in my life, which was following me step by step, could not have come from others *alone*, that there was something *in me* that attracted it, fed it, perpetuated it. It was a moment of humility and openness, conducive to renewal. But it remained peripheral and ephemeral, because I didn't *work on it* in depth. This 'something inside me' was still vague. I could see that it was a lack of love, but the very idea of working to identify more closely where and how there had been a lack of love in me, how it had manifested itself, what its concrete effects had been, etc. . - (On the contrary, K. likes to insist on the vanity of all work, which he automatically equates with the ego's 'craving to become'). So, with borrowed 'wisdom' as my compass, I saw nothing else to do but wait patiently for 'love' to descend upon me like a grace from the Holy Spirit.

However, the humble truth that I had just learnt in the depths of a wave had given rise to a powerful wave of new energy, comparable to the one that would carry me two and a half years later into my first foray into meditation. This energy did not remain entirely unused. A few months later, when I was immobilised by a providential accident, it led to a (written) reflection in which, for the first time in my life, I examined the vision of the world that had been the unspoken basis of my relationship with others, and which came to me from my parents and especially my mother. I realised very clearly that this vision had collapsed, that it was incapable of accounting for the reality of relationships between people, and of fostering personal fulfilment for myself and my family.

relationships with others. This reflection remains marked by the 'Krishnamurti style', and also by the Krishnamurtian taboo on any real *work* towards understanding. It did, however, make tangible and irreversible a knowledge that had been born a few months earlier, but had remained vague and elusive at first. At the time, no book and no other person in the world could have given me this knowledge.

To have the quality of a meditation, this reflection lacked above all a look at myself and my *vision of myself*, and not just my vision of the world, a system of axioms in which I was not really 'flesh and blood'. It also lacked a look at myself *in the moment*, at the very moment of reflection (which fell short of a real work); a look that would have allowed me to detect both a borrowed style and a certain complacency in the literary aspect of these notes, a lack of spontaneity and authenticity. As inadequate as it was, and relatively limited in its immediate effects on my relationships with others, this reflection nevertheless seemed to me to be a step, probably necessary given the starting point, towards the more professional renewal that was to take place two years later. It was then, finally, that I discovered meditation - by discovering that first unsuspected fact: *that there were things to discover about myself* - things that almost completely determined the course of my life and the nature of my relationships with others...

#### (<sup>42</sup>) The salutary uprooting

The 'percussive' event in question was the discovery, at the end of 1969, that the institution to which I felt I belonged was partly financed by funds from the Ministry of the Armed Forces, something that was incompatible with my basic axioms (and still is, in fact). This event was the first in a whole chain of others (each more revealing than the last!) which resulted in my leaving the IHES (Institut des Hautes Études Scientifiques), and one thing leading to another in a radical change of environment and investments.

During the heroic years of the IHES, Dieudonné and I were the only members, and the only ones to give it credibility and an audience in the scientific world, Dieudonné through the publication of 'Publications Mathématiques' (the first volume of which appeared in 1959, the year after Léon Motchane founded the IHES), and I through the 'Séminaires de Géométrie Algébrique'. In those early years, the existence of

The IHES was still very precarious, with uncertain funding (from the generosity of a few companies acting as patrons) and with the only premises a room lent (in a visibly bad mood) by the Fondation Thiers in Paris for the days of my seminar<sup>(\*)</sup>). I felt a bit like a 'scientific' co-founder, with Dieudonné, of my home institute, and I intended to live out my days there! I had come to identify strongly with the IHES, and my departure (as a consequence of my colleagues' indifference) was experienced as a kind of uprooting from another 'home', before proving to be a liberation.

Looking back, I realise that there must already have been a need for renewal in me, although I can't say how long ago it was. It's surely no mere coincidence that the year before I left the IHES, there was a sudden shift in my energy investment, leaving behind the tasks that were still burning in my hands the day before, and the questions that fascinated me the most, to launch myself (under the influence of a biologist friend, Mircea Dumitrescu) into biology. I was embarking on this with a view to making a long-term investment in the IHES (which was in keeping with the multidisciplinary vocation of this institution). Surely this was merely an outlet for the need for a much more profound renewal, which could not have been achieved in the 'scientific incubator' atmosphere of the IHES, and which took place during that 'cascade of awakenings' to which I have already alluded. There have been seven of these, the last of which took place in 1982. The 'military funds' episode was providential in triggering the first of these 'awakenings'. The Ministry of the Armed Forces, like my former colleagues at IHES, finally had my full recognition!

(<sup>43</sup>) "The poetic work of my own composition" contains many things that I know at first hand, and which today seem to me to be just as important in my life, and "in life" in general, as when it was written, with the intention of publishing it. If I refrained from doing so, it was mainly because I later realised that the form was afflicted by a deliberate attempt to 'make poetic', so that its overly constructed overall conception, and many passages, lack spontaneity, to the point at times of painful stiffness or swelling. This form, ampoule at times,

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(<sup>\*</sup>) A recent brochure published by the IHES to mark the twenty-fifth anniversary of its foundation (of which Nico Kniper was kind enough to send me a copy) says nothing about these difficult beginnings, which were perhaps deemed unworthy of the solemnity of the occasion, which was celebrated with great pomp last year.

was a reflection of my attitude, where it was decidedly the 'boss' who often called the shots - heavily, of course...

(<sup>44</sup>) It goes without saying that I am disregarding here the hypothesis, by no means improbable to say the least, of the unexpected eruption of an atomic war or some other celebration of the same kind, likely to put an abrupt end once and for all to the collective game called 'Math- ematics', and to much else besides... .

# HARVESTING AND SOWING

Reflections and testimony  
on a mathematician's past

by

Alexandre GROTHENDIECK

Part Two:

**BURIAL (I)**  
or the robe of the Emperor of China

University of Sciences and Techniques of Languedoc, Montpellier

To those who were my friends  
and to the few who have  
remained so  
and to all those who came in their numbers to sing at my  
funeral

To the memory of a memorable  
Colloquium... and to the entire  
Congregation...

## HARVESTING AND SOWING (II)

### THE FUNERAL (1)

or the robe of the Emperor of China

#### A) INHERITANCE AND HEIRS

##### I The posthumous pupil

- |   |          |
|---|----------|
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| 2. A feeling of injustice and powerlessness...    | !44"     |

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- |  |         |
|--|---------|
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#### B) STONE AND MOTIFS

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- |                |         |
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6. Ambiguity	!63"
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3. The conjurer	!75"
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5. Pouce!	77
6. The robe of the Chinese emperor	*77'
7. Encounters from beyond the grave	78
8. The Victim - or the two silences	*78'
9. The Boss	!78"
10. My friends	*79, 78'
11. The pavement and the beautiful world (or: bladders and lanterns. . . )	80

## VIII The Student - aka the Boss

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## D) LES ENTERRES

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## A) INHERITANCE AND HEIRS

### I. The posthumous pupil

(<sup>44<sup>✉</sup></sup>) This passage 'struck a chord' with the friend I asked to read this last section, "The weight of a past" (\*). He wrote to me: "For many of your former students the aspect, as you say, of the invasive and almost destructive 'boss' has remained strong. Hence the impression you have." (Knowing, I presume, "the impression" that is expressed in certain passages of this section and notes n° s 46, 47, 50 that complete it.) Earlier he writes: "First of all, I think you did well to leave mathematics for a while [! ], because there was a kind of incomprehension between you and your students (apart of course from Deligne). They were a bit taken aback...".

It's the first time I've heard such things about my role as 'boss' before 1970, going beyond the usual compliments! Further on in the same letter: ". . I understand that your former students [read: those 'before 1970'] don't know very well what a mathematical *creation* is, and that you were perhaps partly responsible... It's true that in their time the problems had all been solved..."(\*\*).

My correspondent probably means that it was *I* who posed the 'problems', and with them the concepts that had to be developed, instead of leaving it up to my students to find their own way; and that it was in this way that I perhaps obscured in them the knowledge of what is the essential part of the work of mathematical creation. This is in line with an impression that emerged from a conversation with two of my former students *after* 1970, mentioned in a previous note (note (<sup>23<sup>iv</sup></sup>)). It is true that, in the students who came to me, I was above all looking for *collaborators* to develop intuitions and ideas that had already formed within me, to 'push at the wheels', in short, of a cart that was already there, which they did not therefore have to pull out of a kind of nothingness (like my correspondent

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(\*) (10 May) The friend in question is none other than Zoghman Mebkhout, who has kindly authorised me to lift the anonymity I felt I should maintain regarding the origin of the letter (dated 2 April 1984) I quote in this note.

(\*\*) (10 May) The above quote has been heavily truncated, out of respect for the anonymity of my correspondent. See the following note for a full quotation of the passage from which this quotation is taken, and for comments on its true meaning, which had initially escaped me for lack of more detailed information.

had to do). And yet this is what has always been the most fascinating aspect of mathematical work for me - giving substance to a flexible, dense tangible emerging from the mists of the intangible - and above all the part of the work where I felt that a 'creation' was taking place, the 'birth' of something more delicate and more essential than a simple 'result'.

If I sometimes see some of my students treating this prized thing with disdain, and thus displaying the 'snobbery' of which J. H. C. Whitehead spoke (which consists in despising what one 'could demonstrate') (\*), I am no doubt not unaware of it, in one way or another. The failure of my teaching, which was glaringly obvious in the period after 1970, is now also apparent to me, in a different and more hidden form, in my teaching in the first period, even though in the conventional sense it appears to have been a complete success.

! It's something I've already glimpsed from time to time over the last few years, and which I've mentioned in letters to several of my ex-students, without until now really having received any response from any of them.

I don't think it would be right, however, to say that the work I proposed to my pupils, and what they did with me, was purely technical work, purely routine, unsuited to bringing their creative faculties into play. I provided them with tangible and reliable starting points, between which they were free to choose, and from which they could launch themselves, as I had done before them. I don't think I've ever proposed a subject to a student that I wouldn't have enjoyed tackling myself; nor do I think that there has been such an arid path in the journey that none of them has taken with me, that I haven't gone through others just as arid myself in the course of my life as a mathematician, without getting discouraged or kicking the can down the road, when it was quite clear that the work had to be done and that there was no other way.

So it seems to me that the failure I am seeing today has more subtle causes than the type of themes I was proposing, and the extent to which they remained nebulous or were, on the contrary, quite clear-cut. My part in this failure seems to me to be due rather to attitudes of fatuity in me in my relationship to mathematics, attitudes that I have had occasion to examine in this reflection. These attitudes must have permeated to a greater or lesser extent, if not the work itself in the company of such and such a student, at least the atmosphere or the air that surrounded me. Fatuity, even when it is expressed in the most 'discreet' of ways

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(\*) See the note "Youth snobbery - or the defenders of purity", n° 27.

This is true whether they are 'mathematical things', or living people whom we have the power to welcome, to encourage, or even to look upon from the height of our grandeur, insensitive to the breath that accompanies us and to its destructive effects on others as well as ourselves.

(!<sup>44</sup>) (10 May) Taking advantage of my friend's permission to quote freely from his letters as I see fit, I give here a fuller quotation (\*), which places the truncated quotation in its true context:

"It's true that I was very isolated between 75-80, apart from a few rare questions to Verdier. But I don't blame your former students for that period because nobody really understood the importance of this link [read: between discrete coefficients and continuous coefficients]. That all changed in October 1980 when we covered the first very important application of this link for semisimple groups, namely the proof of the Kazhdan-Lusztig multiplicity formula, in which we made essential use of the category equivalence in question. This equivalence was given the name "Riemann-Hilbert correspondence" without any further comment - after all, it's so natural! That's when I realised that your former students don't really know what a mathematical *creation* is, and that perhaps you were partly to blame. I still feel a sense of injustice and powerlessness. It's true that by their time the problems had all been solved. The number of applications of this theorem is impressive, both in the framework of stale topology and in the transcendental framework, but always under the name of the Riemann-Hilbert correspondence! I have the impression that my name is unworthy of this result for many people, and in particular for your former students. But as you can clearly see from the introductions to my work, it is your 'duality' formalism that leads naturally to this result. But like you, I am not worried about the future of this link between "constructible discrete coefficients" and crystalline coefficients (or  $\square$ -modules).

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(\*) See the second footnote to the previous one, "L'échec d'un enseignement (2) - ou création et fatuité", n° 44<sup>44</sup>.

holonomies). It is clear that it applies in many areas both in the cohomology of spaces and in analysis."

It was this passage from my friend's letter which inspired (in addition to the present note) the later note 'The service stranger and the good Lord's theorem'. According to the terms of this letter, I had no idea (as I explain at the beginning) that this 'feeling of injustice and powerlessness' in my friend was the reaction, not simply to an attitude of blind disdain systematically *minimising* his contributions (an attitude which has ended up becoming quite familiar to me, among some of those who were my students), but to a veritable swindle, consisting in purely and simply *swindling* the authorship of a key theorem. This situation became clear to me only eight days ago - see on this subject the note 'L'Iniquité - ou le sens d'un retour' and the following notes (n° s 75 to 80), brought together under the title 'Le Colloque - ou faisceaux de Mebkout et Perversité'.

(<sup>45</sup>) Because of my change of environment and lifestyle, opportunities to meet or have other contacts with my old friends have become rare. This has not prevented signs of a 'distancing' from them from manifesting themselves in many ways, to a greater or lesser degree from one to another. With others, however, like Dieudonné, Cartan or Schwartz, and in fact with all the 'elders' who had given me such a warm welcome when I started out, I felt nothing of the kind. Apart from these, however, I have the impression that there are very few of my former friends or students in the mathematical world whose relationship with me (whether or not it finds an opportunity to express itself) has not become divided, 'ambivalent', after I withdrew from what was once a common milieu, a common world.

## II. The orphans

(<sup>46</sup>) I would like to take this opportunity to say a few words here about the mathematical notions and ideas, among all those that I have brought to light, that seem to me (and by far) to have the greatest significance (<sup>46</sup> 1 ) (\*). First and foremost, there are five key concepts that are closely related to the following

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(\*) The reader will find in notes n° 46<sub>1</sub> to 46<sub>9</sub> some more technical comments on the concepts reviewed in this note. On the other hand, independently of the particular *notions* I have introduced, the reader will find reflections on what I consider to be 'the master part' of my work (within the part of my work 'fully completed'), in note no.° 88 'La dépouille'.

I'm going to take a quick look at them, in order of increasing specificity and richness (and depth).

The first is the idea of a *derived category* in homological algebra<sup>(48)</sup>, and its use for a 'catch-all' formalism, known as *the 'six operations formalism'* (i.e. the operations  $L^\perp$ ,  $L^*f$ ,  $Rf$ ,  $RHom$ ,  $Rf^\perp$ ,  $Lf^\perp$ )<sup>(462)</sup> for the cohomology of the following types of "spaces

These include 'algebraic' spaces (such as diagrams, schematic multiplicities, etc. . . ), analytic spaces (both complex analytic spaces and rigid-analytic and similar spaces), topological spaces (pending, of course, the context of 'moderated spaces' of all kinds, and certainly many others, such as the Cat category of small categories, used as homotopic models...). This formalism covers both discrete and continuous coefficients.

The gradual discovery of this duality formalism and its ubiquity came about through a solitary, obstinate and demanding process of reflection, which continued between 1956 and 1963. It was in the course of this reflection that the notion of derived category gradually emerged, along with an understanding of its role in homological algebra.

What was still missing in my vision of the cohomological formalism of 'spaces' was an understanding of the link that one could guess between discrete coefficients and continuous coefficients, beyond the familiar case of local systems and their interpretation in terms of moduli with integrable connections, or crystals of moduli. This profound link, first formulated in the context of complex analytic spaces, was discovered and established (nearly twenty years later) by Zoghman Mebkhout, in terms of derived categories formed on the one hand using "constructible" discrete coefficients, and on the other using the notion of " $\mathbb{Q}$ -module" or "complex of differential operators"<sup>(463)</sup>.

For almost ten years, in the absence of encouragement from those of my former students who were in the best position to give it to him, and to support him by their interest and by the experience they had acquired through my contact, Zoghman Mebkhout continued his remarkable work in almost total isolation. This did not prevent him from discovering and proving two key theorems (\*) of a new crystalline theory which was in the process of being born

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(\*) (7 June) Mebkhout points out to me that, to these two theorems, a third must be added, also expressing itself in terms of derived categories, namely what he has called (somewhat improperly perhaps) the "*biduality theorem*" for  $\mathbb{Q}$ -modules, and which is the most difficult of the three. For an overall sketch of Mebkhout's ideas and results and their uses, see Le Dung Trang and Zoghman Mebkhout, *Introduction to*

indifference, both of them in fact (it was a decidedly bad sign).

!) expressed in terms of derived categories: one giving the equivalence of signalled categories between "constructible discrete" coefficients and crystalline coefficients (satisfying certain "holonomy" and "regularity" conditions) (<sup>48</sup>), the other being "*the*" crystalline global duality theorem, for the constant application of a smooth complex analytic space (not necessarily compact, which implies considerable additional technical difficulties) to a point. These are profound theorems(\*\*), which shed new light on the cohomology of both analytic and schematic spaces (in zero characteristic for the moment), and hold out the promise of a vast renewal of the cohomology theory of these spaces. After two applications to join the CNRS were rejected, the work finally earned the author a position as a research fellow (equivalent to an assistant or senior assistant at the university).

No one in these ten years has thought of talking to Mebkhout, who is struggling with the considerable technical difficulties caused by the transcendent context, about the 'formalism of the six variances', which is well known to my students (\*), but which does not appear 'on the net' anywhere. He finally learned of its existence from me last year (in the form of a form which, apparently, is known only to me...), when he was kind enough and patient enough to explain what he'd done, to me, who wasn't really into cohomology any more... Nor did anyone think of suggesting to him that it might be more "profitable" to start with the context of zero characteristic schemes, where the difficulties inherent in the transcendental context disappear, and where on the other hand the conceptual questions fundamental to the theory appear all the more clearly. No one has thought of pointing this out to him (or only to himself).

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*linear differential systems*, Proc. of Symposia in Pure Mathematics, vol. 40 (1983) part. 2, p. 31-63.

(\*\*) (30 May) The proof of the second theorem comes up against the usual technical difficulties in the transcendental context, requiring the use of 'evanescent' techniques, so I guess it can be classed as a 'difficult' proof. The proof of the first theorem is 'obvious' - and profound, using the full force of Hironaka's resolution of singularities. As I pointed out in the penultimate paragraph of the "solidarity" note (n° 85), once the theorem has been established, "anyone" who is well-informed is capable of proving it. Compare also J. H. C. Whitehead's observation quoted in the note "Youth snobbery - or the defenders of purity" (n° 27). When I wrote this last note, as if under the silent dictation of a secret prescience, I had no idea to what extent reality would surpass my timid and groping suggestions!

(\*) They learned this at first hand in the SGA 4 and SGA 5 seminars, and through texts in "Residues and Duality" by R. Hartshorne.

I also realised (as I had already realised when I introduced crystals(\*\*)) that " $\mathbb{Q}$ -modules" on smooth (analytic or schematic) spaces are no more and no less than "*moduli crystals*" (leaving aside any question of "coherence" for both), and that the latter was a catch-all notion that worked just as well for "spaces" with any singularities as for smooth spaces (<sup>46</sup> 4).

Given Mebkhout's means (and uncommon courage), it is quite clear to me that, placed in a sympathetic atmosphere, he would have had no difficulty, but great pleasure, in establishing the complete formalism of the "six variances" in the context of the crystal cohomology of zero characteristic schemes, when all the essential ideas for such a large-scale programme (including his own in addition to those of the Sato school and my own) were already, it seems to me, assembled. For someone of his calibre, it was a matter of a few years' work, just as the development of an all-purpose formalism of stale cohomology was a matter of a few years (1962-1965), since the main thread of the six operations was already known (in addition to the two key theorems of change of basis). It is true that these were years driven by the enthusiasm and sympathy of those who were involved in or witnessed the work, and not by the haughty self-importance of those who had everything under control...

This brings me to the second pair of notions I wanted to talk about, that of *schema*, and the closely related notion of *topos*. The latter is the more intrinsic version of the notion of *site*, which I first introduced to formalise the topological intuition of a 'localisation'. (The term 'site' was later introduced by Jean Giraud, who also did a great deal to give the notions of site and topos all the necessary flexibility). It was the obvious needs of algebraic geometry that led me to introduce diagrams and topos in quick succession. This pair of notions potentially contains a vast renewal of both algebraic geometry and arithmetic, as well as of topology, through a *synthesis* of these 'worlds', too long separated, in a common geometric intuition.

The renewal of algebraic geometry and arithmetic through the point of view of diagrams and the language of sites (or of 'descent'), and through twelve years of work on the foundations (not counting the work of my students and other good wills who got involved), has been a great success.

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(\*\*) (30 May) But I had time to forget it - only to remember it by virtue of the second meeting with Mebkhout, last year. (See the note "Rencontre d'outre-tombe", n° 78.

the game) has been achieved over the last twenty years: the notion of schema, and that of spread cohomology of schemas (if not that of spread topos and that of spread multiplicity) have finally entered the mainstream, and the common heritage.

On the other hand, this vast synthesis, which would also encompass topology, although for twenty years the essential ideas and the main technical tools required seem to me to have been brought together and ready (\*), is still biding its time. For fifteen years (since I left the mathematics scene), the fertile unifying idea and the powerful discovery tool that is the notion of topos, has been kept by a certain fashion (\*) out of the limelight of reputedly serious notions. Even today, very few topologists have the slightest inkling of this considerable potential expansion of their science, and of the new resources it offers.

In this renewed vision, the topological spaces, differentiable spaces etc. . that the topologist handles on a daily basis are, along with diagrams (which he has heard of) and topological, differentiable *or* schematic multiplicities (which nobody talks about), all embodiments of the same type of remarkable geometric objects, the *ringed topos* (<sup>46</sup> 5), which play the role of 'spaces' in which intuitions from topology, algebraic geometry and arithmetic converge into a common geometric vision. The 'modular' multiplicities of all kinds that we encounter at every turn (provided we have eyes open to see) provide striking examples of this (<sup>46</sup> 6). Studying them in depth is a first-rate way of penetrating further into the essential properties of geometric objects (or other objects, if there are any that are not geometric).

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(\*) (15 May) These 'essential ideas and principal technical means' had been brought together in the vast fresco of the SGA 4 and SGA 5 seminars, between 1963 and 1965. The strange vicissitudes that affected the writing and publication of the SGA 5 part of this fresco, which appeared (in unrecognizable, devastated form) eleven years later (in 1977), give a striking picture of the fate of this vast vision in the hands of 'a certain fashion' - or rather, in the hands of some of my students who were the first to introduce it (see note b. on the following page). These vicissitudes and their meaning are gradually revealed in the course of the reflections of the last four weeks, continuing in the notes "Le compère", "La table rase", "L'être à part", "Le signal", "Le renversement", "Le silence", "La solidarité", "La mystification", "Le défunt", "Le massacre", "La dépouille", notes n° s 63□□□, 67, 67□, 68, 68□ and 84-88.

(\*) (13 May) Further reflection in the six weeks since these lines were written (at the end of March), has revealed that this 'fashion' was first and foremost introduced by some of my students - by those who were best placed to adopt a certain vision, ideas and technical means, and who chose to appropriate working tools, while disowning both the vision that had given rise to them, and the person in whom this vision had originated.

These modular multiplicities describe the modes of variation, degeneration and generalisation. Yet this richness remains ignored, since the notion that enables it to be described in detail does not fit into commonly accepted categories.

Another unexpected aspect of this rejected synthesis(\*\*) is that the familiar homotopic invariants of some of the most common spaces (<sup>46</sup> 7) (or more precisely, their profinite compactifications) are equipped with unsuspected arithmetic structures, in particular operations of certain profinite Galois groups. ...

And yet, for nearly fifteen years, it has been part of the fashion in the 'big world' to look down one's nose at anyone who dares to utter the word 'topos', unless it is in jest or they have the excuse of being a logician. (These are people who are known to be different from the rest and for whom you have to forgive certain whims. . .) The yoga of derived categories, to express the homology and cohomology of topological spaces, has not penetrated among topologists either. ) Nor has the yoga of derived categories, to express the homology and cohomology of topological spaces, penetrated among topologists, for whom Künneth's formula (for a ring of coefficients that is not a body) still continues to be a system of two spectral sequences (or, at most, a kyriad of short exact sequences), and not a unique canonical isomorphism in a suitable category; and who continue to ignore the base change theorems (for a proper morphism or by a smooth morphism, for example), which (in the neighbouring framework of stale cohomology) constituted the crucial turning point for the strong "start" of this cohomology (<sup>46</sup> 8). I should not be surprised, when the very people who helped develop this yoga have long since forgotten it.

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(\*\*) (13 May) This synthesis was 'challenged' in the first place, both in its spirit and in the key notion that makes it possible, by none other than the very person who was the main user and beneficiary, throughout his work, of the technical means that it had enabled me to develop (with the language of diagrams and the construction of a theory of stale cohomology). It was Pierre Deligne. Because of his exceptional influence (due to his exceptional resources), and because of the very special position that he occupied in relation to my work, of which he was like an implicit legatee, the discreet and systematic barrier that he put up against the main ideas that I had introduced (with the exception of the notion of schema and staggered cohomology) was highly effective, and certainly played a leading role in establishing the 'fashion' that *buried* these ideas, which had already been reduced to a vegetative life for nearly fifteen years. His work has been profoundly marked by this ambiguity, which I first glimpsed in the reflections that follow on from this note. (See "Refus d'un héritage - ou le prix d'une contradiction", note no.° 47.) This initial perception, vivid but still confused, of this permanent hindrance in Deligne's work after my departure, was clarified and confirmed in a striking way throughout the reflection on this Enterrement, in which my friend plays the role of principal officiant.

They've been around for a long time now, and they give a cold shoulder to anyone who even pretends to want to use them! (\*)

The fifth concept that is closest to my heart, perhaps more than any other, is that of '*motif*'. It differs from the previous four in that '*the*' right notion of pattern (even above a basic body, let alone any basic scheme) has not yet been satisfactorily defined, even if we were to admit all the 'reasonable' conjectures we would need. Or rather, obviously, *the* 'reasonable conjecture' to be made, as a first step, would be that of the *existence of* a theory, satisfying such and such data and such and such properties, which it would not be at all difficult (and quite fascinating!), for someone in the know (\*), to explain fully. In fact, I came very close to doing so, shortly before I 'gave up maths'.

In some respects, the situation resembles that of the 'infinitely small' in the heroic days of differential and integral calculus, but with two differences. Firstly, we now have experience in building sophisticated mathematical theories, and an effective conceptual baggage, which our predecessors lacked. And secondly, despite the resources at our disposal and in the more than twenty years since this visibly essential notion emerged, no one has deigned (or dared, despite those who do not deign...) to get down to work and draw up the broad outlines of a theory of the mo-

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(\*) (13 May) It became clear in the course of subsequent reflection that the situation began to change with the Colloquium at Luminy in June 1981: we saw those who had "forgotten" (or rather, buried...) these notions strutting around with them, without, however, ceasing to beat the cold shoulder of the same "unfortunate" without whom this brilliant Colloquium would never have taken place. (See notes n° s 75 and 81 on this memorable Colloquium).

(\*) (13 May) I've come to realise that the only person (apart from myself) who has so far answered the One person who has a particular sense of being 'in the know' is Pierre Deligne, who for four years had the advantage, at the same time as listening to 'what little I knew about algebraic geometry', of being the day-to-day confidant of my motivational reflections. It's true that I've talked about these things to many other colleagues here and there, but none of them has apparently been 'in the know' enough to assimilate an overall vision that had developed in me over several years, or to take my indications as a starting point for developing a vision and a programme on his own (as I myself had done from two or three 'strong impressions' produced by some of Serre's ideas). Perhaps I am mistaken, but it seems to me that people interested in the cohomology of algebraic varieties were not psychologically disposed to "take the motives seriously" for as long as Deligne, who was an authority on cohomology and who was at the same time the only one supposed to know in depth what these motives were all about, himself passed them over in silence.

(8 June) Checking made it appear that my first motivational reflections date back to the early sixties - so they continued for almost a decade.

It is as clear now for the motives as it was in the past for the "in- finiments petits", that these beasts exist, and that they manifest themselves at every step in algebraic geometry.

However, it is now as clear for patterns as it was for "in- finiments petits", that these beasts exist, and that they manifest themselves at every step in algebraic geometry, as long as we are interested in the cohomology of algebraic varieties and families of such varieties, and more particularly in the "arithmetic" properties of these varieties. Perhaps even more than for the other four notions I have mentioned, the notion of pattern, which is the most specific and the richest of all, is associated with a multitude of intuitions of all kinds, which are by no means vague but can often be formulated with perfect precision (even if it means admitting a few motivic premises, if need be). The most fascinating of these "motivic" intuitions was for me that of the "motivic Galois group" which, in a sense, makes it possible to "put a motivic structure" on the profinite Galois groups of bodies and schemes of finite type (in the absolute sense). (The technical work required to give a precise meaning to this notion, in terms of "premises" giving a provisional foundation to the notion of motive, was accomplished in Neantro Saavedra's thesis on "Tannakian categories").

The current consensus is a little more nuanced for the notion of motive than for its three brothers (or sisters) in misfortune (derived categories, duality formalism known as the 'six operations', topos), in the sense that it is not treated outright as 'bombast' (\*). In practice, however, it all boils down to the same thing: as long as there is no way of 'defining' a motive and 'proving' something, serious people can only refrain from talking about it (with the greatest regret, it's a given, but you're either serious or you're not...). Of course, there's no risk of ever being able to construct a theory of motives and 'prove' anything about them, as long as we declare that it's not serious even to talk about them!

But the few people in the know (and who make the fashion) know very well that in terms of the premises, which remain secret, many things can be proved. In other words, ever since the notion first appeared in the wake of Weil's conjectures (though proved by Deligne, which is still a good point!), the *yoga of motives* has existed. But it has the status of a *secret science*, with admittedly very few initiates(\*\*).

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(\*) As I mentioned in a previous footnote, the derived categories were exhumed three years ago to great fanfare (without my name being mentioned). The topos and the six operations are still waiting for their time, and so are the motifs, except for the little piece that was exhumed two years ago, with an alternative paternity (see notes n° s 51, 52, 59). (13th May)

It may not be 'serious', but it nonetheless enables these rare initiates to say in a host of cohomological situations 'what one is entitled to expect'. It thus gives rise to a multitude of intuitions and partial conjectures, which are sometimes accessible after the fact by the means at hand, in the light of the understanding provided by 'yoga'. Several of Deligne's works were inspired by this yoga (\*), in particular the one that (if I am not mistaken) was his first published work, establishing the degeneracy of the Leray spectral sequence for a projective and smooth morphism of algebraic varieties (in null car., for the purposes of the demonstration). This result was suggested by considerations of "weight", of an arithmetical nature. These are typically "motivic" considerations, by which I mean that they can be formulated in terms of the "geometry" of motives. Deligne proved this statement with Lefschetz-Hodge theory and (if I remember correctly) said nothing about motivation (49), without which no one would have thought of suspecting something so implausible!

In fact, the yoga of motifs was born, first and foremost, from this 'yoga of weights' that I inherited from Serre(\*\*). It was he who made me understand the charm of Weil's conjectures (which became Deligne's theorem). He explained to me how (on the basis of a hypothesis of resolution of singularities in the characteristic under consideration) it was possible, thanks to the yoga of weights, to associate 'virtual Betti numbers' with every algebraic variety (not necessarily smooth or proper) over any body - something that I found very appealing.

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(\*\*) (13 May) I think I now understand that the 'very few initiates' were reduced until 1982 to the one and only Deligne. It is true that he revealed this 'secret science' in the form of certain important results included in this yoga, revealed as and when he was able to prove them, in order to take credit for them while hiding his source of inspiration, which remained secret. If, however, for fifteen years no one has yet stepped forward to finally embark on a far-reaching theory of motives, it is because our age is decidedly far from the bold dynamism of the heroic age of infinitesimal calculus!

(\*) (13 May) Having finally read the bibliography a little, I can now see that Deligne's entire work is rooted in this yoga. And my bibliographical sampling (as well as other cross-checks) lead me to suppose that in Deligne's entire work, the only reference to this source is found in a lapidary line (quoting me in one breath with Serre) in "Théorie de Hodge I" in 1970. (See notes n° s 78<sup>1</sup> and 78<sup>2</sup> 2.)

(\*\*) What I have from Serre (early 60's?) is an idea or intuition that I had at the outset, and which made me think that I was to realise that there was something important to understand! This acted as an initial impetus, triggering a process of reflection that continued in the years that followed, first on a 'yoga' of weights and soon on a broader yoga of patterns.

hit (<sup>46</sup> 9). It was this idea, I believe, that was the starting point for my thinking on weights, which continued (alongside my work on writing foundations) throughout the following years. (It was also this idea that I took up again in the 1970s, with the notion of a 'virtual pattern' on some basic schema, with a view to establishing a formalism of the 'six operations', at least for virtual patterns). If throughout these years I spoke of this yoga of motifs to Deligne (as a privileged interlocutor) and to anyone who would listen (\*), it was certainly not so that he and others would keep it as a secret science, reserved for themselves alone.

(→47)

(<sup>461</sup>) At most, I would make an exception for the ideas and points of view introduced with the formulation I had given to the Riemann-Roch theorem (and with the two proofs I found for it), as well as for various variants of it. If I remember correctly, such variants appeared in the last lecture of the SGA 5 seminar in 1965/66, which was lost along with various other lectures from the same seminar. The most interesting seems to me to be a variant for constructible discrete coefficients, which I do not know if it has since been made explicit in the literature(\*\*). Note that this also admits a "motivic" variant, which essentially amounts to asserting that the "characteristic classes" (in the Chow ring of a regular scheme  $Y$ ) associated with constructible  $A$ -adic bundles for different primes  $A$  (primes with residual characteristics), when these bundles come from the same "pattern" (for example are  $R^i f_!(\mathbb{Z}_A)$  for a given  $f: X \rightarrow Y$ ) are all equal.

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(<sup>462</sup>) This formalism can be considered as a kind of quintessential "*global duality*" formalism in cohomology, in its most "efficient" form, free of all superfluous assumptions (of smoothness in particular for the "spaces" and applications considered).

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(\*) (10 April) It seems to me that Deligne was the only one to 'hear' - and he was careful to reserve for himself the exclusive privilege of what he heard. It is also true that, in writing these final lines, I was 'delaying' events: two years ago, there was a partial exhumation of the Yoga des motifs without any allusion to a role I had played in it! On this subject, see notes<sup>o</sup> s 50, 51, 59, prompted by an unforeseen discovery that shed unexpected light (for me at least) on the meaning of the burial that had been going on for twelve years. Until then I'd been dimly aware of a kind of burial, without taking the time to look into it more closely. ...

(\*\*) (6 June) I found it again (in a similar form, and under the flattering name of "Deligne-conjecture"). Grothendieck") in an article by Mac-Pherson published in 1974. For details, see note no.<sup>o</sup> 87<sub>1</sub>.

aged, or cleanliness for morphisms). It needs to be supplemented by a *local duality* formalism, in which a distinction is made among the admissible "coefficients" between so-called "*dualising*" objects or "*complexes*" (a notion stable by the operation  $Lf^t$ ), i.e. those giving rise to a "*biduality theorem*" (in terms of the  $RHom$  operation) for coefficients satisfying suitable finiteness conditions (on the degrees, and of coherence or "*constructibility*" on the local cohomology objects). When I speak of the "six-variance formalism", what I mean hereafter is this complete duality formalism, both in its "local" and "global" aspects.

A first step towards a deeper understanding of duality in cohomology was the progressive discovery of the six-variance formalism in a first important case, that of Noetherian schemes and cohomology-coherent complexes of modules. A second was the discovery (in the context of scalar cohomology of schemes) that this formalism also applied to discrete coefficients. These two extreme cases were sufficient to establish the conviction that this formalism was *ubiquitous* in all geometric situations giving rise to a Poincaré-type 'duality' - a conviction that was confirmed by the work (among others) of Verdier, Ramis and Ruget. This conviction will undoubtedly be confirmed for other types of coefficients, once the *blockage* that has prevented the development and widespread use of this formalism for fifteen years has been broken down.

This ubiquity seems to me to be a *fact* of considerable significance. It made it imperative to feel a profound unity between Poincaré's duality and Serre's duality, which was finally established with the generality required by Mebkhout. This ubiquity makes the "formalism of six variances" one of the fundamental structures in homological algebra, for an understanding of the phenomena of "all azimuths" cohomological duality (\*). The fact that this rather sophisticated structure has not been explained in the past (any more than the "good" notion of "triangulated category", of which the Verdier version is still a very provisional and insufficient form) does not change anything; nor does the fact that topologists, and even algebraic geometers who pretend to be interested in cohomology, continue to ignore the very existence of the duality formalism, as well as the language of derived categories on which it is based.

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(<sup>463</sup>) The point of view of  $\square$ -modules and complexes of differential operators has been in-

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(\*) The interested reader will find an outline of this formalism in the Appendix to this volume.

It was developed by Sato and initially by him and his school, with an approach (as I understand it) quite different from that followed by Mebkhout, which is closer to my own.

The various notions of "*constructibility*" for "discrete" coefficients (in the analytic-complex, analytic-real, piecewise linear contexts) were first worked out by me, it seems, towards the end of the 1950s (and I took them up again a few years later in the context of scalar cohomology). At the time I asked the question of the stability of this notion by direct higher images for a pro-pre morphism of real or complex analytic spaces, and I do not know whether this stability has been established in the complex analytic case (\*). In the real analytic case, the notion that I had envisaged was in fact the wrong one, as I did not have the notion of a real sub-analytic Hironaka set, which has the essential limiting property of stability by direct images. As for local operations such as  $R\text{Hom}$ , it was clear that the argument which established the stability of constructible coefficients in the framework of excellent schemes of zero characteristic (using the resolution of Hironaka singularities) worked as is in the complex analytic case, and the same applied to the biduality theorem (see SGA 5 I). In the piecewise linear framework, the natural stabilities and the biduality theorem are "easy exercises", which I had enjoyed doing as a check on the "ubiquity" of the duality formalism, when I started up stale cohomology (one of whose main surprises had been precisely the discovery of this ubiquity).

Returning to the semi-analytical case, the "right" framework in this direction for stability theorems (of coefficients constructible by the six operations) is obviously that of "moderated spaces" (see Outline of a Programme, par. 5, 6).

(<sup>464</sup>) Of course, the " $\mathbb{Q}$ -modules" point of view, together with the fact that  $\mathbb{Q}$  is a coherent ring bundle, brings to light for moduli crystals a more hidden notion of "coherence" than the one I used to work with, and which keeps a meaning on (analytic or schematic) spaces that are not necessarily smooth. It would only be fair to call it '*M-coherence*' (*M* as in Mebkhout). It should therefore be quite obvious, to anyone who is even slightly in the know (and in full possession of his healthy mathematical instincts), that the "right category of coefficients" which generalises the complexes of "differential operators" in the smooth case, must be none other than the derived category "*M-coherent*" of

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(\*) (25 May) It was drawn up by J. L. Verdier, see "Les bonnes références", note no.° 82.

that of moduli crystals (a complex of crystals being called *M-coherent* if its cohomology objects are M-coherent). The latter makes reasonable sense without a smoothness assumption, and should encompass both the theory of ordinary "continuous" (coherent) coefficients, and that of "constructible" discrete coefficients (by introducing suitable holonomy and regularity assumptions for the latter). If my vision of things is correct, the two new conceptual ingredients of Sato-Mebkhout's theory, compared with the previously known crystalline context, are this notion of M-coherence for crystals of modules, and the holonomy and regularity conditions (of a more profound nature) concerning the M-coherent complexes of crystals. Having acquired these notions, an essential first task would be to develop the formalism of the six variances in the crystalline context, so as to encompass the two special cases (ordinary coherent, discrete) that I developed more than twenty years ago (and that some of my former cohomology students have long since forgotten in favour of tasks that are undoubtedly more important...).

Mebkhout had eventually learned of the existence of a notion of 'crystal' by frequenting my writings, and he had felt that his point of view should give a good approach to this notion (at least in zero characteristic) - but this suggestion fell on deaf ears. Psychologically, it was hardly conceivable that he would embark on the vast work of laying the foundations that was required, placed as he was in a climate of haughty indifference on the part of the very people who were cohomological authorities, and best placed to encourage - or to discourage...

(<sup>465</sup>) (13 May) We are mainly concerned here with topos ringed by a *local commutative* ring. The idea of describing the structure of a 'variety' in terms of the data of such a bundle of rings on a topological space was first introduced by H. Cartan, and was taken up by Serre in his classic work FAC (*Faisceaux algébriques cohérents*). It was this work that gave me the initial impetus to think about the notion of 'schema'. What was still missing in Cartan's approach, taken up by Serre, in order to encompass all the types of 'spaces' or 'varieties' that have arisen to date, was the notion of topos (i.e. precisely 'something' about which the notion of 'bundle of sets' has a meaning, and possesses the familiar properties).

(<sup>466</sup>) Other remarkable examples of topos that are not ordinary spaces, and for which there seems to be no satisfactory substitute in terms of

of the "accepted" notions, I would point out: the quotient topos of a topological space by a local equivalence relation (e.g. the laminations of varieties, in which case the quotient topos is even a "multiplicity" i.e. is locally a variety); the "classifying" topos for just about any kind of mathematical structure (at least those "expressed in terms of finite projective limits and any inductive limits"). When we take a "variety" structure (topological, differentiable, real or complex analytic, Nash, etc. . . or even smooth schematic on a given basis) we find in each case a particularly attractive topos, which deserves the name of "universal variety" (of the species under consideration). Its homotopic invariants (and in particular its cohomology, which deserves the name of "classifying cohomology" for the species of variety under consideration) should have been studied and known a long time ago, but for the moment this is not the case...

(<sup>467</sup>) These are spaces  $X$  whose homotopy type is "naturally" described as that of a complex algebraic variety. The latter can then be defined over a subfield  $K$  of the field of complexes, such that  $K$  is an extension of finite type of the prime field  $\mathbb{Q}$ . The Galois profinite group  $\overline{\text{Gal}}(K/\mathbb{Q})$  then operates naturally on the homotopic profinite invariants of  $X$ . Often (e.g. when  $X$  is an odd-dimensional homotopic sphere) we can take the prime field  $\mathbb{Q}$  for  $K$ .

(<sup>468</sup>) (13 May) When I learned my first rudiments of algebraic geometry from Serre's FAC article (which was to 'trigger' me in the direction of schemes), the very notion of a change of basis was practically unknown in algebraic geometry, except in the particular case of the change of basis field. With the introduction of the language of diagrams, this operation has undoubtedly become the most commonly used in algebraic geometry, where it can be introduced at any time. The fact that this operation is still practically unknown in topology, except in very special cases, seems to me to be a typical sign (among many others) of the isolation of topology from the ideas and techniques coming from algebraic geometry, and a tenacious legacy of the inadequate foundations of "geometric" topology.

(<sup>469</sup>) (5 June) Serre's idea was that it should be possible to associate to any scheme  $X$  of finite type over a field  $K$ , integers

$$h^i(X) \quad (i \in \mathbb{N})$$

which he calls his "virtual Betti numbers", so that we have:

- a) for  $Y$  a closed subschema and  $U$  the complementary open

$$h^i(X) = h^i(Y) + h^i(U),$$

- b) for smooth projective  $X$ , we have

$$h^i(X) = i\text{-th Betti number of } X$$

(defined for example via the  $A$ -adic cohomology, for  $A$  prime to the characteristic of  $k$ ). If we admit singularity resolution for algebraic schemes over  $k$ , then it is immediate that the  $h^i(X)$  are uniquely determined by these properties. *The existence* of such a function  $X \rightarrow (h^i(X))_{i \in \mathbb{N}}$  for fixed  $k$ , using the formalism of cohomology with proper support, can be essentially reduced to the case where the basis field is finite. Working in the "Grothendieck group" of finite-dimensional vectors over  $\mathbb{Q}_A$  on which  $\overline{\text{Gal}}(k/k)$  operates continuously, and taking the  $A$ -adic Euler-Poincaré characteristic (with support pro- pre) of  $X$  in this group,  $h^i(X)$  then denotes the virtual rank of the "weight component  $i$ " of  $\text{EP}(X, \mathbb{Q}_A)$ , where the notion of weight is that deduced from Weil's conjectures, plus a weak form of singularity resolution. Even without resolution, Serre's idea is realised thanks to the strong form of Weil's conjectures (established by Deligne in "Conjectures of Weil II").

I pursued heuristic reflections in this direction, leading me towards a formalism of six operations for "virtual relative schemes", the base body  $k$  being replaced by a more or less arbitrary base scheme  $S$  - and towards various notions of "characteristic classes" for such virtual schemes (of finite presentation) on  $S$ . Thus, I was led (to simplify matters by returning to the case of a base body) to consider integer numerical invariants finer than those of Serre, denoted  $h^{p,q}(X)$ , satisfying properties analogous to a),

- b) above, and giving the virtual Betti de Serre numbers by the usual formula

$$h^i(X) = \sum_{p+q=i} h^{p,q}(X).$$

<sup>(47)</sup> Note that four of the five notions I have just reviewed (precisely those which are considered to be "not serious") concern cohomology, and above all,

the *cohomology of algebraic schemes and varieties*. In any case, all four were suggested to me by the needs of a cohomological theory of algebraic varieties, first for continuous coefficients, then for discrete coefficients. In other words, the cohomology of algebraic varieties was my main motivation and a constant leitmotif in my work over the fifteen years from 1955 to 1970.

Remarkably, this is also the theme that Deligne still considers to be his main source of inspiration, if I am to believe what is said on the subject in last year's IHES brochure (\*). I came across this with some surprise. Admittedly, I was still 'on the scene' and all the rage when Deligne (after his fine work on the Ramanuyam conjecture) developed his remarkable extension of Hodge's theory. Above all, for him as for me, it was a first step towards a formal construction of the notion of pattern on the field of complexes - to start with! In the first few years after my 'turning point' in 1970, I of course also heard of Deligne's proof of Weil's conjectures (which also proved Ramanuyam's conjecture), and in the wake of that, of the 'Lefschetz cow theorem' in positive characteristic. I expected nothing less from him! I was even sure that he must at the same time have proved the "*standard conjectures*", which I had proposed towards the end of the sixties as a first step towards founding (at least) the notion of "semi-simple" patterns over a body, and translating some of the expected properties of these patterns in terms of properties of A-adic cohomology and groups of algebraic cycles. Deligne later told me that his proof of Weil's conjectures would certainly not make it possible to prove the standard (stronger) conjectures, and that he had no idea how to approach them. That must have been about ten years ago now. Since then, I have not heard of any other really decisive progress in understanding the 'motivic' (or 'arithmetic') aspects of the cohomology of algebraic varieties. Knowing Deligne's means, I had tacitly concluded that his main interest must have turned to other subjects - hence my astonishment to read that this was not the case.

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(\*) (12 May) On the other hand, I have just noticed that nothing in the aforementioned brochure could lead the reader to suspect that my work has anything to do with the cohomology of algebraic varieties, or that of anything else! On this subject, see the note "L'Eloge Funèbre (1) - ou les compliments" (n° 98) written today. The brochure in question is the one mentioned in the footnote to the note "L'arrachement salutaire", n° 42, and examined a little more closely in the note "L'Eloge Funèbre" just mentioned.

What seems to me beyond doubt is that, for the last twenty years, it has hardly been possible to make a major breakthrough in our understanding of the co-homology of algebraic varieties without also appearing, more or less, as a 'Grothendieck follower'. Zoghman Mebkhout learned this the hard way, and (to a certain extent) so did Carlos Contou-Carrère, who soon realised that it was in his interest to change his subject (<sup>47</sup> 1). One of the very first things that cannot be avoided is the development of the famous 'six-variance formalism' in contexts of various coefficients, as close as possible to that of the patterns (which for the moment play the role of a sort of ideal 'horizon line'): crystalline coefficients with zero characteristic (in the tradition of the Sato school and Mebkhout, with Grothendieck sauce) or  $p$  (studied above all by Berthelot, Katz, Messing and a whole group of visibly motivated younger researchers), "stratified promodules" à la Deligne (which appear to be a dualized variant, or "pro", of the "ind"-notion of coherent  $\mathbb{Q}$ -module, or " $\square$ -coherent" crystal), and finally "Hodge-Deligne" coefficients (which seem to be as good as motifs, except that their definition is transcendental and limited to basic schemes of finite type over the field of complexes)... At the other end of the spectrum is the task of clearing the very notion of pattern from the mists that surround it (and for good reason. . . ), and also, if at all possible, tackling questions as precise as the 'standard conjectures'. (For the latter, I had thought, among other things, of developing a theory of "intermediate Jacobians" for projective and smooth varieties over a field, as a means perhaps of obtaining the formula of positivity of traces, which was one of the essential ingredients of the standard conjectures).

These were the tasks and questions that burned in my hands right up to the moment when I 'left maths' - burning, juicy things, none of which ever appeared to me as forming a 'wall', a stopping point (\*). They represented an inexhaustible source of inspiration and substance - something where all I had to do was pull where it stuck out (and it 'stuck out' everywhere!) for something to come along, the expected as well as the unexpected. With the limited means I have, but without being dedicated to my work, I know just how much can be achieved if you put your mind to it, in a single day, or in a year, or in ten. And I also know, from having seen it in action at a time when

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(\*) (25 May) This is, however, what was kindly suggested in this famous jubilee brochure, by an anonymous writer whom I think I recognise. On this subject, see the note "L'Eloge Funèbre (2)". which follows on from "L'Eloge Funèbre (1)" quoted in the previous b. de p. note.

he was not divided in his work, what Deligne's means are, and what he can do in a day, in a week, or in a month, when he is willing to put his mind to it. But no one, not even Deligne, can, in the long run, do fruitful work, work of profound renewal, while looking down on the very objects that it is basically a question of probing, as well as the language and a whole arsenal of tools that have been developed for this purpose by such and such a predecessor (and with his assistance what is more, among many others who have put their hands to the wheel. . . .) ( ).<sup>59</sup>

I'm also thinking of the Deligne-Mumford compactification of modulus multiplicity. Ilaire  $M_{g,v}$  (over Spec Z), for connected smooth algebraic curves of genus  $g$  with  $v$  marked points. They were introduced (\*) in connection with the problem of proving the connectedness of modular spaces  $M_{g,v}$  in any characteristic, by a specialisation argument from characteristic zero. These objects  $M_{g,v}$  seem to me (along with the group  $SL(2)$ ) the most beautiful, the most fascinating I have encountered in mathematics (<sup>47</sup> 2). Their mere existence already, with properties so perfect, seems to me a kind of miracle (perfectly well understood what is more), of incomparably greater scope than the fact of connectedness that it was a question of demonstrating. For me, they contain the quintessence of what is most essential in algebraic geometry, namely the totality (more or less) of all algebraic curves (over all conceivable basic bodies), which are precisely the ultimate building blocks of all other algebraic varieties. But the kind of objects we are talking about, "proper and smooth multiplicities on Spec(Z)", still elude the "accepted" categories, i.e. those that we are *willing* (for reasons we are not careful to examine) to "accept". The average person speaks of them at most in allusions, and with an air of apology for appearing to be still making 'general nonsense', when care has certainly been taken to say 'stack' or 'field', so as not to utter the taboo word 'topos' or 'multiplicity'. This is undoubtedly why these unique gems have not been studied or used (as far as I know) since their introduction over ten years ago, except by myself in unpublished seminar notes. Instead, one continues to work either with the "coarse" varieties of modules, or with finite coverings of modular multiplicities which have the appearance of being real schemes - both of which are only relatively fallible and lame shadows of the perfect gems from which they come, and which remain practically banished...

Deligne's four works on the Ramanujan conjecture, on the structures of

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(\*) In Pub. Math. 36, 1969, pp. 75-110. See comments in note n° 63<sub>1</sub>.

Hodge mixtures, on the compactification of modular multiplicities (in collaboration with Mumford), and on Weil's conjectures, each constituted a renewal of our understanding of algebraic varieties, and hence a new point of departure. These fundamental works followed each other within a space of a few years (1968-73). For nearly ten years now, however, these major milestones have not been the springboards for a new launch into the glimpsed and the unknown, or the means for a more far-reaching renewal. Instead, they have led to a situation of morose stagnation (<sup>47</sup> 3). It's certainly not that the 'means' that were there ten years ago, on the part of some and others, have magically disappeared; nor that the beauty of things within our reach has suddenly vanished. But it's not enough for the world to be beautiful - we have to deign to enjoy it. ...

(<sup>471</sup>) I am thinking here of the promising start made by Contou-Carrère, five or six years ago, of a theory of relative local Jacobians, their links with global Jacobians (known as "generalised Jacobians") for diagrams of smooth curves and not necessarily proper on any diagram, and with Cartier's theory of commutative formal groups and typical curves. Apart from an encouraging reaction from Cartier, the response to Contou-Carrère's first note, from those who were best placed to appreciate it, was so cool that the author refrained from ever publishing the second note that he had kept in reserve, and hastened to change subject (without, however, avoiding other mishaps) (\*).

I had suggested to him the theme of local and global Jacobians, as a first step towards a programme which goes back to the end of the fifties, directed in particular towards a theory of an "adelic" dualising complex in any dimension, formed with local Jacobians (for local rings of arbitrary dimension), in analogy with the residual complex of a Noetherian scheme (formed with the dualising modules of all its local rings). This part of my cohomological duality programme found itself (along with others) somewhat relegated to oblivion during the 1960s, owing to the influx of other tasks which then appeared more urgent.

(<sup>472</sup>) In truth, it is the "Teichmüller tower" into which the family of all these multiplicities fits, and the discrete or profinite paradigm of this tower in terms of fundamental groupoids, that constitutes the richest, most fascinating single object I have encountered

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(\*) (8 June) See the sub-note (<sup>95</sup> 1) to the note "Cercueil 3 - ou les jacobiniennes un peu trop relatives", n° 95.

in mathematics. The  $\mathrm{SL}(2)$  group, with the 'arithmetic' structure of the profinite compactified  $\mathrm{SL}(2, \mathbb{Z})$  (consisting in the operation of the Galois group  $\mathrm{Gal}(\overline{\mathbb{Q}/\mathbb{Q}}$ ) on it), can be considered as the main building stone for the 'profinite version' of this tower. On this subject, see the indications in "Esquisse d'un Programme" (pending the volume or volumes of Réflexions Mathématiques which will be devoted to this theme).

(<sup>473</sup>) This observation of a "morose stagnation" is not the considered opinion of someone who is well aware of the main events in the last ten years concerning the cohomology of algebraic schemes and varieties. It is a simple overall *impression* of an 'outsider', which I got from conversations and correspondence with Illusie, Verdier and Mebkhout, among others, in 1982 and 1983. There are certainly many ways of qualifying this impression. Deligne's work "Conjectures de Weil II", published in 1980, represents substantial new progress, if not a surprise in terms of the main result. It seems that there has also been progress in crystalline cohomology of car.  $p > 0$ , not to mention the "rush" around intersection cohomology, which has ended up making some people (unwillingly) return to the language of derived categories, and even making them remember long-repudiated paternities...

### III. Fashion - or the Lives of Famous Men

(<sup>48</sup>) As is well known, the theory of derived categories is due to J. L. Verdier. Before he undertook the foundational work I had proposed, I had confined myself to working with derived categories in a heuristic way, with a provisional definition of these categories (which subsequently proved to be the correct one), and with an equally provisory intuition of their essential internal structure (an intuition that turned out to be technically wrong in the intended context, since the 'cone mapping' does *not* depend functorially on the arrow in a derived category that is supposed to define it, and which defines it only to within a non-unique isomorphism). The theory of duality of coherent bundles (i.e. the formalism of the "six vari- ances" in the coherent framework), which I had developed towards the end of the 1950s (\*), only took on its full meaning as a module of a fundamental work on the notion of derived category, which was done later by Verdier.

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(\*) It still lacked an operation  $Rf_!$  (cohomology with proper support) for a non-pro- pre morphism, which was introduced six or seven years later by Deligne, thanks to the introduction by him of the context of the

The text of Verdier's thesis (passed only in 1967), about twenty pages long, seems to me the best introduction to the language of derived categories written to date, placing this language in the context of its essential uses (several of which are due to Verdier himself). It was only an introduction to a work in progress, which ended up being written later. I can pride myself on being, if not the only one, at least one of the very few people who can testify to having held this work in their hands, which is supposed to establish the validity of the title of Doctor of Science awarded to its author on the basis of the introduction alone! This work is (or was - I don't know if a copy still exists somewhere...) the only text, to date, that presents systematic foundations of holographic algebra from the point of view of derived categories.

Perhaps I am the only one to regret that neither the introductory text nor the foundations themselves have been published (\*), so that the technical baggage essential for the use of the language of derived categories is scattered in three different places in the literature(\*\*). This absence of a systematic reference text of comparable weight to the classic Cartan-Eilenberg book seems to me to be both a *cause* and a typical *sign* of the disaffection that struck the formalism of derived categories after I left the mathematical scene in 1970.

It is true that, as early as 1968, it had become clear (for the needs of a co-homological theory of traces, developed in SGA 5) that the notion of derived category in its primitive form, and the corresponding notion of triangulated category, were insufficient for certain needs, and that a more thorough groundwork remained to be done. A useful but still modest step in this direction was taken (mainly for the purposes of the trace cause) by Illusie, with the introduction in his thesis of "filtered derived categories". It would seem that my departure in 1970 was the signal for a sudden and definitive halt to any reflection on the foundations of homological algebra, as well as on those, intimately related, of homological algebra.

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coherent promodules, which seems to me to be an important new idea (successfully taken up in his theory of stratified promodules).

(\*) (25 May) After these lines were written, I discovered that the first embryo of the thesis of Verdier, dating from 1963 (four years before the defence) was finally published in 1967. See on this subject the notes "Le compère" and "Thèse à crédit et assurance tous risques", n° 63000 and 81.

(\*\*) These places are: Hartshorne's well-known seminar on coherent duality, containing the only part published to date of the duality theory I developed in the second half of the 1950s; one or two Deligne papers in SGA 4; one or two chapters of Illusie's voluminous thesis.

of a theory of motives (<sup>48</sup> 1). However, as far as the former are concerned, all the essential ideas for large-scale foundations seemed to have been acquired in the years before I left (<sup>48</sup> 2). (Including the key idea of the "derivator", or "machine for manufacturing derived categories", which seems to be the common richer object underlying the triangulated categories we have encountered so far; an idea that will finally be developed to some extent in a non-additive framework, almost twenty years later, in a chapter of volume 2 of the *Poursuite des Champs*). Moreover, a large part of the groundwork to be done had already been done by Verdier, Hartshorne, Deligne and Illusie, work which could be used as it stood for a synthesis taking up the ideas acquired in the wider perspective of derivation.

It is true that this disaffection over the past fifteen years (\*) for the very notion of derived category, which for some has been akin to the disavowal of a past, is in line with a certain fashion, which affects to look with disdain at any reflection on the foundations, however urgent it may be(\*\*). On the other hand, it is quite clear to me that the development of staggered cohomology, which 'everyone' uses today without looking twice (if only implicitly via Weil's conjectures...), could not have taken place without the conceptual baggage represented by the derived categories, the six operations, and the language of sites and topos (developed first and foremost precisely for this purpose), not to mention SGA 1 and SGA 2. And it is just as clear that the stagnation that can be seen today in the cohomological theory of algebraic varieties could not have arisen, let alone become established, if some of my students had known, during those years, how to follow their healthy mathematical instincts rather than a fashion that they were among the first to introduce, and which has long since become law with their support.

(<sup>48</sup>1) The same can be said (with certain reservations) of my entire programme of foundations of algebraic geometry, only a small part of which was completed: it came to a screeching halt with my departure. I was particularly struck by the halt in the duality programme, which I considered to be particularly lucrative. Zoghman Mebkhout's work, which has continued against all odds, is nevertheless in line with this programme (renewed by the contribution of unexpected ideas). The same is true of the work of Carlos Contou-Carrère

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(\*) (24 May) these "fifteen past years" should be qualified - see note no. <sup>°47</sup> 3, as well as the more detailed note "Thèse à crédit et assurance tous risques", no. <sup>°</sup> 81.

(\*\*) (25 May) For a reflection on the forces at work in the emergence and persistence of this fashion, see the note "The Gravedigger - or the entire Congregation", n° 97.

of 1976 (discussed in the note <sup>(47)</sup> 1)) - work which he had the prudence to suspend sine die. There was also work on duality in the fppf cohomology of surfaces (Milne). That's all I know about it.

It is true that I never thought of writing an outline of the long-term work programme that had emerged for me during the years between 1955 and 1970, as I did for the last twelve years, with the *Esquisse d'un Programme*. The reason for this, I think, is simply that there has never been a particular occasion (such as my application to join the CNRS) to motivate such exhibition work. In the letters to Larry Breen (from 1975) which are reproduced as an appendix to Chap I of the History of Models (*Réflexions Mathématiques* 2), you will find some indications about certain theories (of duality in particular) on my agenda before 1970, theories which are still waiting for arms to enter the common heritage.

(<sup>482</sup>) The same is true for the theory of motives, except that it is likely to remain conjectural for some time.

(<sup>48</sup><sup>✉</sup>) While it is customary to call the key theorems of a theory by the names of those who have done the work of identifying and establishing them, it would seem that the name of Zoghman Mebkhout has been deemed unworthy of this fundamental theorem, the culmination of four years of obstinate and solitary work (1975-79), against the fashion of the day and the disdain of his elders. On the day when the significance of the theorem could no longer be ignored, they took pleasure in calling it the 'Riemann-Hilbert theorem', and I trust (although neither Riemann nor Hilbert would surely have asked for so much...) that they had excellent reasons for doing so. After all (once the feeling of a need - that of an understanding of the precise relations between general discrete coefficients and continuous coefficients, had appeared against the general indifference, and had been refined and specified by delicate and patient work, that after successive stages the right statement was finally found, that it was written down in black and white and proved, and when finally this theorem, the fruit of solitude, proved itself where it was least expected - after all that) this theorem appears so obvious (not to say 'trivial', for those who 'would have known how to prove it'....) that there's really no need to clutter one's memory with the name of a vague stranger on duty!

Encouraged by this precedent, I propose that any theorem that is truly natural and fundamental to a theory should henceforth be called 'Adam and Eve's theorem', or even to go back further than that

and to give honour where honour is due, simply by calling it "*God's theorem*" (\*).

As far as I know, apart from myself, Deligne was the only one before Mebkhout to feel the interest in understanding the relations between discrete coefficients and continuous coefficients in a framework broader than that of stratified modules, so as to be able to interpret any 'constructible' coefficients in 'continuous' terms. The first attempt in this direction was the subject of a seminar (which remained unpublished) given by Deligne at the IHES in 1968 or 69, in which he introduced the point of view of "stratified promodules" and gave a comparison theorem (over the field of complexes) for transcendental discrete cohomology and the associated cohomology of the De Rham type, which still makes sense for schemes of finite type, over any base field of zero square. (Apparently, he was not yet aware of the remarkable results of his distant predecessors Riemann and Hilbert...) Even more than Verdier (\*) or Berthelot(\*\*), Deligne was therefore in a particularly good position to appreciate the interest of the direction in which Mebkhout's research was heading in 1975, and subsequently the interest of Mebkhout's results and in particular the "theorem of the good God", which gives a more delicate and deeper understanding of discrete coefficients in terms of continuous coefficients, than that which he himself had worked out. This did not prevent Mebkhout from having to continue his work in painful moral isolation, and the credit due to him (all the more so, I would say) for his pioneering work remains unappreciated.

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(\*) In my life as a mathematician, I have never had the pleasure of inspiring, or even encouraging, a student to write a thesis containing a 'God's theorem' - at least not one of comparable depth and scope.

(\*) It would appear that Verdier, as official thesis supervisor for Zoghman Mebkhout's thesis (and who in this capacity even "granted him some discussions"), was the main person concerned (apart from Mebkhout himself) in the concealment which took place around the authorship of this fundamental theorem, and the credit which went to his "pupil" in the renewal which began in the cohomological theory of algebraic varieties by the point of view of  $\mathbb{Q}$ -modules developed by Mebkhout. I am not aware, however, that he was more moved by this than Deligne.

(\*\*) (25 May) In writing these lines, I have refrained (with some hesitation) from including the name of my friend Luc Illusie in this list of my students who would have been 'best placed' to give Zoghman Mebkhout the encouragement that should have gone without saying. I failed to notice a certain uneasiness in myself, which could have told me that I was giving a helping hand to someone I cared about, to pretend to relieve him of a responsibility that falls to him as it does to my other 'cohomology students'.

today, five years later(\*\*\*)�.

(<sup>49</sup>) After checking (in Publications Mathématiques 35, 1968), I notice that towards the end of the article "Théorème de Lefschetz et critères de dégénérescence de suites spectrales" (Lefschetz's theorem and criteria for the degeneracy of spectral sequences), three lines allude to "important considerations" which had led me to conjecture (in a slightly less general form) the main result of the work. I doubt that this sybilline allusion could have been useful to anyone, nor understood at the time by anyone other than Serre or myself, who were in any case already aware of it (\*).

I would point out in this connection that a very precise 'yoga of weights', including the behaviour of weights for operations such as  $R^i f_*$  and  $R^i f_!$ , was well known to me (and therefore also to

Deligne) from that time, in the late sixties, in the wake of the conjectures of Weil. Part of this yoga is finally established (in the context of bundles of A-adic coefficients, pending its establishment in the more natural setting of motives) in Deligne's work "Conjectures de Weil II" (Publications Mathématiques 1980). Unless I am mistaken, during the twelve years or so that elapsed between the two moments(\*\*), there was no trace in the literature of an exposé, however succinct and partial, of the yoga of weights (still entirely conjectural), which for all that time remained the exclusive privilege of a few (two or three?) initiates(\*\*\*)�. However, this yoga constitutes a first essential key to an understanding of the 'arithmetical' properties of the cohomology of algebraic varieties, so it is both a *means of* recognising oneself in a given situation and of making predictions with a reliability that has never been seen before, and at the same time

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(\*\*\*) (25 May) In fact, this cover-up was primarily the work of Deligne and Verdier themselves.

On this subject, see the note "L'Iniquité - ou le sens d'un retour", n° 75.

(\*) (29 April) For a closer look at this article, which is instructive in more ways than one, see the note "Eviction" (n° 63).

(\*\*) (19 April) I note on a list of Deligne's publications that I have just received and read with interest It is interesting to note that 'weights' were mentioned as early as 1974 in a paper presented by Deligne at the Vancouver Congress.

- So that's six years of 'secrecy around the weights' instead of twelve. Yet this secret seems to me to be inseparable from the similar secret surrounding the motifs (during the *twelve* years 1970-1982). The meaning of this secret has just been shed in a new light in the course of today's reflection, in the long double-note that follows n° 51-52).

(\*\*\*) (25 May) It would appear, from all the information that has come to light in the course of our discussions, that it is, that these 'two or three initiates' were limited to the one and only Deligne, who seems to have taken great care

to reserve for himself the exclusive benefit of possessing this yoga, which he got from me, until 1974 (see note b. on previous page), when the time was ripe to be able to present it as his own ideas, without reference to either me or Serre (see notes n<sup>os</sup> 1, 2).

and thus represented one of the most urgent and fascinating *tasks* facing the cohomological theory of algebraic varieties. The fact that this yoga remained virtually ignored until it was finally established (at least in certain important aspects) seems to me to be a particularly striking example of the role of *blocking information* that is often played by the very people who, by virtue of their privileged position and functions, are supposed to ensure that it is widely disseminated (\*).

(<sup>50</sup>) My first experiences in this direction were the unexpected fruits of my unsuccessful efforts to try and get Yves Ladegaillerie's thesis on isotropy theorems on surfaces published - a work as good as any of the eleven state doctorate works ("before 1970", it is true!) for which I had been the "boss". If I remember correctly, these efforts continued for a good year or more, and involved many of my former friends (not to mention one of my former students, as it happens)(\*\*). To this day, the main episodes still seem like episodes out of vaudeville!

It was also my first encounter with a certain new spirit and new mores (which had become commonplace in the circle of my friends of yesteryear), to which I have already alluded here and there in the course of my reflection. It was during that year (1976) that I learnt for the first time, but not for the last, that today it is considered a lack of seriousness (at least on the part of the first-comer...) to actually prove delicate things that everyone uses and that predecessors have always been content to admit (in this case, the non-existence of wild phenomena in the topology of surfaces)(\*\*\*). Or to prove a result that includes as a partial case-

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(\*) On this subject, see also sections 32 and 33, "The mathematician's ethic" and "The note - or the new ethic (1)", as well as the two related notes, "Deontological consensus and control of information" and "Youth snobbery, or the defenders of purity", n° s 25, 27.

(\*\*) On this subject, see the note "Coffin 2 - or cut to length", no.° 94.

(\*\*\*) On this subject, see also the episode 'the note - or the new ethic' (section 33). This infamous 'note' had precisely the problem of spelling out notions and statements that had hitherto been left vague, and which were nevertheless implicitly used by me to establish the results that bear my name and that everyone has been shamelessly using for nearly twenty-five years (something, incidentally, that the two illustrious colleagues knew perfectly well).

(8 June) For more details, see the note "Coffin 4 - or topos without flowers or wreaths" (n° 96). The "results that bear my name" are results on the generation and finite presentation of certain groups.

This obviously shows that the supposedly new result can only be a special case or an easy consequence of known results. Or to take the trouble only, when stating a result or describing a situation in terms of another, to carefully formulate the natural hypotheses (a sign of regrettable bombast), rather than confining oneself to some case in point to the liking of the high-flying person expressing his or her opinion. (Only last year, I saw Contou-Carrère criticised for not having confined himself in his thesis to a basic body instead of a general outline - while still conceding that it was surely at the insistence of his boss that he had had to do so. However, the person who expressed himself in this way was sufficiently familiar with the subject to know that even if we confine ourselves to the body of complexes, the necessities of demonstration force us to introduce general basic diagrams...)

The excesses of a certain fashion today go so far as to disgrace not only careful demonstrations (or even demonstrations at all), but often even formal statements and definitions. Given the price of paper and the longevity of the gorged reader, it will soon be out of the question to bother with such costly luxuries! Extrapolating from current trends, we should be able to predict the time when there will no longer be any question of explaining definitions or statements in a publication, which will henceforth be content to name them with code words, leaving it to the indefatigable and genial reader to fill in the blanks according to his or her own insights. The task of the referee will be that much easier, because all he or she will have to do is look in the 'Who is Who' directory to see if the author is known to be credible (in any case, no one could contradict the blanks and dotted lines that make up the brilliant article), or on the contrary, an unavowable unknown who will be (as is already the case today and has been for a long time) automatically ejected. ...

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fundamental global and local profinis, "proved" in SGA 1 by descent techniques which remain heuristic for lack of a careful theoretical justification, accomplished in the (apparently "unpublishable") work of Olivier Leroy, on theorems of the Van Kampen type for fundamental groups of topoi.

## B. STONE AND MOTIFS

### IV. Reasons (birth burial)

(<sup>51</sup>) (19 April) Since these lines (which end the note "My orphans", no.° 46) were written less than a month ago, I have noticed that they lag a little behind events.

! I have just received "Hodge Cycles, Motives and Shimura Varieties" (LN 900), by Pierre Deligne, James S. Milne, Arthur Ogus and Kuang-Yen Shih, which Deligne was kind enough to send me, together with a list of his publications. This collection of six texts, published in 1982, represents an interesting development since 1970, with the mention of motives in the title and the presence of this notion in the text, albeit still modest, especially via the notion of a 'motivic Galois group'. Of course, we are still a long way from the overall picture of a theory of motives, which for fifteen or twenty years has been awaiting the bold mathematician who will be willing to paint it, vast enough to serve as inspiration, Ariadne's thread and horizon line for one or more generations of arithmetical geometers, who will have the privilege of establishing its validity (or at any rate of discovering the final word on the reality of motives...).<sup>53</sup>

It would seem that it was also in 1982 (\*) that the tide began to turn, more or less, towards derived categories; Zoghman Mebkhout (in a perhaps somewhat euphoric flight of fancy) already sees them on the point of "invading all areas of mathematics". If their usefulness, which simple mathematical instinct (for a well-informed person) made quite obvious in the early sixties, is only just beginning to be accepted now, it is (it seems to me) mainly thanks to the solitary efforts of Mebkhout, who for seven years had the thankless task of wiping the slate clean, with the courage of someone who trusts his instinct alone, against a tyrannical fashion...

Remarkably, on reading this first publication, which (twelve years after my departure from the mathematical scene) marks a modest re-entry of the notion of pattern into the areopagus of accepted mathematical notions, nothing could lead the uninformed reader to suspect that my modest person was in any way associated with the birth of this long-taboo notion, and with the unfolding of a rich and precise 'yoga', which (in a very fragmentary form) appears here as if it had emerged from nothing, without any hint of authorship (1).<sup>51</sup>

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(\*) (25 May) I delay again, this time by a year - the turning point comes in June 1981 with the Colloque de Luminy, see the note "L'Iniquité - ou le sens d'un retour", n° 75.

When, just three weeks ago, I wrote in a page or two about the yoga of patterns, as one of my 'orphans' and one that was closer to my heart than any other, I must have been way off the mark! No doubt I was dreaming, when I seemed to remember years of gestation of a vision, tenuous and elusive at first, and growing richer and more precise as the months and years went by, in an obstinate effort to try to grasp the common 'motif', the common quintessence, of which the many cohomological theories known at the time (54) were so many different incarnations, each speaking to us in its own language about the nature of the 'motif' of which it was one of the directly tangible manifestations. No doubt I am still dreaming, remembering the strong impression made on me by such an intuition of Serre's, who had been led to see a Galois profinite group, an object that seemed essentially discrete in nature (or, at least, tautologically reduced to simple systems of *finite* groups), as giving rise to an immense projective system of *analytic*  $A$ -adic groups, or even *algebraic* groups on  $Q_A$  (by passing to suitable algebraic envelopes), which even had a tendency to be reductive - with the introduction of the whole arsenal of intuitions and methods (à la Lie) of analytic and algebraic groups. This construction made sense for any prime number  $A$ , and I felt (or I dream I felt...) that there was a mystery to be probed, about the relationship of these algebraic groups for different primes; that they all had to come from the same projective system of algebraic groups on the only natural common subbody of all its basic bodies, namely the body  $Q$ , the 'absolute' body of zero characteristic. And since I like to dream, I continue to dream that I remember entering this glimpsed mystery, through work that was surely only a dream, since I wasn't 'demonstrating' anything; that I ended up understanding how the notion of pattern provided the key to an understanding of this mystery.

- how, by the mere fact of the presence of a category (here that of "smooth" patterns on a given basic scheme, e.g. patterns on a given basic field), having internal structures similar to those found on the category of linear representations of an algebraic pro-group on a field  $k$  (the charm of the notion of algebraic pro-group having been revealed to me previously by Serre as well), we can indeed reconstitute such a progroup (as soon as we have a suitable "fibre functor"), and interpret the "abstract" category as the category of its linear representations.

This approach towards a "motivic Galois theory" was inspired by the approach I had found, years before, to describe the fundamental group of a space

topology or a diagram (or even a topos of some kind - but here I feel I'm going to offend delicate ears that "topos don't amuse" . . . ), in terms of the category of spread coverings on the "space" under consideration, and the fibre functors on it. And the very language of "*motivic Galois groups*" (which I could just as easily have called motivic "fundamental groups", the two kinds of intuition being for me the same thing, since the end of the fifties...), and that of the "fibre functors" (which correspond very exactly to the "manifest incarnations" mentioned above, i.e. to the various "cohomological theories" which apply to a given category of motives) - this language was designed to express the profound nature of these groups, and to suggest obviously their immediate links with the Galois groups and with the ordinary fundamental groups.

I still remember the pleasure and wonder of playing with fibre functors, and with the torsors under Galois groups which allow us to pass from one to the other by 'twisting', to rediscover, in a particularly concrete and fascinating situation, the whole arsenal of notions of non-commutative cohomology developed in Giraud's book, with the sheaf of fibre functors (here above the étale topos, or better still, the fpqc topos of  $\mathbb{Q}$  - non-trivial and interesting topos if ever there was one!), with the "link" (in algebraic groups or progroups) which binds this sheaf, and the avatars of this link, realised by various algebraic groups or progroups, corresponding to the various "sections" of the sheaf, i.e. to the various cohomological functors. The various complex points (for example) of a scheme of zero characteristic gave rise (via the corresponding Hodge functors) to as many sections of the sheaf, and to torsors of passage from one to the other, these torsors and the progroups operating on them being provided with remarkable algebraic-geometric structures, expressing the specific structures of Hodge cohomology - but here I am anticipating another part of the dream of motifs... Those were the days when today's trendsetters hadn't yet declared that topos, sheaves and the like didn't amuse them, and that it was therefore bullshit to talk about them (and I wouldn't have minded recognising topos and sheaves where they were to be found...). And now, twelve more years have gone by and the same people are pretending to discover and teach that sheaves (or even topos) do indeed have something to do with the cohomology of algebraic varieties, or even with the periods of abelian integrals...

I could evoke here the dream of another memory (or the memory of another dream. . . ) around the dream of the motifs, also born of a 'strong impression' (I'm definitely in the middle of a 'strong impression').

subjectivity!) that some of Serre's comments made to me about a certain "philosophy" behind Weil's conjectures. Their translation into cohomological terms, for A-adic coefficients with variable A, raised suspicions about the corresponding cohomologies of remarkable structures - the structure of "filtration by weights" (\*). Surely the "pattern" common to the different A-adic cohomologies had to be the ultimate support of this essential arithmetic structure, which then took on a *geometric* aspect, that of a remarkable structure on the geometric object "pattern". It would be misleading to speak of 'work' (when, of course, these were still guessing games, no more and no less) when it was a question of 'guessing' (with the only guide being the inner coherence of a vision that was taking shape, with the help of scattered elements known or conjectured here and there...), about the specific structure of the different cohomological 'avatars' of a pattern, and how the filtration of weights(\*\*) translated into them, starting with the Hodge avatar (at a time when the Hodge-Deligne theory had not yet seen the light of day, and for good reason. . . (\*\*\*)). This enabled me (in my dream) to see Tate's conjecture on algebraic cycles (another 'strong impression' that inspired the Dreamer in his dream of motives!) and Hodge's conjecture (<sup>55</sup>) compete in the same vast picture, and to come up with two or three conjectures of the same kind, which I mentioned to some people who must have forgotten them because I never heard of them again, any more than I heard of the 'standard conjectures'. In any case, they were just conjectures (and unpublished ones at that...). One of them did not concern a particular cohomological theory, but gave a direct interpretation of the filtration of weights on the motivic cohomology of a nonsingular projective variety over a field, in terms of the geometric filtration of this variety itself by closed subsets of given codimension (the codimension playing the role of the "weight") (\*).

And then there was the work (I should put quotation marks around 'work', but I can't bring myself to do it!) of 'guessing' the behaviour of the weights by the six operations.

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(\*) (24 January 1985) For a rectification of this distorted memory, see note no.° 164 (I 4), and sub-note no.° 164<sub>1</sub>, giving details of the origins of the "yoga of the weights".

(\*\*) (28 February 1985) There is a slight confusion in my mind here. It's actually about filtration closely linked by the "levels".

(\*\*\*) This was at a time when the young Deligne had probably never heard the word 'schema' in a mathematical context, nor the word 'cohomology'. (He was introduced to these concepts by me in 1965).

(\*) (28 February 1985) This is in fact filtration by "levels" (see previous footnote).

(which have since been lost...). Here again, I never had the impression of inventing, but always of discovering - or rather of listening to what things were telling me, when I took the trouble to listen to them with pen in hand. What they said was peremptorily precise, and there was no mistaking it.

Then there was a third "pattern dream", which was like the marriage of the two previous dreams - when it was a question of interpreting, in terms of structures on motivic Galois groups and on the torsors under these groups which are used to "twist" a fibre functor to obtain (canonically) any other fibre(\*\*) functor, the various supplementary structures with which the category of patterns is equipped, and one of the very first of which is precisely that of filtration by weights. I seem to remember that here, less than ever, it was not a question of riddles, but of proper mathematical translations. These were all brand new 'exercises' on the linear representations of algebraic groups, which I enjoyed doing for days and weeks on end, feeling that I was getting closer and closer to a mystery that had fascinated me for years! Perhaps the most subtle notion that had to be grasped and formulated in terms of representations was that of the 'polarisation' of a motif, drawing on Hodge's theory and trying to deconstruct what still made sense in the motivic context. This was a reflection that must have taken place around the time I was thinking about a formulation of the 'standard conjectures', both inspired by Serre's idea (still him!) of a 'Kählerian' analogue of Weil's conjectures.

In such a situation, when things themselves tell us what their hidden nature is, and by what means we can most delicately and faithfully express it, and yet many essential facts seem beyond the immediate reach of demonstration, simple instinct tells us to simply write down in black and white what things insistently tell us, and all the more clearly because we take the trouble to write under their dictation! There's no need to worry about demonstrations or complete constructions - to bother with such requirements at this stage of the work would be tantamount to denying ourselves access to the most delicate, most essential stage of a vast work of discovery - that of the birth of a vision, taking shape and substance out of an apparent nothingness. The simple act of *writing, naming, describing* - even if it's just

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(\*\*) Just like the fundamental groups  $\pi_1(x), \pi_1(y)$  of some "space"  $X$  at two "points"  $x$  and  $y$  are reduced from each other by "twisting" by the torsor  $\pi_1(x, y)$  classes of paths from  $x$  to  $y$  . . .

describing elusive intuitions or simple 'suspicions' that are reluctant to take shape - has a *creative power*. It is the instrument of the passion to know, when this passion is invested in things that the intellect can grasp. In the process of discovering these things, this work is the creative stage above all others, which always precedes the demonstration and gives us the means to do it - or to put it better, without which the question of "demonstrating" something does not even arise, until nothing that touches the essential has been formulated and seen. By the sheer virtue of an effort to formulate, what was shapeless takes shape, lends itself to examination, allowing what is visibly false to be decanted from what is possible, and from that above all which fits so perfectly with the whole of what is known, or guessed, that it in turn becomes a tangible and reliable element of the vision in the process of being born. This vision becomes richer and more precise as the work of formulating it progresses. Just ten suspected things, none of which (let's say Hodge's conjecture) leads to conviction, but which mutually illuminate and complete each other and seem to contribute to the same still mysterious harmony, acquire in this harmony the force of vision. Even if all ten eventually prove to be false, the work that has led to this provisional vision has not been in vain, and the harmony that it has given us a glimpse of and allowed us to penetrate to some extent is not an illusion, but a reality, calling us to know it. Only through this work have we been able to enter into intimate contact with this reality, this hidden and perfect harmony. When we know that things are right to be what they are, that our vocation is to know them, not to dominate them, then the day when an error is revealed is a day of exultation (<sup>56</sup>) - just as much as the day when a demonstration teaches us beyond any doubt that something we imagined was indeed the faithful and true expression of reality itself.

In both cases, such a discovery comes as a reward for *work*, and could not have taken place without it. But whereas it would only come at the end of years of effort, or even if we never learn the final word, reserved for others after us, the work is its own reward, rich in each moment of what this very moment reveals to us.

(<sup>511</sup>) (5 June) However, Zoghman Mebkhout has just drawn my attention to a reference to "Grothendieck's motives" on page 261 of the volume cited, in an article by Deligne which "takes up and completes a letter to Langlands". It reads: "it will not be a question of Grothendieck's motives, as he defined them in terms of algebraic cycles, but of *motives*

*absolute Hodge cycles*, similarly defined in terms of absolute Hodges cycles".

Grothendieck's motives" (not underlined) are named here, not as a source of inspiration, but to distance ourselves from them and to insist that we are talking about *something else* (which we are careful to underline). This distancing is all the more remarkable in that the validity of Hodge's conjecture (a conjecture known to Deligne, I suppose, as it is to every reader of his article-letter, starting with his original addressee Langlands) would imply that the two notions are *identical!*

Of course, as early as 1964, when I had developed the notion of a motivic Galois group, it was well known to me that a notion of "Hodge pattern" could be developed on the same model, with a corresponding notion of "motivic Galois-Hodge group", which was introduced independently by Tate (I cannot say whether it was before or after) and was then given the name of Hodge-Tate group (associated with a Hodge structure). The crude swindle (which doesn't seem to bother anyone, coming from such a prestigious figure) consists in purely and simply concealing the authorship of a new and profound notion, that of motif, and of a whole rich web of intuitions that I had developed around this notion, under the derisory pretext that the technical approach taken towards this notion (via absolute Hodge cycles, instead of algebraic cycles) is (perhaps, if Hodge's conjecture is false) different from the one I had (very provisionally) adopted. This *yoga*, which I had developed over a period of almost ten years, has been the main source of inspiration in Deligne's work since his beginnings in 1968. Its fruitfulness and power as a tool for discovery were clear long before I left in 1970, and its identity is independent of any technical approach followed to establish the validity of this or that limited part of this *yoga*. Deligne had the merit of identifying two such approaches, independently of any conjecture. He did not, however, have the honesty to name his source of inspiration, endeavouring as early as 1968 to hide it from everyone in order to reserve the exclusive benefit for himself, while waiting to (tacitly) claim credit for it in 1982.

(<sup>52</sup>) To come back to the dream of the motives, I think I also remember that I dreamt it aloud. Of course, dream work is by nature solitary work - but the twists and turns of this tenacious work that went on for years, alongside a vast task of writing the foundations that absorbed most of my time - these twists and turns had a witness on a day-to-day basis, much closer than Serre, who confined himself to following things from a distance... . (\*).

On the subject of this day-to-day confidant, I wrote in my retrospective that he had 'acted a bit like a pupil' in the mid-sixties, and that I had 'told him what little I knew about algebraic geometry'. I could have added that I even told him what I didn't 'know' in the common sense of the term - those mathematical 'dreams' (on the theme of motifs as on others) that always found in him an attentive ear and an alert mind, like mine, eager to understand.

It is true that when I wrote that Pierre Deligne may have been 'a bit of a pupil', this is still a very subjective impression (<sup>57</sup>), which is not corroborated (as far as I know) by any written or at least printed record that might lead anyone to suspect that Deligne may have learned something from me - whereas it is a pleasure for me here to remember that I never spoke mathematics with him without learning something. (And even when I stopped talking mathematics with him, I continued to learn more difficult and perhaps more important things from him, including on the very day I am writing these lines... .).

Having recently been informed by a third party, who had guessed (one wonders how!) that I might be interested in the matter, of the existence of a text by Deligne and others in which motives or at least 'tannaki- enan categories' are mentioned, and having mentioned this to Deligne, he expressed his sincere surprise that I should be interested in this sort of thing. Looking through the copy he sent me, I can see that his surprise was well-founded. Clearly, I have nothing to do with the subject in question. The most that is alluded to in passing, in the introduction, is that certain 'standard conjectures' (which I had made at the time, one wonders why) would have a consequence for the structure of the category of motives over a body... The reader who is curious to know more would be at a loss, for throughout this book he will find no details or references to these conjectures, which are no longer mentioned; nor any mention of the one and only published text in which I explain the construction of a category of grounds over a body in terms of the standard conjectures; nor of the only other published text before 1970 in which grounds are discussed, by Demazure (in a Bourbaki Seminar, if I remember correctly), which followed my

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(\*) (25 May) However, the beginnings of my thinking about motifs predate Deligne's appearance. My handwritten notes on Galois motivic theory date from 1964.

ad hoc construction principle, from a slightly different angle... . (\*)

Nevertheless, Neantro Saavedra, who had the good fortune to be one of my 'pre-1970 students', was duly cited. He had done a thesis with me on what I think I called 'rigid tensorial categories', which he called 'Tannakian categories'. One wonders by what miraculous chance Saavedra had been able to anticipate the needs of Deligne's theory of motives, which was to blossom ten years later! In fact, in his thesis he does exactly *the* work that technically constitutes the key to a motivic Galois theory, just as J. L. Verdier's thesis was in principle *the* work that technically constitutes the key to a formalism of the six operations in cohomology. One difference (among others) in Saavedra's honour is that he took the trouble to publish his work; it is true that he had not had the pen of Hartshorne, Deligne and Illusie combined to dispense him from such a formality. However, ten years later, Saavedra's thesis was reproduced ab ovo and practically in toto in the remarkable collection, this time by Deligne and Milne. This may not have been essential, if it was merely a question of correcting two specific points in Saavedra's work<sup>(58)</sup>. But there is a reason for everything, and I think I can see why Deligne himself went to all this trouble (\*), despite the fact that it was quite contrary to his own high standards in publishing, which he is known to apply with exemplary rigour when it comes to others. ... (\*\*)

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(\*) After checking, I note that apart from a few pages on standard conjectures (*Algebraic Geometry*, Bombay, 1968, Oxford Univ. Press (1969) pp. 193-199), there is no published mathematical text by me in which motives are mentioned. In Demazure's talk (Séminaire Bourbaki n° 365, 1969/70), following Manin's talk in Russian, mention is made of talks I had given at the IHES in 1967, which were (I suppose) intended to be a first overall sketch of a vision of motives. A talk on standard conjectures and their relation to the Weil conjectures, more detailed than the announcement at the Bombay congress, is given by Kleiman (*Algebraic Cycles and the Weil conjectures*, in *Dix exposés sur la cohomologie des schémas*, Masson-North Holland, 1968, pp. 359-386). I was not aware of any reflection on the standard conjectures, in particular towards a demonstration of them, other than my own before 1970. The deliberate decision to ignore these key conjectures (which, as I said in my Bombay sketch, I considered, along with the resolution of the singularities of excellent schemes, to be the most important open problem in algebraic geometry), seems to me to have a lot to do with the impression of stagnation that the cohomological theory of algebraic varieties gives me, from the echoes that have come back to me.

(\*) On this subject, see the reflections in the note "The clean slate", no.° 67.

(\*\*) (8 June) And even more so, when it comes to works that bear the mark of my influence - see on this subject the episode "The note - or the new ethic", Section 33.

As far as the authorship of the notions and motivic yoga themselves is concerned, for an uninformed reader (and informed readers are becoming rare and will end up dying a natural death...) there can be no doubt whatsoever about this authorship - and there is no need here to go bothering distant Hilbert and Riemann, let alone the good Lord. If the prestigious author, whose beautiful result on absolute Hodge cycles on abelian varieties appears to be the starting point, and the birth to say the least, of the theory of motives, does not breathe a word about his paternity, this is a modesty that honours him and is in perfect accord with the customs and ethics of the profession, which require that we leave it to others (if need be) to give honour where honour is visibly due: to the legitimate Father... .

(<sup>53</sup>) Touched by the vicissitudes of this orphan, and doubting that another will do the work whose need and scope I am apparently the only one, even today, to feel, I predict that the 'bold mathematician' in question will be none other than myself, once I have completed the Poursuite des Champs (which I expect to keep me busy for another year or so).

(<sup>54</sup>) Since then two new cohomological theories for algebraic varieties have appeared (apart from the Hodge-Deligne theory, a natural extension, in the "motivic" spirit, of the Hodge cohomology), These include Deligne's theory of "stratified promodules", and especially that of crystals, the " $\mathbb{Q}$ -modules" version à la Sato-Mebkhout, with the new insight provided by the theorem of the good God (alias Mebkhout) mentioned earlier. This approach to constructible discrete coefficients is likely to replace Deligne's earlier version, since it is probably better suited to expressing relations with De Rham cohomology. Moreover, these new theories do not provide new fibre functors on the category of smooth patterns on a given scheme, but rather (modulus of a more thorough groundwork than has been done so far) a way of precisely apprehending the "Hodge" incarnation of a pattern (not necessarily smooth) on a scheme of finite type over the field of complexes, or the "De Rham" incarnation on a scheme of finite type over a field of zero characteristic. It is likely, moreover, that the (apparently still unwritten) theory of Hodge-Deligne coefficients on a finite type scheme over  $\mathbb{C}$  will end up appearing as contained in the (equally unwritten) theory of Sato-Mebkhout crystalline coefficients (with an additional filtration datum at the end), or more precisely as a kind of

the intersection of the latter with the theory of  $\mathbb{Q}$ -vectorial constructible discrete coefficients... As for the elucidation of the relations between the crystalline theory à la Mebkhout and the theory developed in positive characteristic by Berthelot and others, this is a task that Mebkhout has been aware of since before 1978, in a climate of general indifference, and which seems to me to be one of the most fascinating that is immediately arising for our understanding of "the" cohomology (unique and indivisible, motivic knowledge!) of algebraic varieties.

(<sup>55</sup>) I may have been dreaming, but my dream about the relationship between Hodge patterns and structures has led me, unintentionally, to find an inconsistency in the "generalised" Hodge conjecture as originally formulated by Hodge, and to replace it with a corrected version which (I would wager) must be no more or less wrong than the "usual" Hodge conjecture about algebraic cycles.

(<sup>56</sup>) I am thinking in particular, precisely in the context of the cohomology of algebraic varieties, of Griffiths' discovery of the falsity of a seductive idea that had long been held about algebraic cycles, namely that a cycle homologically equivalent to zero had a multiple that was algebraically equivalent to zero. This discovery of a completely new phenomenon struck me enough for me to spend a week's work trying to grasp Griffiths' example, by transposing his construction (which was transcendental, over the field  $\mathbb{C}$ ) into a construction that was "as general as possible", and valid in particular over fields of any characteristic. The extension was not entirely obvious, using (if I remember correctly) Leray's spectral sequences and Lefschetz's theorem.

(16 June) This reflection had been the occasion for me to develop, in the étale context, the cohomological theory of "Lefschetz brushes". My notes on this subject are developed in the SGA 7 II seminar (by P. Deligne and N. Katz) in lectures XVII, XVIII, XX by N. Katz (who takes care to refer to these notes, which he followed closely). In the introduction to the volume by P. Deligne, on the other hand, where it is stated that the key results of the volume are talks XV (Picard-Lefschetz formulae in stale cohomology) and XVIII (theory of Lefschetz brushes), the author is careful not to point out that I had something to do with this "key theory" of Lefschetz brushes. Reading the introduction gives the impression that I have nothing to do with the themes developed in the volume.

The long APG 7 seminar, which followed on from the APG 1 to APG 6 seminars in 1967-69

developed at my instigation between 1960 and 1967, had been conducted jointly by Deligne and myself, who had kicked things off with a systematic theory of groups of evanescent cycles. As the writing of the papers by various volunteers dragged on, the two volumes of the seminar (SGA 7 I and SGA 7 II) were not published until 1973, by Deligne. Although it had been agreed at the time of the seminar that it would be presented as a joint seminar, after I left Deligne informed me of his desire (which seemed strange to me) for the seminar to be *split in two*, part I presented as directed by me, the other by him and Katz. I now see in it an 'operation' that prefigures the 'SGA 4 1/2 operation', aimed (among other things) at making the whole series of foundations SGA 1 to SGA 7, which in its spirit and conception was inseparable from my person, as much as the EGA series of Elements of Algebraic Geometry, appear as a collection of texts for all purposes, in which my person would play only an episodic, even superfluous role. This tendency appears very clearly, even brutally, in the volume SGA 4 1/2 and above all in the massacre of the seminar SGA 5, to which this volume is indissolubly linked. On this subject, see, among others, the notes "La table rase" and "Le massacre", no.° s 67 and 87, and especially "La dépouille...". (no.° 88).

(17 June) I was responsible for the overall conception of the SGA 7 seminar (in which I made no distinction between parts 'I' and 'II', and still do not), and Deligne had made important contributions (mentioned in my report on Deligne's work, written in 1969, see n° s 13, 14 of this report), the most crucial for the purposes of the seminar being the Picard-Lefschetz formula, proved by a specialisation argument starting from the transcendental case already known. The splitting of the seminar into two parts was unjustified both mathematically and in terms of the respective contributions - there are substantial contributions from both Deligne and myself in each of the two 'pieces' of SGA 7.

Of course, I would have been delighted if Deligne had continued the series of SGA foundations that I had inaugurated - which was a long way from the end of the road! This 'SGA 7 operation' is in no way a continuation, but I feel it is a sort of brutal 'saw' (or chainsaw...), *bringing* the SGA series to an *end* with a volume that stands out ostentatiously from my person, even though it is linked to my work and bears its mark just as much as the others. While my person is glossed over as far as possible, the tone towards my work is not yet that of the barely disguised contempt of "operation SGA 4 1/2 ",

which was an even more brutal blow to the unity of the SGA 4 and 5 seminar, and the means and pretext for the complete ransacking of the unpublished SGA 5 part of the seminar, the pieces of which were shared equally between Deligne and Verdier...

(<sup>57</sup>) I hasten to add that the same remark applies to the other mathematician of great means whom I ventured to say (in note no.° 19) that he had "looked a bit like a pupil", ten years after Deligne.

(<sup>58</sup>) This reminds me that Lectures Notes (which had published six or seven doctoral theses 'before 1970' done with me) never wanted to publish Yves Ladegaillerie's 'after 1970' thesis (reason: they don't publish theses!). On the other hand, they did publish Saavedra's thesis a second time... Incidentally, I told Deligne about Ladegaillerie's beautiful isotopy result, which was rejected everywhere (with the secret hope that he would help to publish it) - but he didn't seem to be interested (reason: his incompetence in surface topology. . . ).  
Curtain...

(<sup>59</sup>) (20 April) In the few weeks since these lines were written, which note a contradiction and its price, I was surprised to find that the person concerned had already found, two years ago, a very simple way of 'resolving' the said contradiction - the only thing was to think of it! We could call it 'the early burial method' (which readers can read about in the double note (<sup>50</sup>)(<sup>51</sup>), written yesterday in the fresh emotion of the discovery). I'm sorry to say that the unexpected reappearance of the anticipated *deceased* on the famous 'mathematical scene' (which sometimes looks rather like a jostling match...) is likely to introduce technical complications for the smooth application of this brilliant method!

In a previous note ("ethical consensus - and control of information", n° 6) I felt (still somewhat confusedly) that the most universally accepted rule of ethics in the scientific profession "remained a dead letter" in the absence of respect, by those who control scientific information, for the right of all scientists to be able to make their ideas and results known. Towards this point in my thinking, I also took the trouble to describe in some detail a case in point where, in my view, there was flagrant disregard for this right, and where I felt, moreover, that this disregard bordered on disregard for the first rule, which is the subject of a general consensus. (See "the note - or

the new ethics", section 30).

It's not the only time I've felt this particular unease, when I saw the *hope* of this first rule scorned, while the person doing it was 'inchng' both by his position (above suspicion!) and by his means, and by the casualness of the form. I try to pinpoint this malaise in the note ('the snobbery of youth - or the defenders of purity') that relates to the section quoted. When one allows oneself to despise the 'obvious' things of which I speak there, and in the same spirit also (I might add now) the (perhaps profound) things that are neither demonstrated nor patented as 'conjectures' published and known to all, one might as well (considering how little!) consider them as common property (trivial, it goes without saying) (\*), and therefore also, when the time comes, as 'one's own' with the greatest casualness and the best conscience in the world - it being understood, of course, that one would not think of appropriating a muscular demonstration of ten pages or a hundred (or just ten lines) that establishes a result 'that one has not been able to demonstrate'<sup>(59)</sup>). I didn't think I had such a good feeling or such a good word to say (on the subject of 'dead letter'), since I was given to see the undecided 'limit' of the case cited above blithely crossed - and surely crossed with the best conscience in the world again, *given how little*: a *dream*, and what's more is not even demonstrated (nor, above all, *published*. . . )!(\*\*)

Fortunately, I have a defence - when I have to, I manage to express what I feel and what I want to say, I have acquired (rightly or wrongly) credibility, and thus a chance to be listened to when I have something to say, or to publish it if I feel the need to do so. On the other hand, I'm more acutely aware of the 'feeling of injustice and powerlessness' of those who are wronged and have no recourse, when they feel their hands and feet are tied by the arbitrariness of 'those who have everything in their hands' - and use it as they please.

It's true that there have been times in my life as a mathematician when I've behaved

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(\*) Such was the fate of the "theorem of the good God" (alias Mebkhou).

(8 June) Taking care, as with the yoga of motifs, to skilfully create the appearance of authorship, without ever saying so outright! See on this subject (in the case in point) the note "Le Prestidigitateur" n° 75<sup>59</sup>, and for the brilliant general method or style, the note "Pouce!" n° 77, as well as the following note "Appropriation and contempt", n° 59<sup>59</sup>.

(\*\*) It would be wrong to be ashamed, since the event seems to show that the general consensus of Nowadays, this is considered quite normal - at least for someone of such high standing! What we call a 'good conscience' is no more and no less than a feeling of agreement with the prevailing consensus in the milieu to which one belongs.

I had the opportunity in my reflection to talk about the cases that this has brought to the surface from the mists of oblivion and ambiguity never before ameliorated. In examining them, I finally understood that I shouldn't be surprised if today (and for a long time now) the pupil has blithely surpassed the master, nor should I disown anyone to whom I have sympathy or affection. But it is healthy, for me as for everyone else, to call a spade a spade, whether that spade belongs to my house or to someone else's house.

(!<sup>59</sup>) (8 June) I am no longer at all convinced, as far as my friend Pierre Deligne is concerned, having had occasion to observe that he has finally slipped into the game of 'tacit paternity' with regard to the A-adic cohomological tool, i.e. what I call 'mastery' of staggered cohomology. There has been a remarkable evolution between "l'opération SGA 4 1/2" (where my name is still pronounced, but with an affectation of casual contempt towards this central part of my work, from which his is derived), and "L'Eloge Funèbre" where any reference to the very word "cohomology" is banned in relation to my name. (See the notes 'La table rase' and 'L'être à part' for the initial phase, and the notes 'L'Eloge Funèbre (1), (2)' for the final phase).

Intermediary phases in this escalation include the 'memorable article' on the so-called 'perverse' beams in 1981 (see on this subject the notes "L'Iniquité - ou le sens d'un retour" and "Pouce!", n° 75 and 77), and the exhumation of the motifs in LN 900 the following year (the Eloge Funèbre taking place the following year, in 1983). In all these cases and others of lesser importance that I have been able to observe, the inner attitude and the 'method' that allows Deligne to take credit for the ideas of others with a perfect good conscience, is that of *contempt* (which remains partially tacit, so 'little' in fact that it's not even worth talking about it, when it's going to be used so dryly to do really powerful things - Weil's conjectures, the theory of so-called 'perverse' beams... Once the operation has been carried out, the appropriation having been made and accepted by all, there is always time to rectify the situation and to strut about modestly with what has been appropriated. The same contribution is the object of casual scorn, as long as it still seems to be tainted with the name of one of those it is intended to bury, and it is pinned up when it has been appropriated by himself (A-adic cohomology, motives, while waiting for Mebkhout's yoga) or by some good friend (yoga of derived categories, yoga of duality, appropriated by Verdier with Deligne's active encouragement).

## V. My friend Pierre

(<sup>60</sup>) (21 April) To take up again this dream of a memory, which is *not* only the memory of the birth of a vision.... . I remember well (although I have forgotten so many things!) the pleasure I had each time in talking with the man who had quickly become much more the confidant of everything that intrigued me, or of what was illuminating and enchanting me from day to day in my love affair with mathematics, than he had ever been a 'pupil'. His constant interest, the ease with which he took in everything ("as if he'd always known. . .") were a constant source of enchantment for me. He was a perfect listener, driven by the same thirst for understanding that drove him and me - a highly alert listener, a sign of communion. His comments always met my own intuitions or reservations, when they didn't throw some unexpected light on the reality that I was trying to pin down through the mists that still surrounded it. As I have said elsewhere, he often had the answers to the questions I raised, often on the spot, or he would elaborate on them in the days or weeks that followed. In other words, the listening was shared, when he in turn explained to me the answers he had found, that is to say quite simply the reason for things, which always appeared with that perfect naturalness, with that same ease that had often enchanted me with some of my elders like Schwartz and Serre (and also, with Cartier). It was this same simplicity, this same 'obviousness' that I had always pursued in my understanding of mathematics. Without having to say it, it was clear that with this approach and these high standards, he and I were 'from the same family'.

I sensed from the moment we met that his 'means', as they say, were of a very rare quality, far beyond the modest means at my disposal, even though we were on the same wavelength in terms of our passion for understanding and our demand for understanding mathematical things. I also had a vague feeling, without being able to put it into words at the time, that this 'strength' that I saw in him (and that I also felt in myself, but to a lesser degree), the strength to 'see' the obvious things that no one else saw, was the strength of childhood, the *innocence* of a child's eyes. There was something of the child in him, much more apparent than in the other mathematicians I knew, and this was surely no accident. He told me that one day, when he was still at lycée I think, he had fun checking the multiplication table (and in the process, and by force of circumstance, the

addition table too), for numbers from 1 to 9, in terms of the definitions. He certainly wasn't expecting any surprises - if there was a surprise (a pleasant one, as always...), it was that the demonstration could be done nicely and completely in just a few pages, maybe half an hour. When he told me the story, laughing, I could feel that it had been half an hour well spent - and that's something I understand even better today than I did then. This little story struck me, impressed me even (although I don't think I let on) - I sensed in it the sign of an *earlier auronomy*, a freedom from received knowledge, which had also been present in my relationship with mathematics in my childhood, from the very first contacts (<sup>69</sup>) (\*).

This relationship of privileged interlocutor for each other, when we saw each other practically every day I believe(\*\*), continued over a period of five years, from 1965 (if my memory is correct) to 1969 inclusive. I still remember the pleasure I had, in that year, in writing a detailed report on his work, when I was proposing to co-opt him as a professor in the institution where I had worked since its foundation (in 1958), and where most of my mathematical work was done. I no longer have a copy of this report (<sup>64</sup>), in which I reviewed, I believe, a good dozen of my friend's works, almost all unpublished at the time (and many have remained so), and most if not all of which, in my opinion, were the main substance of a good doctoral thesis. I was prouder and happier to present this eloquent report than I would have been to present a report on my own work (something I have only done twice in my life, and each time I was forced to do so...). Many of these works were answers to questions that I had raised (the only one published among them being the work already mentioned on the degeneracy of the spectral Leray sequence for a clean and smooth morphism of schemes (<sup>63</sup>)). The two most important, on the other hand, were the answers to questions that

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(\*) It seems to me that this freedom has never entirely disappeared during my life as a mathematician, and that it is once again present as it was in my childhood.

Two or three years ago I reminded my friend of the little episode involving the multiplication table. I felt he was embarrassed by this evocation of a childhood memory, which no longer corresponded visibly to the image he had of himself. I wasn't really surprised by this embarrassment, but saddened to see something I knew well confirmed once again, something I was still finding hard to admit...

(\*\*) This was the case at least as long as I lived in Bures, where he was housed in a studio at the IHES. A From 1967 onwards (when I moved to Massy), I think we still saw each other once or twice a week, at least as long as I continued to be involved in mathematics.

Deligne himself had asked himself these questions, and it was clear that their scope was of a completely different order from that of a "good state doctorate thesis". These were his work on the Ramanuyam conjecture (published in the Bourbaki seminar), and the work on mixed Hodge structures, also known as "Hodge-Deligne theory".

It is a strange thing, and one that I was far from suspecting when I wrote this eternal report, that less than a year later I was going to leave this institution where I was preparing to co-opt my young and impressive friend, and where I intended to end my days. And (now that I've put these two double-episodes together) it's another strange thing, and no more surely the effect of mere 'chance', that this same (now less young!) friend announced to me a month or two ago that he was leaving this same institution, just as it had been a year since I had resumed regular mathematical activity, in the sense of a sort of unexpected 're-entry' onto the mathematical scene (if not into the 'great world'...).

More than once in *Récoltes et Semailles* I have had occasion to talk about my departure - this 'salutary uprooting' - and even more about the 'awakening' that followed it so closely, and which made this episode a crucial turning point in my life. In the intense years that followed, the world of mathematicians, with those I had loved in it, and the very thing that had fascinated me most in mathematics itself, became very distant - as if drowned in the mists of memory of another 'myself', who would have been dead for ages. ...

But both before this episode, and in the years that followed this first major turning point, I knew that the man who had been (somewhat (\*)) my pupil and (very much) a confidant and friend, had only to follow the spontaneous impulse within him of a child who plays and wants to know, in order to discover and bring to light new and unsuspected worlds, and to fathom them and know their intimate nature - and thereby also reveal them to his fellow creatures as well as to himself. And so, if after my departure (with no spirit of return!) I saw a bold and inspired mathematician sketch out (to begin with...) this vast picture that I had glimpsed and of which I had still only drawn a series of partial and provisional sketches, it was indeed him

- who had everything in hand to do it! To paint this first large-scale picture, a 'master builder' bringing together in a common vision the essentials of what was known and what was guessed about the cohomology of algebraic varieties, for the person in whom such a 'master builder' was to be the first to see the light of day.

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(\*) For the meaning of this scruple of mine to consider the (too!) brilliant Deligne as one of my students, see the note 'L'être à part' (n° 67).

The overall vision was already ready to emerge from the mists of the unwritten, was the work of a few months, not even years. (To be taken up again and deepened over the years, or generations if generations were needed - until the final word on the reality of the motifs was fully understood and established). And I had no doubt that this work, which used to 'burn in my hands', was going to be done any moment now, and at least over the next two or three years while it was still hot. After I left, there was certainly only one person left who was called upon, by his very impetus of knowledge, to do this burning and fascinating work. Once the 'master builder' had been written and tested, and the work had progressed a little or a lot, I would leave it to others to continue this work, however fascinating it may be, and embark on other adventures, in this world of mathematical things where every bend in the road reveals the promise of a new and limitless world, as long as our eyes are open and new enough to see....

At a time when my life was still taking place in the warm scientific incubator that isolated it from the noise of the world, and when Deligne was developing his extension of Hodge's theory (this must have been in 1968 or 69), it was a matter of course between us that this work was a very first step towards realising, testing and clarifying a certain *part of* this "tableau des motifs", which had never been put down in black and white in its entirety (\*). In the years following my departure from the incubator, at a time when mathematics was a long way off for me, it was certainly no surprise to learn that Weil's conjectures had finally been demonstrated. (If there was any surprise, it was that the 'standard conjectures' had not been demonstrated at the same time, even though they had been developed precisely with a view to an approach to Weil's conjectures, as well as a means of establishing at least a theory of semisimple patterns over a body(\*\*). I was well aware that neither by this first step towards a general theory of coefficients à la Hodge, nor by

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(\*) That this theory of Hodge-Deligne never (to my knowledge) went beyond the stage of this first draft, that it never expanded into a theory of "Hodge-Deligne coefficients" (and of the "six operations" on them) above finite type schemes on the field of complexes, is inseparable from this other strange fact: that this vast "table of motifs" was never sketched, and that its very existence has been carefully hushed up to this day...

(\*\*) It's only in the last few years that I've become vaguely aware (but no longer precise) that the 'standard conjectures', just as much as the very notion of motive for which they provided a first 'constructive' approach, had been *buried*, for reasons that seem to me to be of the utmost importance.

In this demonstration of certain key conjectures (among a number of others that are more or less well known) he had not yet reached his full potential - not by a long shot, in fact. And I waited without impatience, while most of my attention was absorbed elsewhere. (-→61)

(<sup>61</sup>) I had the privilege of seeing the first flowering of a child's impulse, carrying the promise of a vast deployment. Over the next fifteen years, I came to realise that this promise was constantly being postponed. There was this delicate thing in him that I had been able to sense and recognise (at a time when I was insensitive to so many things!), a thing that is of an entirely different nature from cerebral power (which crushes as well as penetrates...) - a thing that is essential above all for any truly creative work. I had sensed this thing in others at times, but in no mathematician I had ever known had it manifested itself with comparable force. And I expected (as a matter of course) that this thing would continue to blossom in him and to transform itself, and to express itself effortlessly in a unique work, of which I would have been a modest precursor. But another strange thing (and surely there is a deep and simple link between so many 'strange things') - I have seen this 'delicate thing', this 'strength' that is neither muscle nor brain, gradually fade away over the years, as if *buried* under successive layers, thicker and thicker - layers of *another thing* that I know only too well - the most common thing in the world! This does not necessarily go well with brain power, or with consummate experience or a flair for a particular discipline, which can force the admiration of some and t h e fear of others, or both, through the accumulation of works, brilliant perhaps and certainly with their own strength and beauty. But *that's not what* I had in mind when I spoke of 'unfolding' or 'blossoming'. The blossoming I had in mind is the fruit of an innocence, eager to know and always ready to rejoice in the beauty of the small and great things of this inexhaustible world, or of such and such a part of this world (such as the vast world of mathematical things...). He alone has the power of profound renewal, whether it be the renewal of oneself, or the renewal of knowledge of the things of this world. It is this power that has been fully realised, it seems to me, in the modest person of Riemann.

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now particularly clearly. (Compare also the previous footnote).

(\*). This true fulfilment is alien to contempt: contempt for others (for those we feel are far below us. . . ), or contempt for things that are too 'small' or too obvious for us to deign to take an interest in them, or contempt for things we feel fall short of our legitimate expectations; or contempt for a *dream*, perhaps, that speaks to us insistently about the things we profess to love... It is foreign to contempt, just as it is foreign to the fatuity that feeds it.

Certainly, with his impressive 'means', but even more so with that delicate thing that impresses no one and *creates*, the 'pupil' was destined to far surpass the 'master'. I had no doubt that in the years leading up to my departure from this place where I had witnessed such a beautiful flight, Deligne would reach his full potential in the development of a vast and profound work, of which I would have been one of the precursors. The echoes of such a work would not fail to reach me over the years, while I myself, in the pursuit of other quests far from mathematics, could only imperfectly appreciate the full scope and beauty of the new worlds he was about to discover.

But the pupil cannot surpass the teacher by *disowning* him within himself, by secretly striving, before himself and before others, to erase all trace of what he has contributed (whether the contribution was for the better, or for the worse. . . ) - any more than the son can truly surpass the father by disowning him. This is something I learnt above all through my relationship with my children, but also (subsequently) through my relationship with some of my former pupils; and above all with the one, of all people, whom I have always been scrupulous about calling 'pupil', having sensed from the moment I met him that I had as much to learn from him as he had from me (\*). But it was only almost ten years after that meeting, after 1975 and especially since I began to meditate on the meaning of what I was experiencing and witnessing, that I began to feel this *enrapture* in the man who continued to be dear to me. And I also felt, obscurely, that this secret disavowal of myself and of a role I had played in crucial years of his life was also, at a deeper level, a disavowal *of himself*.

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(\*) Riemann's work (1826-1866) consists of a modest volume of around ten works (it is true that he died in his forties), most of which contain simple and essential ideas that profoundly renewed the mathematics of his time.

(\*) (14 June) Regarding my deliberate and persistent intention to play down what I had to contribute, and to To deny the reality of a teacher-pupil relationship, see the note 'Being apart', n° 67<sup>2</sup>. Clearly, there is no comparison between what my friend learnt from me ('as if he had always known', of course!) and what I learnt from him. It would undoubtedly have been different if I had continued my intense mathematical involvement right up to the present day, and if regular mathematical contact had been maintained between us.

(This is undoubtedly the case every time we disavow and want to erase something that has indeed taken place, and whose fruit is ours to reap....).

However, because I wasn't even remotely 'in touch' with 'what was being done in maths', and with what he was doing himself (\*), I never realised, until I thought about it a few weeks ago, the extent to which this hindrance *also* weighed on the very thing in which he had invested his all: his mathematical work. Certainly, more than once in the last eight or nine years I have seen simple common sense or the healthy instincts of a mathematician wiped out by a deliberate gesture of disdain (towards me) or contempt (towards others whom it was in his power to discourage) (<sup>66</sup>). Moreover, he was not the only one of my former students, with or without inverted commas, in whom I witnessed such attitudes towards people I cared about (or towards others). But in no other case have I been so painfully affected. More than once in the course of my reflections over the past two months, I've alluded to this experience, "the most bitter I've ever had in my life as a mathematician" - and I've also said what it taught me in the end, at the end of this Harvest and Sow reflection. This sorrow was so vivid, it taught me something so far-reaching about a person who was always dear to me (while I continued to evade what it also taught me about myself and my past....), that the question of the impact of this thing on a greater or lesser mathematical 'creativity', in him or even in the person who was discouraged or humiliated, became entirely secondary, not to say derisory.

The note "Refus d'un héritage - ou le prix d'une contradiction" (Refusing an inheritance - or the price of a contradiction) is the first written reflection in which I took stock of what had come back to me in bits and pieces, here and there, over the years, both on the "state of art" and on the work of the man I had known so well and so little. It was also the first time that I finally saw, in a single glance, the full '*price*', or the full *weight*, in his work as a mathematician, of this refusal that he had been carrying within him for more than fifteen years. In writing this note, however, I was 'delaying', since for two years already (and without 'anyone' seeing fit to inform me), the reasons had emerged from the secrecy in which they had been kept for twelve years.... And today, as I write this final stage (I believe) in my reflection on my past as a mathematician, two days after having read the broad outlines of this memorable volume which consecrates this furtive 're-entry', the perception of

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(\*) Since 1970 I have received four offprints by Deligne, which I went through quickly (like most of the offprints I still receive), on the spot. That wasn't enough to give me an idea of a mathematical work, even in

outline or in terms of its main themes.

this crushing weight has become striking. It's the weight that those who are made to fly enjoy dragging along, day after day and through a hundred detours - a flight that is supple and light, joyful and intrepid in its pursuit of the unknown, for its own joy and that of the wind that carries it...(\*)

If he does not steal, and if he is content to be a man admired and feared, accumulating evidence of his superiority over others, I have nothing to worry about. If he drags the weights he likes to drag, surely he finds satisfaction in it - just as I myself enjoyed dragging weights, and continue today to drag those I have not yet been able to part with along the way. Of what I had to offer, the best and the worst, he took what he liked. I don't have to worry about his choices, which are his alone; nor do I have to say here whether they are the best or the worst <sup>(62)</sup>. What's 'the best' for one person is 'the worst' for another, or sometimes for the same person (as long as he changes, which is not very often, it's true. . . ).

But the choices we make, and the actions that express them (even though our words often deny them), we make at our peril. While they often bring us the expected gratifications (which we receive as 'the best'), these very gratifications sometimes end up having setbacks (which we reject as 'the worst', and often as an outrage). When we finally understand that setbacks are not an insult, we often see them as a price to be paid, which we pay with reluctance. But there are also times when you realise that such setbacks are *something other* than ruthless cashiers, to whom you have to pay, whether you like it or not, for the good time you've had. That they are patient and obstinate messengers, who never tire of coming back to bring us the same message over and over again; a message that is certainly unwelcome and constantly rejected - because even more than the setback itself, it is the humble message that is always rejected that appears to us as 'the worst': worse than a thousand setbacks, often worse than a thousand deaths and the destruction of the entire universe, of which we no longer give a damn.... .

On the day when we finally accept the message, our eyes are suddenly opened and we see: what was feared as "the worst" is a *liberation*, an immense deliverance - and this weight

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(\*) I have no intention of suggesting that it is the privilege of a few exceptional beings to be called upon to "fly" and discover the world. Surely we are all called to do so by birth! However, this capacity rarely finds the opportunity to blossom even a little, if only in a very limited direction (such as mathematical work). But in one person I have seen such a particularly brilliant ability (in the 'mathematical' direction) preserved as if by a miracle, only to regress over the years.

The crushing weight from which we are suddenly relieved is the very thing we were clinging to only yesterday, as 'the best'.

(<sup>62</sup>) (21 April) People will tell me that if I have nothing to worry about, then why am I going on for pages and pages about a personal relationship that concerns only me and the person concerned! If I felt the need to reflect retrospectively on certain important aspects of a relationship, it was under the impact of a specific event that affected me closely (even though I learned of it two years later). This event, on the other hand, is in the public domain, in an even more obvious way than the behaviour and routine acts of prominent mathematicians (such as Deligne, or myself) towards others of lesser renown or beginners (even though their effect on the lives of others is often of a completely different scope than in the present case). The event in question (i.e. the publication of the 'memorable volume' of Lecture Notes LN 900, a.k.a. the 'funeral volume') and everything surrounding it struck me as *unhealthy*, rightly or wrongly. I thought it would be healthy for everyone, starting with the 'interested party' himself, to give a detailed account of some of the ins and outs, including

the way I see things today.

Through this account and these reflections, I am not trying to convince anyone of anything (which is far too tiring, and moreover hopeless!) (\*), but simply to understand the events and situations in which I found myself involved. If it inspires others to think beyond the usual clichés, this account will not be published in vain.

(<sup>63</sup>) (22 April) This article (\*) appeared in Publications Mathématiques in 1968, two years before I left the world of mathematicians. Its starting point was a conjecture I had mentioned to Deligne about a degeneracy property of spectral sequences that

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(\*) (25 May) If I felt the need here to repeat to myself that it was 'far too tiring' and 'hopeless' to try to convince, it's undoubtedly because somewhere inside me, the intention to convince was nonetheless well and truly present, and also perceived. The whole period between 19 April (when I learned about the 'memorable volume' LN 900) and 30 April was marked by a state of inner tension, and also division, in the face of the impact of an entirely unexpected 'event' whose message I was trying as hard as I could to assimilate. This tension was finally resolved with the note 'Le retour des choses' (n° 73) of 30 April, when at last my thoughts had returned to myself and immediately provided me with the obvious key to this message.

(\*) This is Deligne's article on the degeneracy of spectral sequences and Lefschetz's theorem.  
(Publications Mathématiques 35, 1968) quoted in the note "Poids en conserve et douze ans de secret", n° 49).

at the time might have seemed quite incredible, and which nevertheless became plausible by way of 'arithmetic', as a consequence of Weil's conjectures. This motivation was in itself of great interest, because it showed all the advantage that could be drawn from a 'yoga of weights' implicit in Weil's conjectures (a yoga first glimpsed by Serre, in certain important aspects). From then on I routinely applied it to all sorts of analogous situations, to draw conclusions of a 'geometric' nature (for the cohomology of algebraic varieties) from 'arithmetic' arguments. These remained heuristic as long as Weil's conjectures had not been established, but nevertheless had great probative force, and represented a *means of discovery* of the highest order. Deligne's 'geometrical' demonstration for the particular conjecture in question, using Lefschetz's theorem (established then in null form only), had an interest in a completely different direction, in addition to the first merit of not depending on any conjecture. The link indicated by the two approaches between two seemingly unrelated things - Weil's conjectures on the one hand (and the yoga of weights which represented the most fascinating aspect of them for me at the time), and Lefschetz's theorem on the other - was in itself very instructive.

The interesting thing here for my own present purposes, and which only became clear to me today, is that the reader of this article will have very little chance of suspecting that I had anything to do with the initial motivation for the main result, and no chance at all of learning from this article *what* that motivation had been. (See also the beginning of the note <sup>(49)</sup>.) The *sensible* approach (including, I'm sure, on the part of the author himself), when presenting a result like this, would have been to *start* with the (admittedly striking) conjecture, to indicate the first reason found, which was just as striking, and which was a good opportunity to finally 'sell' this famous yoga of weights, which is much more far-reaching in itself than the main result of the work (\*); followed by the 'Lefschetz theorem'(\*\*), which allowed the initial conjecture to be demonstrated under the following conditions

(\*) It was yoga itself that remained a secret (I think) for the next six years!

(7 June) And (as it has since appeared) which was then presented by Deligne "on his own account", without any allusion either to Serre or to me. (See notes n<sup>o</sup> 78<sup>1</sup>, 78<sup>2</sup>).

(\*\*) (17 June) The idea of using Lefschetz's theorem ("Vache") to prove a degeneracy of spectral sequences is due to Blanchard, who only obtains the degeneracy theorem under the draconian assumption (rarely verified) that the local system formed by the rational cohomology of fibres is trivial. I was aware of Blanchard's work, and I mentioned it to Deligne, who thus drew inspiration from it.

slightly more general conditions (any basic scheme, not necessarily clean and smooth over a body), but in characteristic zero only. On the other hand, the exposition that follows begins with some generalities about homological algebra (all very pretty, as you'd expect, and presented with the author's customary elegance), generalities that he, like everyone else, must have forgotten by now, like the axiomatisation of Lefschetz's theorem. The main result (the only one everyone remembers, of course) appears as cor. X towards the middle of the article, while in "remark 2.9" somewhere towards the end (the reader doesn't quite know why) the word " weight" and my name are pronounced...

I can't remember what impression the article made on me when it first appeared - as I was in the know, I must have just glanced at it. I must surely have sensed an intention to 'distance myself', but also felt that it was only natural that my friend should be concerned not to risk appearing as the disciple (or 'foal') of a 'master'(\*\*\*) . It is true that if he had had the quiet assurance of his own strength, he would have had no hesitation in writing a work of greater scope and more useful to everyone (including surely himself), without fear of not being seen for what he is.... . ( )<sup>65</sup>

The situation was somewhat similar with the publication of his first major work

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of Blanchard's idea for his demonstration, even though he hadn't read the article. Serre, who remembered Blanchard's demonstration better than I did, pointed out to Deligne that his demonstration was in fact an easy adaptation of Blanchard's. This is what Deligne points out in his remark 2.10. This remark, in which he quotes Serre, is written in such a way as to give the impression that he only became aware of Blanchard's idea after the event, which is in no way the case. The two main *sources* for his article have therefore been overlooked: on the one hand the arithmetical *morivarion*, which made it possible to predict a considerable strengthening of Blanchard's result, and on the other hand Blanchard's *idea of demonsrrarion*, which he elegantly adapts to obtain a result that Blanchard had probably not dared to hope for, and for that reason had not even tried to 'get' by his method.

(\*\*\*) (26 May) About this attitude of mine, see the note that follows this one, "Ascension" (n° 63).<sup>66</sup>

(8 June) Drawing a parallel with his own style of *appropriating* other people's ideas, of which this is the first typical example, I realise that my friend's motivation was in no way to preserve an 'autonomy' in relation to a prestigious 'master', but rather to conceal the role of other people's ideas in the genesis of his own, while waiting to appropriate these other people's ideas as well (at a later stage). (On this subject, see the two notes 'Le Prestidigitateur' and 'Appropriation et mépris', n° 75<sup>67</sup> and 59<sup>68</sup>.) On the subject of my share of responsibility for the unfettered development of this propensity in my friend, see the two notes "The Ascent" and "Ambiguity", as well as "The Being Apart" (n° 63<sup>69</sup> , 63<sup>70</sup> , 67<sup>71</sup> ), where the role of a certain complacency that I showed towards the brilliant young man Deligne comes to the fore.

the following year, on mixed Hodge theory. (At the time I considered this work to be comparable in scope to Hodge theory itself, seeing it as the starting point for a theory of 'Hodge-Deligne coefficients', which unfortunately never saw the light of day....) As I said, it was quite obvious to both him and me that this work had its 'motivation' in the yoga of patterns that I had arrived at over the previous years - it was a first approach towards a tangible realisation of that yoga. To emphasise such a link in his work, it seems to me (and it must also have seemed to me then), would at once have given his work an even wider scope than it already had on its own merits. At the same time, it would have been another opportunity to draw the reader's attention to the reality of motifs, which is evident at every step behind that of Hodge's structures (1).<sup>63</sup>

It is only with hindsight that these omissions take on their full meaning, against the backdrop of six years of silence on the yoga of weights, twelve years of silence (not to say, a ban) on patterns, the unusual reintroduction of these in the burial volume LN 900, the stagnation in the Hodge-Deligne theory after a dazzling start... But you can't do great things if you're not prepared to do them!

In any case, if I had been more mature when I left IHES in 1970, it would have been quite clear to me from that moment on that there was a profound ambiguity with regard to me in the person who, over the past five years, had been my closest friend. What's more, behind the friendly facade of good company within the same hushed institution, my departure ultimately suited everyone, for reasons that I think I can discern with hindsight, and which were not the same for everyone. Clearly my departure suited my young friend, who had only recently moved into the job, perfectly, and who would only have had to stand shoulder to shoulder with me (in the face of the hesitant indifference of the other three permanent colleagues) to turn around an undecided situation. If I didn't understand the meaning of what was happening, it was because I really didn't want to understand things that were quite clear and even eloquent! It was as if, often in the course of my life, there was an anguish in me (never called by that name!) that signalled a 'take-off' between a reality that was quite tangible and simple, and an image of reality that I didn't want to part with: the image of what my role had been in the institution I was leaving, and even more so, perhaps, the image of what my relationship with my friend had been. It was this refusal to take cognisance of an irrefutable reality, and the anguish signalling this contradiction to

that I was clinging on to, which made the episode of this 'salutary wrench' so painful at the time (\*).

To tell the truth, because I had never written anything about this relationship (apart from the occasional letter to my friend, none of which got any response...), I hadn't realised until then that the first signs (discreet, admittedly, but unmistakable) of ambivalence in my friend's relationship with me dated back to 1968, two years before 'the great turning point'. It was a time when the relationship seemed perfect, a mathematically unclouded communion, in the context of a simple and affectionate friendship. It's all very well to quibble about innocence, the creative child and so on!

Yet I know that this communion was a *reality*, not an illusion; just as this 'delicate thing' was a reality - this creative force, of which the work that followed gives only a pale reflection. "Innocence" and "conflict" are two tangible realities, recognisable to a somewhat alert perception, by no means concepts; and they seem to me by their very nature alien to each other, one excluding the other. Yet there is no doubt that these two realities coexisted in my friend's relationship with me, at different levels(\*\*). It doesn't seem that at the time I'm talking about, 'conflict' interfered with mathematical creativity - at least not in the work done in solitude, or the work done in face-to-face meetings. It's also true that in the two articles I've just mentioned, which after all are among the most tangible fruits of this work, the imprint of 'conflict' is already clearly visible. And with the benefit of fifteen years' hindsight and the reflection of the days and weeks that have passed, I can see that this imprint (however discreet it may be) is a striking foreshadowing of the particular form that this gradual grip of conflict on the initial impetus was to take, stripping it over the years of its rarest essence - that which makes for great destinies (\*).

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(\*) See note no.° 42.

(\*\*) On two or three other occasions, I've been able to observe such coexistence in the same person at a given time, including in my own person at certain times.

(\*) Such lofty lyricism has made me lose touch with down-to-earth realities. If I qualify In this case, the 'imprint' of 'discreet' is that I myself am wrapped up in a layer, that I find hard to separate from the blinkers that are still dear to me! Having finally got rid of them, I realise that the 'imprint' in question is a crude cover-up, which I didn't want to see because of a certain complacency in myself, which I clearly realise in the note of 1 June 'Ambiguity', n° 63<sup>11</sup>. As for "the hold of conflict over

(<sup>63</sup> 1) (26 May) Compare also with the remark in footnote (\*) at the end of note 60, noting the 'blockage' in the natural development of the Hodge-Deligne theory, as a result of attitudes of rejection towards certain key ideas introduced by me (here, the six operations...). - to which the motives are indissolubly linked), of the same nature as the one examined here, apparent from the publication of Hodge's Theory I and II.

The same attitude, striving as far as possible (and even beyond!) to erase all traces of my influence, is also to be found in the work (already mentioned in note n° 47) written in collaboration with Mumford, on Mumford-Deligne compactifications of modular multiplicitieso (This work also predates my departure.) The work uses a principle of passing from topological results on the field C (known by tran- scendental means) to results in car.  $p > 0$ , which I had introduced at the end of the fifties, for the theory of the fundamental group. At the beginning of the 1960s, I suggested using this method to prove the connectedness of modular varieties in any characteristic (\*). However, this idea came up against technical difficulties which had stopped Mumford, and which were elegantly overcome in their work by the introduction of modular *multiplicities*, and a "compactification" of these which has perfect properties. The very idea of modular multiplicities can be found, 'between the lines' at least, in my 'Teichmüller' talks at the Cartan seminar, given at a time when the language of sites and topos did not yet exist. The very language used by Deligne ('algebraic stack'), where there was a whole language of sites, topos and multiplicities tailor-made to express this kind of situation, shows quite clearly (with hindsight and in the light of much larger subsequent 'operations') the intention to erase the origin of some of the main ideas.

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the initial impetus' of my brilliant young friend, I speak of it almost as a regrettable fate of which the poor man is the unwitting victim, losing in the process, alas, the benefit of 'great destiny'. Yet he is responsible for his destiny just as I am for mine. If he chose the role of his master's gravedigger (to begin with) before I left, and if the circumstances (including the spirit of the times) were favourable to this choice, granting him the role of Big Boss to whom all the tricks are allowed, he also chose to taste to the dregs the privileges that prestige and power can give, including that of crushing (discreetly) and despoiling. You can't have it all at once, and it's in the nature of things that he loses by this choice (in which he is in good company) the benefit of more delicate and less popular things... (Undated footnote, early June).

(\*) (September 1984) Checked, this circumstance is indeed mentioned in the introduction to the work cited (p. 75).

in this brilliant work. It is surely this attitude (as I first sensed in the note "Refus d'un héritage - ou le prix d'une contradiction", n° 47) that had a "chainsaw effect", cutting short any further reflection on modular multiplicities, which nevertheless appear to me to be among the most beautiful and fundamental of all the "concrete" mathematical objects identified to date.

I should mention in passing that the arguments I introduced at the end of the 1950s make it possible (thanks to the Mumford-Deligne compactification) not only to prove the connectedness of modular manifolds in any characteristic, but also to determine their "*p*-first fundamental group", as being the "*p*-first profinite compactification" of the ordinary Teichmüller group.

(<sup>63</sup>) (10 May) With the additional hindsight of less than three weeks, I now realise that this attitude, which was intended to be 'understanding' in relation to this 'quite natural' intention to distance oneself, was in reality a lack of clear-sightedness and complacency towards my brilliant young friend. If I had relied on my healthy faculties of perception, instead of allowing myself to be dazzled and to be fooled by vague clichés posing as an 'understanding' or even 'generous' attitude ('I'm not going to make any remarks about him because he doesn't put my name up for publicity... .'), I would have realised then what I realise now, sixteen years later. I could call it a lack of probity towards the reader, towards myself and towards myself. Seeing things simply and not being afraid to call them by their name, I would have been able to talk about them simply, as I am now, and my friend would then have had the opportunity to learn from it - or at least he would have understood that even with the means at his disposal, his elders (or at least one of them) expected from him the same probity in his work that they themselves put into it. So I can see that on that occasion, before my departure from the mathematical scene, at a time when I was by no means 'out of the game' and when I undoubtedly exercised a certain moral ascendancy over my young friend, I did not live up to my responsibility towards him, through the *laxity* I showed at the time (\*). This was confirmed by the publication of "Hodge Theory II", which is the work of

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(\*) (28 May) The word 'complacency' here better expresses the nature of my attitude than the somewhat elusive word 'laxity'. This complacency in my relationship with my brilliant young friend became clearer to me in yesterday's reflection, see the note 'Being apart', n° 67<sup>¶</sup>.

Deligne's thesis, in which he makes no allusion either to his motives or to me. It is true that at that time mathematics and the very person of my friend were already very far away and appeared to me as if through a fog!

In the light of what I have been able to see in my friend's development, both spiritual and mathematical (and the two aspects are closely interrelated), I can see that when I met him and was impressed by his intellectual resources, by his acuity of vision and by his lively understanding of mathematics, I could discern no lack of maturity in him; nor (subsequently) the effects that his vertiginous social ascent would have on him, in the space of barely four years, from the status of unknown student to that of star of the mathematical world and permanent professor, invested with considerable privileges and powers, in an already prestigious institution. I have no regrets about facilitating his ascent and speeding it up - but I realise that, through a lack of discernment and maturity in myself, the 'service' I did him was not a service at all. It won't have been a 'service', at least until my friend himself has completed this harvest, which he prepared with my carefree assistance.

(!<sup>63</sup>) (1 June) In the three weeks since this observation of 'laxity' (or 'complacency', to use the more appropriate expression that has appeared in the meantime) in my relationship with my friend Pierre came to light, I have had the opportunity in my reflection to realise more clearly a certain lack of rigour, a complacency in myself. They manifested themselves in my relationship, firstly with the man I treated more than anyone else as a 'being apart', but also with other mathematicians for whom I was the elder statesman. What I have detected so far in this respect has been a certain ambiguity in me, and no doubt also in the person I was treating as a pupil, in situations where the latter took over ideas and methods from me, or even a detailed masterpiece of a whole piece of work he was doing, without clearly indicating its source or even sometimes alluding to it. Situations like this were not uncommon, both in the sixties and after I left, right up to the last few years. It seems to me that in all these situations, at some level I felt the ambiguity, which was expressed by a shadow of unease, never examined until these very last days. The motivation that made me play along with a certain connivance, and that made me pass over this unease without ever paying attention to it, was the desire to *conform* to a certain image I had of myself, and of what I wanted to be.

was to be a so-called 'generosity'. True generosity is not born of conformism, of a desire to be (and to appear, to oneself and others) 'generous'. The repressed discomfort was always a very clear sign that this 'generosity' was fake, that it was an *arrogance*, not the spontaneous, unreserved gift of true generosity.

In this malaise I see two components of different origins. One comes from the 'pa-tron', the 'me' who remains frustrated, because he has not been able to have it both ways: to take part in the credit for a job in which he knows he has had a (more or less large) share, and at the same time to live up to a certain brand image, which includes (among many other things) the eponymous label of 'generosity'. The other component comes from the 'child', the one in me who is not fooled by attitudes and facades, and who has the simplicity to sense what is false about this situation (\*). Not only false in relation to myself, but also false in relation to others. In short, my 'generosity' consisted in entering into a game in which the other person presents as his own ideas that come from others, in which he gives an image of himself and of a certain reality, which he and I know perfectly well is false. We are therefore united in what can be called a 'cheating', in which each of us, he and I, has found our own way. It's a 'cheat' at least according to the consensus that prevailed 'in my day', and which, it seems to me, is still being paid lip service to today. Of course I wouldn't have entered into such a game if it had been a question of someone else's ideas being used as if they had been found by my 'protégé' (\*). However, the fact that

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(\*) (5 June) When I say here that the malaise comes (in part) from "the child", it's a way of speaking that gives a false image of reality. It's *not* the candid perception of a false situation that creates any discomfort. The discomfort is the sign of a *resistance* to this perception, of an unravelling between the reality actually perceived at a certain level (in this case that of a false situation), and an *image* of reality to which I cling (in this case, that I'm being 'generous' and that I couldn't do less!), in favour of which I *dismiss*, I repress the unwelcome perception. In this case, as soon as I give up resistance and allow the perception to appear in the field of conscious gaze, the 'discomfort' has ceased, along with the false situation. I was going to add "supposing it was a false situation involving my present, and not a situation in the past". But on reflection, I realise that these false situations 'from the past' that I've just been talking about have remained present as such until now, or at least until the reflection of three days ago, simply because they've never been examined and therefore never been resolved. I've remained a prisoner to the point of mechanically reproducing the same situations as soon as the opportunity presented itself. The knowledge of my 'power' of meditation (which I talked about in the section 'Desire and meditation', n° 36) was of no use to me, because I was not attentive to the day-to-day situations in which I was involved, and to the incessant game of perception and the 'sorting' of perceptions, this game of the child and the boss shutting him up. ...

The only difference is that in this case there are two of us cheating, instead of just one. And even apart from this aspect concerning myself (that I myself am taking part in cheating, in behaviour contrary to the very consensus to which I claim to adhere), it is quite clear that there is no generosity in encouraging others to cheat (even if this seems to be done at our own expense - which is in no way the case), or at least to adopt an ambiguous attitude towards a consensus to which they too pretend to adhere, while at the same time breaking it. True generosity is good for everyone, starting with the person in whom it manifests itself and the person to whom it is addressed. My ambiguous attitude, arousing or encouraging ambiguity in others, and allowing myself to claim 'generosity' when, logically, the other person must appear to be a bit of a cheat (and in fact we both cheat) - this attitude is a benefit neither to me nor to the other person.

All I had to do was examine the matter and the obvious would appear, without even having to refer to an experience, to a 'lesson from events'. And yet it was events that eventually led me to this examination, making me finally discover an obvious fact that I was just as capable of discovering thirty years ago, before a pupil had appeared on the horizon to learn a trade with me, and to imbibe a certain spirit in the exercise of that trade. I have had occasion to talk about the 'rigour' in the work itself, which I believe I have shown (see the section 'Rigour and rigour', n° 26). But today I am also aware, outside the 'work' itself, of an absence of rigour, expressed in the ambiguity and complacency I have mentioned. It seems to me that this ambiguity in me was not communicated to me by any of my elders, all of whom (I believe) were as demanding of me as they were of themselves. Beyond the ambiguity of the particular attitude, I detect an ambiguity in my own person, which I had occasion to mention more than once in the first part of Harvest and Sowing. This ambiguity began to be resolved with the discovery of meditation in 1976, at a time when some of the signs of this ambiguity, expressed in attitudes and behaviour that became

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(\*) This expression 'my protégé', used by one of my former pupils to refer to one of my current pupils who had just done very well in mathematics, made me cringe. However, the ambiguous situation I'm examining establishes a false relationship in which one of the two protagonists is indeed the 'protégé' of the other.

(particularly in my relationship with my students) have probably persisted to this day.

Clearly this ambiguity in me has found favour with some of my students. What was done by tacit agreement has even become, it seems, a fundamental part of the mores of the mathematical 'big world' today, where fishing in troubled waters (with or without the agreement of the 'person concerned'), or even plundering (when the person who allows himself to do so is part of the intangible elite), seems to have become such a common practice that no one seems to be surprised any more, even though everyone is careful not to talk about it. The 'boss' in me would like to stand out, to denounce, to take offence - and yet in doing so, I'm only perpetuating the same ambiguity in myself that I can now see is proliferating.

(<sup>63</sup>  ) (24 April) (\*) Leafing through an offprint of Mebkhout that I had just received two days ago, I came across a reference to a work by J. L. Verdier entitled "Catégories Dérivées, Etat 0" which appeared in SGA 4 1/2 (Lecture Notes n° 569, pp. 262-311). I am excused for not having been aware of this publication earlier, as I never had the honour before today of holding this volume in my hands, of which neither Verdier nor Deligne (who is the author) saw fit to send me a copy, either when it appeared or later. I do not know whether

C. Chevalley and R. Godement, who with me formed the jury that awarded J. L. Verdier the title of 'Doctor of Science' on the basis of a 17-page introduction (still unpublished), were themselves entitled, ten years later, to receive 'State 0' (50 pages this time) of this 'thesis' like no other! I think I remember once holding in my hands a serious work of foundations of a few hundred pages, which could reasonably pass for a good doctoral thesis, and which corresponded roughly to the work of foundations that I had proposed to Verdier around 1960 - except that it had already become clear by then that the framework of 'triangulated categories' developed by him (to express the internal structure of derived categories) was insufficient.

Needless to say, my name does not appear anywhere in this 'State 0' of a thesis. Indeed, one wonders what it would be doing there. It is well known that the derived categories were introduced by Verdier, to enable him to develop the duality

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(\*) This note is taken from a footnote to "Instinct and fashion - or the law of the strongest" (n° 48) - note in which I stated that Verdier's work on derived categories had never been published, without realising that a 'State 0' of his thesis had appeared in 1977. For an overview of Verdier's strange twists and turns in relation to the theory that was supposed to constitute his thesis work, see the note 'Thèse à crédit et assurance'

tous risques', n° 81.

"Poincaré-Verdier" duality of topological spaces, and the "Serre-Verdier" duality of analytic spaces, while waiting for a vague unknown (\*) to develop a synthesis of the two, appropriately called (the Unknown Student could do no less!) the "Poincaré-Serre-Verdier duality". After all that, all I had to do was follow the lead and make the necessary adaptations to develop the Poincaré-Verdier duality and the Serre-Verdier duality within the very specific framework, my faith, of the coherent cohomology of diagrams...

I have only just become aware (libraries are useful!) of SGA 4 1/2 (\*\*), in which I was again honoured to be listed as a co-author, or rather as a 'collaborator' (sic) of Deligne (without seeing fit to inform me, let alone consult me). This was clearly a precursor of the memorable 'volume enterrement' published five years later, which I had the pleasure of reading a few days ago (see notes n° 50, 51 and following, inspired by the event). But I didn't have to hold the pre-burial volume in my hands, with the evidence of a phantom thesis that doesn't say its name, to understand last year that the next stage of this 'thesis' would never be written by anyone other than myself. And so I set to work on *La Poursuite des Champs*, where it had pleased my illustrious ex-student to leave off seventeen years ago.

(<sup>64</sup>) (25 April) Yesterday I found a copy in my office at the University. In fact, it's two reports written a year apart in April (?) 1968 and April 1969. In seventeen pages I review fifteen pieces of work carried out over three years of scientific activity at the IHES. These included the work on the Ra-manuyam conjecture, the work on the compactification of modular sites, and the extension of Hodge's theory. All of the work reviewed in this report (if only the work I have just mentioned) bears witness to a prodigious creativity, unfolding with perfect ease, as if at play. Leaving aside the demonstration of Weil's conjectures, still in the wake of this first plunge into the unknown, it seems to me that the subsequent work gives only a pale image of this unique flight of a young mind with exceptional means, and also benefiting from exceptional conditions for its blossoming.

(\*) See the note "L'inconnu de service et le théorème du bon Dieu" for some information on this dubious character (note n° 48).<sup>65</sup>

(\*\*) On this volume, see the note "La table rase", no.° 67.

Yet I have to believe that something about these 'exceptional conditions' must have given rise to this other force, foreign to the drive for knowledge, which ended up taking over and overpowering it, diverting and absorbing the initial impulse. And obviously, this 'something' was also linked to me...(\*)

This short report with commentary (which I intend to include as an appendix to the present volume) seems to me to be interesting in more ways than one, including from a mathematical point of view (although some of the work reviewed remains unpublished to this day). In several places in the report I predicted that such work, which Deligne had contented himself with outlining and dealing with the crucial points, would be developed by future students. These students never appeared, given the changes that subsequently took place in his relationship with ordinary people(\*\*). Of the ideas that I have reviewed, the only one that I know of to have been developed by someone else (who would thus appear to be a pupil of Deligne) was the theory of cohomological descent, developed by Saint Donat in SGA 4 (so still in the period of the initial impetus), a theory that has since become one of the most commonly used tools in the cohomological arsenal.

An amusing and characteristic detail is that for three of the four works that have since been the subject of articles by Deligne (\*), I take great care to make clear, in passing, the relationship of these works to ideas that I had introduced and questions that I had raised - as if to forestall the silence that the author was going to give on their subject.

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(\*) (26 May) On the subject of a certain complacency in me which gave rise to this 'something', see the note (two weeks later than this note) 'The Ascension' (n° 63).<sup>631</sup>

(\*\*) In the days when I worked with him regularly at IHES (in my seminar in particular), relations Deligne's talks to other mathematicians, and more particularly to the young researchers (often beginners) who came to the seminar, were full of kindness. I noticed the same openness to other people's thoughts, even if they were awkward to express or even confused, as in our mathematical tête-à-tête. He had this ability to follow the thoughts of others in the images and language of others, which I have always lacked, and which (it seems to me) predisposed him much more than me to the role of 'master', capable of stimulating the blossoming of a vocation, a creativity in others.

(\*) The only one of the four works in question not directly influenced by me is the work on Ramanuyam's conjecture, deducing it from Weil's conjectures. It is in a research direction (that of modular forms) that constituted one of the most serious 'holes' in my mathematical culture. The other three works are those on the degeneracy of the Leray spectral sequence, on Hodge-Deligne theory, and on modular multiplicities (in collaboration with Mumford), discussed in the note "Eviction" (n° 63) and in the sub-note n°

631.

in his articles (not all of which had been published or even, I believe, written by the time I wrote the report).

(<sup>65</sup>) (26 April) It is also clear that keeping a large-scale 'yoga' (that of weights, and beyond that, that of motives), about which I had spoken here and there to others, but which he was the only one to have assimilated intimately and to grasp its full scope, conferred on him an additional 'superiority', as the exclusive possessor of an incomparable instrument of discovery for an understanding of the cohomology of algebraic varieties. I don't think, however, that this temptation played a decisive role, at a time when I was still very present and active in the mathematical world, and when there was nothing to foreshadow my departure *sine die*. It must have appeared with or after my departure, which was an unexpired-for 'opportunity' to seize an inheritance (which belonged to him in his own right!), by hiding both the inheritance and its origin.

It is here that I see revealed once again, in an extreme and particularly striking case, the crux of a profound contradiction, which goes far beyond any individual case. I'm talking about the ignorance, the disdain, the deep-seated doubt that surrounds the creative force that lies within our own person - that unique heritage that is more precious than anything a person could ever pass on. It is this ignorance, this insidious alienation of what is most precious, most rare in ourselves, that allows us to envy the strength perceived in others, and to covet for ourselves the fruits and outward signs of this strength in others that we have forgotten in ourselves. As soon as this desire to *supplant* takes root and finds an opportunity to proliferate, as soon as it channels the energy available for creative fulfilment, this alienation within us deepens and becomes permanent. The closer we come to the coveted 'goal' of supplanting, crowding out, dazzling, the further we distance ourselves and cut ourselves off from this delicate force within us, and clip the wings of our own creative impulse. In our tenacious effort to rise, we have long forgotten that we are meant to fly.

In his relationship with me, from the day of our meeting, I felt that my friend was perfectly at ease, without any sign which might have made me suspect that he was in the least impressed or dazzled by my reputation or by my person, or that there was any unspoken doubt in him, whether about his gifts or faculties in the mathematical field, or about any other subject. It is also true, it seems to me, that he had received from me and in the

In my own environment, including that of my family, I received a friendly and affectionate welcome, which was likely to put him at ease. But the simple, apparently unproblematic nature that attracted me to him as it did others, had surely not waited for this meeting to appear and blossom. The impression he gave off, which made him so endearing, was that of a harmonious balance, in which his penchant for mathematics was in no way a devouring goddess. Next to him, I was a bit of an unrepentant 'coward', not to say a 'thick brute' - and I remember his discreet astonishment at my lack of deep contact with the nature around me and the rhythm of the seasons, which I passed through without seeing anything, so to speak... .

Yet this profound 'doubt', which I would have been incapable of perceiving then (or perhaps even today, in similar circumstances), must have been present in my friend long before we met. With the benefit of hindsight, I can see the first unambiguous sign of this as early as 1968, and other even clearer signs over the years that followed (\*). These are 'indirect' signs though - none of those I've been able to observe at first hand take the form of doubt or lack of confidence - but rather, and increasingly over the years, of what may seem to be the opposite: a smugness, a deliberate gesture of disdain, even contempt. But such an 'opposite' reveals its opposite, with which it forms a pair and of which it is the shadow.

I also learned through an intermediary that for a prestigious (and reputedly awkward) mathematician whom he had never had the opportunity to meet on a personal level, he would have been under great tension at the prospect of a meeting, in a sort of irrational fear of not being considered by the great man as worthy of his own greatness. This account was so contrary to what I myself had seen in my young friend that I found it hard to believe at the time (this was in 1973). With hindsight, however, it overlaps with the signs of division that I know of elsewhere, and which all point in the same direction.

This division, and the role I played as a sort of fixer of a conflict that was undoubtedly diffuse before we met, would probably have remained hidden in the usual circumstances of the evolution of a relationship with someone who was (in one sense or another) a 'master', or at least someone who passes on or confides in. So my departure

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(\*) (10 May) In fact, another "very clear" sign dates back as far as 1966, see footnote<sup>??</sup> (\*) to note n° 82 (p. 329 <??> ).

will have been the *revelation* of a conflict *that no one knew about*, and that perhaps only I know about.

And my 'return' today is a second revelation, more untimely no doubt. I can't imagine what it will reveal to me, beyond what it has already taught me about my own past and present, and about the people I have loved and to whom I am still linked today. Nor what it will reveal to the person who, for the past week, has been at the centre of this final stage of my reflection, which I called last month (and I didn't think it was such a good word...) '*the weight of a past*'.

(<sup>66</sup>) (25 April) This deliberate disdain and antagonism in my friend Pierre's relationship with me was confined exclusively to the mathematical and professional level. The personal relationship has remained to this day one of affection and friendly respect, manifested more than once by delicate attentions that have touched me, surely signs of true feelings without ulterior motives.

In the intense years that followed my departure from the IHES, this episode ended up being forgotten, as did the long misunderstood teaching that it had given me. So, for more than ten years, my friend remained for me (as a matter of course) my privileged interlocutor in mathematics; or more precisely, between 1970 and 1981 he was the only interlocutor (apart from one episode) whom I think of addressing during the periods of my sporadic mathematical activity, when the need for an interlocutor was felt.

It was also to him, as the mathematician closest to me, that I turned just as spontaneously on the first occasions (between 1975 and 1978) when I had to ask for assistance, a guarantee or support for the students working with me. The first of these occasions was the defence of Mrs Sinh's thesis in 1975, which she had prepared in Vietnam under exceptionally difficult conditions. He was the first person I contacted to sit on the thesis jury. He declined, suggesting that it could only be a bogus thesis, to which there was no question of him lending his support. (I had the skill to circumvent the good faith of Cartan, Schwartz, Deny and Zisman to lend me a hand in this deception - and the defence took place in an atmosphere of interest and warm sympathy). It took three or four similar experiences over the next three years before I finally realised that my prestigious and influential friend was deliberately antagonistic towards my 'post-1970' students, as I had been.

also with regard to work that bears only the mark of my influence (at least that undertaken "after 1970"). I don't know whether the attitudes of manifest contempt that I was able to observe on several of these occasions are also to be found more or less in his relationship with other mathematicians whom he considers to be far below him. The very spirit of a certain excessive elitism that he prides himself on professing would lead me to suppose that he is. The fact remains that since 1978 I have refrained from approaching him about anything. This has not prevented his power to discourage from finding yet another opportunity to manifest itself effectively.

It was also around the same year that the first signs, discreet at first, of an attitude of disdain towards my own mathematical activity appeared. The first occasion had been my reflection on cellular maps, after a discovery about them that had stunned me (see on this subject: *Esquisse d'un Programme*, par. 3: "Corps de nombres associés à un dessin d'enfant"). This discovery (admittedly 'trivial', and which had nothing to move or even interest my prestigious friend) was the starting point and the first material for this other mathematical *dream*, of comparable dimensions to that of the motifs, which began to take shape only three years later (January-June 1981), with 'La Longue Marche à travers la théorie de Galois'. These notes and others from the same period (some two thousand handwritten pages) constitute a very first tour of this 'new continent' that a trivial remark on a child's drawing had given me a glimpse of.

In the course of this intense work, I described my friend to him two or three times, to share some of my ideas with him, and occasionally to ask him questions of a technical nature. When he liked to talk about my questions, his comments were always just as clear and just as pertinent, and showed the same 'means' that had impressed me even at his young age. But a smugness had dulled the eagerness to understand that had enchanted me then, and the ability to grasp great things through 'small' things, like the ability to grasp or conceive great plans, by listening to both. This ability is not a matter of intellect, of simple 'efficiency', or of 'mastery' of an already established discipline or known techniques. It is the reflection, at the level of the intellect, of something of an entirely different essence - the child's *gift of wonder*. This gift in him seemed extinguished, as if it had never been. It was so at least in his relationship with me, after it had been so first in his relationship with my 'later' students. He had become an important man, and his approach to mathematics had become no more and no less than that '*sporadic*' attitude I have been examining.

for the first time just a month or two ago, and to which I myself have been no stranger...

Perhaps I would have been able to come to terms with the obvious absence of this communion in a shared passion, of this deep bond that had once linked us. I would have been content, no doubt, to submit (when the opportunity arose) more or less technical questions or simple requests for information to my friend's astuteness and his vast knowledge of the world of mathematical things. But in that year (1981) the signs of this disdainful affection suddenly became so brutal (\*), that I lost all interest in communicating with him again on mathematical matters, even occasionally. (→67)

(<sup>67</sup>) (26 April) It was while I was writing the above lines yesterday that I made the connection between this new turning point in our relations and the publication in 1982 (so practically at the same time as this drastic turning point) of the 'remarkable volume' of Lecture Notes, which consecrated my mathematical funeral without flowers or wreaths! At a time when I had been declared mathematically 'dead', my friend was doing me the kind of favour of continuing, here and there, to answer mathematical questions which, in the final analysis, were no longer relevant... .

Trying to listen to the meaning of events, I have the feeling that it is no coincidence either that the first appearance of a disdain, a mathematical disinterest (in things, moreover, that his 'healthy mathematical instinct' must have told him were hot and juicy), in his relationship to myself at least, was around the time of the publication of the pre-burial volume SGA 4 1/2 , five years before (\*).

The circumstances surrounding the publication of this volume alone attest to a

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(\*) (28 May) For a new take on this second turning point, see also the note "La Perversité", n° 76. (\*) On this subject, see the note "Le compère" (n° 63□□□) from the day before this one.

(5 June) The reflections in this note are taken up again in this note and the next three ("The clean slate", "Being apart", "The green light", "The reversal"), which give a glimpse of the meaning of "operation SGA 4 1/2 " and its link to the "dismantling" of the SGA 5 mother seminary. This reflection is taken up again in the "My students" section, and in particular in the continuation "My students (1)-(7)", where little by little the picture emerges of a veritable *massacre* of the seminary where my cohomology students learned their trade. The whole operation shows a casual contempt, of which the 'discreet disdain' (which I saw appear around the same time), in my friend's relationship with me, was only a very pale reflection.

Another association came to me a week or two ago, for the moment of this 'first turning point' in my life.

a deliberate gesture of disdain, both discreet and ostentatious. The mere fact of introducing me as Deligne's 'collaborator', without deigning to consult me or even inform me, and without even sending me a copy, seems to me in itself more eloquent than a speech. Not to mention the fact that Deligne's book was essentially supposed to make more accessible to a wider public the work I had developed over fifteen years earlier, at a time when I had not yet heard the name of my brilliant friend! Disdain, and later arrogance, must have been fuelled, on the one hand, by my absenteeism, which meant that I was unaware of anything and 'cashed in' without knowing it; but on the other hand, also by a certain climate, which meant that this kind of misunderstanding could 'pass' without apparently eliciting the slightest comment. The fact remains that I have not received any feedback from anyone (particularly among the many friends I thought I still had in the world of mathematicians) about this volume, or about the funeral volume he has prepared.

In the introduction, the author does not beat about the bush. The aim of the volume is to spare the non-expert "recourse to the lengthy explanations of SGA 4 and SGA 5", "to cut out unnecessary details", "to allow the user to forget SGA 5, which can be considered as a series of digressions, some of which are very interesting" (how nice of him to mention these "digressions"!). The existence of SGA 4 1/2 "will soon make it possible to publish SGA 5 as is" - a mysterious assertion, because one wonders how this publication (of something that one is advised to forget), which had already dragged on for a dozen years, and which presented a perfectly coherent set of results (and which had not waited for Deligne to be identified and proven) could be subordinated to the existence of SGA 4 1/2 (\*).

In asking the question, I also see a simple answer, and a possible explanation for the vicissitudes of this poor SGA 5 seminar (<sup>68</sup>), (which I had developed at length

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my friend's relationship with me, at the end of 1977 or during 1978. It was in 1978 that my friend got his well-deserved 'medal' (for proving Weil's conjecture). The way in which this new title (linked to the demonstration of a conjecture 'of proverbial difficulty') was internalised by my friend is strikingly apparent in the Funeral Eulogy (concerning my late person) and its counterpart (concerning his), published, it is true, only five years later on a 'great occasion'. On this subject, see the note "L'Eloge Funèbre (1) - ou les compliments", n° 104.

(\*) See a footnote (dated 28 April) to the "Green light" note (n° 68) for a clarification of this point. "mystery".

in 1965/66, eleven years before the publication of the volume SGA 4 1/2 by Deligne)(\*). The first hint of this can already be seen when it is stated (page 2) that in the original version of SGA 5 "the Lefschetz-Verdier formula was established only conjecturally" (which is harsh for Verdier, who is supposed to have been able to prove his theorem, which predates SGA 5 (\*\*)) and that "moreover, the local terms were not calculated". This may seem a regrettable omission for the non-expert reader (for whom this volume is primarily intended). Readers with a bit of experience will be well aware that the said local terms are still not 'calculated' today, and that the brilliant and peremptory author himself would be at a loss if asked what he meant in this case (in the general case) by 'calculate'(\*\*\*) (but apparently no one thought to ask him this indiscreet question).

An ambiguous sentence "this seminar (?) contains *another* demonstration, a complete one, in the particular case of the Frobenius morphism", seems to suggest that SGA 5 does *not* give (one would have expected it, for a volume of digressions!), at the end of the ends, a complete demonstration of the main "result" it announces, a trace formula implying the rationality of  $L$  functions à la Weil; fortunately "this seminar" comes to save, better late than never, a very compromised situation...

On page 4, we learn that the aim of the "Arcata" lectures was "to give demonstrations of the fundamental theorems in stale cohomology, stripped of the gangue of nonsense (\*) that surrounds them in SGA 4". He has the charity not to dwell on this regrettable nonsense which is rampant in SGA 4 (such as topos and other similar horrors - the reader can flatter himself to have escaped it by the providential appearance of this brilliant volume, making at last a clean sweep of the regrettable "gangue" that preceded it...) (67<sup>¶</sup>)(1).<sup>67</sup>

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(\*\*) (10 June) For further details on this subject, see sub-note no. ° 87 2 of the note "The massacre" no. ° 87.

(\*\*\*) (10 June) In the general Lefschetz-Verdier formula, for a cohomological correspondence between a bundle of coefficients and itself, the "local terms" (corresponding to the related components of the set of fixed points) are unambiguously defined by the very fact of writing the formula. The question of "calculating" these local terms only makes sense in specific cases, one of the simplest of which is that of the Frobenius morphism, where they are given simply by the ordinary traces of the endomorphisms induced on the fibres at these points. This formula had been fully demonstrated in the oral seminar as a special case of a much more general one.

(\*) The term "general non-sense" (in the sense of generalities that are sometimes painful, but often It's no coincidence that the adjective 'general' has been 'omitted' here. It's surely no coincidence that the adjective 'general' has been 'forgotten' here, so as to say 'non sense', which in good French means no more and no less than non-sens, and suggests the idea of bombast, of 'bullshit'.

I've just gone through the introduction to the volume and the introductions to its various chapters, and I've reproduced the comments and statements of intent that seem to me to most clearly announce the colour of the book, along with two or three others (digressions, admittedly, but 'very interesting') that seem to me to be intended mainly to 'pass the pill' (which has indeed been passed without a hitch). For example, the author is honest enough to state clearly at the beginning that "for complete results and detailed demonstrations, SGA 4 remains indispensable". This volume, however ambiguous its spirit and motivations, is not a swindle(\*\*). Its role seems to me to be more that of a sounding board, visibly conclusive: there was really no need to bother so much!

There is a sort of *escalation in the absurdity* (apparently unnoticed by all!) from one flight to the one he is preparing (SGA 4 1/2 , and LN 900). In both cases, we see a man of impressive means, made to discover, explore and probe vast worlds, taking it upon himself to 'redo' the work of a predecessor, first myself, then a former student of mine (Saavedra), when in doing so he had nothing essential to contribute to the work of these predecessors, which had been done with care and by getting to the bottom of things. (What he contributed in total could be set out in some twenty or thirty pages it seems to me). In the first case, the reason given was plausible: to allow the non-expert user a tear-free access to staggered cohomology (\*), without having to rely on the voluminous SGA 4 and SGA 5 seminars. (It is the first time, however, that we see such solicitude on the part of the author for the common user.

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(\*\*) (26 May) See, however, the note of the following day, "Le renversement" (n° 68<sup>¶</sup>), where I come back to this impression, which turns out to be hasty. Further reflection gradually reveals a large-scale operation, 'SGA 4 1/2 - SGA 5', which was carried out, mainly for Deligne's 'benefit', with the help or tacit agreement of all my 'cohomologist' students. "The 'honesty' that I think I can see (on the basis of the statement in line 7 of the introduction, which has just been quoted), plays here the role of a 'control line' intended to give the impression, in the purest 'thumb' style. My friend used this style as early as 1968 (see "Poids en conserve et douze ans de secret", and "L'éviction", notes n° 49 and 63). See also the notes "Pouce!" and "La robe de l'Empereur de Chine", n° 77 and 77<sup>¶</sup>.

(\*) (10 June) When I wrote this note, I had only just 'landed' and hadn't yet grasped the true meaning of "the APG 4 1/2 operation" (and its link with the vicissitudes of APG 5, of which I had only just had a sudden foreknowledge). I have since understood that the heterogeneous collection of texts published under the misleading name of SGA 4 1/2 (see the note 'Le renversement', n° 68<sup>¶</sup>) is in no way a book of popularisation ('without tears') of the SGA 4 and SGA 5 seminar (which constitutes the heart of my published mathematical work), but that it represents a manoeuvre to *subsume* itself to the latter (acting as a precursor that is a little muddy around the edges), and to appear as *the real* masterwork on scalar cohomology, which would be due to

Deligne. For a

The second time, the work consisted almost entirely of *copying* the thesis that Saavedra had written with me! This thesis was a perfect reference, and the fact that the proof of one statement was wrong and that another statement contained an unnecessary hypothesis was surely no reason to rewrite the whole article. Of course, no "reason" was given for such a strange thing.

Yet I didn't have to hold SGA 4 1/2 in my hands to feel the meaning of this apparently absurd thing: Deligne 'redoing' Saavedra's thesis, ten years later! It is surely the same thing as the meaning of the slightly less absurd thing that prepared it: Deligne doing (twelve years later) a 'digest' (a little condescending around the edges) of a certain part of Grothendieck's published work. This is precisely the part of Grothendieck's work that he can't pretend to do without, if he continues to be interested in the cohomology of algebraic varieties (from which he is unable to break away). And Saavedra's thesis is the work of all works, published and bearing the mark of my influence, that he can in no way do without, if he wants to take up 'on his own' the notion of motivic Galois group that I had developed, and finally (fifteen years later!) exploit this obviously crucial notion. First by writing SGA 4 1/2 , and five years later by the landmark article Milne-Deligne (alias Saavedra) in LN 900, my friend indulged in an illusory feeling of liberation from something he surely felt to be a painful obligation: having to refer constantly to the very person he was trying to supplant and deny, or even to such and such another who referred to him.

To arrive at this intimate conviction about the common meaning of these two 'absurd' acts, I didn't need to go through all the (fifty-one) publications of my prolific friend, a list of which I received (for the first time) about ten days ago. To tell the truth, I haven't even thought of going through the four offprints in my possession (\*) again, to look for confirmation of what I think I know. If, in the future, I consult the works of my friend again, it will be to find something other than what I already know enough about, and I will certainly have the pleasure of learning something new.

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A striking formulation (by an anonymous writer) of such an imposture, six years after the SGA 4 1/2 probe, see "L'Eloge Funèbre (1) - ou les compliments" (note n° 104).

(\*) Not counting the work in the Publications Mathématiques de l'IHES, which the director, Nico Kuiper, has been kind enough to send me for nearly fifteen years.

beautiful mathematical things, which I once had the even greater pleasure of learning in person and from his mouth!

(<sup>67</sup> 1) (14 June) I have noted two other micro-crooks (of detail) in SGA 4 1/2 . One is in the "Breadcrumb trail for SGA 4, SGA 4 1/2 , SGA 5" (admire the suggestive sequence!), where the author writes (p. 2) that to establish in stale cohomology a "duality formalism analogous to that of coherent duality...". Grothendieck used the resolution of singularities and the purity conjecture", thus giving the impression that this formalism was finally established only by him, Deligne, in the case (sufficient for many applications) of schemes of finite type over a regular scheme of dimension 0 or 1 (see same paragraph). He knows very well that the formalism of the six variances (and therefore the theory of *global dualité*) was established by me without any "conjecture", and that his restriction is only founded for the biduality theorem (or "local duality") - which incidentally becomes in SGA 5 (under Illusie's pen) "Deligne's theorem"!

On the other hand, on page 100 there is a section entitled "The Nielsen-Wecken method", which is the method I introduced into algebraic geometry to prove a formula of the Nielsen-Wecken type, proved by these authors (in the transcendental context) by a technique of triangulations unusable in the algebraic context. Deligne learned about this method (as well as the names of Messrs Nielsen and Wecken, whose fine article in German he didn't need to read!) from me, in the SGA 5 seminar of 'technical digressions', which SGA 4 1/2 is designed to make us forget! In this section, there is no allusion either to SGA 5 or to me, and the reader has the choice, for the authorship of this method, between Nielsen-Wecken (if he is very badly informed) and the brilliant and modest author of the volume.

Interestingly, in the whole volume, Verdier's "Woodshole" proof for a trace formula including the case I needed (for Frobenius morphisms) is not mentioned. This demonstration (apparently forgotten, in favour of the more general method developed in SGA 5) was the missing link to fully justify my cohomological interpretation of *L-functions*. Clearly, there was an (undoubtedly tacit) agreement between Deligne and Verdier - Verdier giving Deligne credit for the trace formula for Weil's conjectures, in return for the part of SGA 5 that he had taken over for himself the previous year (1976). (See on this subject the note "Les bonnes références" n° 82.) Another compensation: the publication in SGA 4 1/2 of the "Etat 0" of derived and triangulated categories, from which my name is equally absent. Four years later

In fact, late in Deligne's career, the staggered duality in algebraic geometry became known as 'Verdier's duality' - Verdier had not done a bad job! (See the end of note no.° 75 "L'Iniquité - ou le sens d'un retour").

(<sup>67</sup>) (27 May) (\*) The passages quoted, like all the circumstances that led to the publication of this remarkable volume called SGA 4 1/2 , bear witness to my friend's deliberate intention to deride and scorn the central part of my work, represented by the two closely interrelated seminars SGA 4 and SGA 5. Not the least of these 'circumstances', which came to light in the course of reflection from 24 April (see the note 'Le compère', no.° 63<sup>¶¶</sup>) to 18 May (see the notes 'La dépouille...', '... et le corps', nos.° 88, 89), was the ransacking of the original SGA 5 seminar, which took the form of the 1977 edition-massacre (see in particular the note 'Le massacre', no.° 87).

This deliberate derision of my friend takes on its full meaning if we remember that the SGA 5 oral seminar represented the young man Deligne's first contact with schemes, cohomological techniques and in particular the duality formalism, and with A-adic cohomology, when he arrived at the IHES in 1965 at the age of 21, with the very specific aim of learning 'algebraic geometry' with me. It was in this oral seminar, and in the notes of the SGA 4 seminar that had taken place two years earlier, that he had the privilege of learning at first hand the ideas and techniques that have dominated his work to this very day (\*).

This essential aspect of the context of the 'SGA 4 1/2 - SGA 5 operation', and beyond that, of my friend Pierre's relationship with me, was clearly not present when I wrote the previous note ('La table rase (1)', n° 67), nor in the part of the reflection on the Burial that precedes it. The memory of this 'young man Deligne', arriving at the SGA 5 seminar where he still had everything to learn and where he did indeed (and very quickly) learn a lot, only came back in the final stages of the reflection, as if against my will. I deliberately decided, from the very year of the young Deligne's appearance in my mathematical 'microcosm', *not* to count him among my 'friends'.

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(\*) This note is a footnote to the previous note "La table rase", of which it is a complement, written one month later to the day.

(\*) Pretty much the same comment can be made for each of my other students. cohomologists Verdier, Illusie, Berthelot, Jouanolou - see on this subject the note "Solidarity", and the four notes that follow it (notes n° 85 to 89).

my pupils (as if by doing so I would have failed in my obligation of modesty towards such a brilliantly gifted person), made me also minimise, or to put it better, ignore to-tally until these very last weeks, a reality which is nevertheless obvious and tangible, and which is commonly expressed by this double appellation (which I objected to) of 'teacher-pupil' (\*\*). I was happy to forget, to ignore that there had indeed been a 'transmission' of something from me to him, something that for me as for him had great *value*, in a sense that was certainly very different for him and for me. What I was passing on, in those four years of close mathematical contact between him and me, was something in which I had put the best of myself, something nourished by my strength and my love - something of which (I believe) I gave unreservedly and without measuring or even, perhaps, really feeling the price.

Surely, what I was giving was being fed by a passion for knowledge in him that was in tune with the one that animated me - and by *something else* too that I didn't feel until much later and without yet linking it to this 'transmission' that had taken place and that I was happy to ignore. To put it another way, what I gave was *also* received, at another level that remained hidden from me, not as tools to fathom an inexhaustible and fascinating Unknown, but as *instruments* to supplant (at first), and later to establish a domination, a ruthless 'superiority' over others.

Without even taking into account what came back to the 'child' in my friend, eager to discover, and what came back to the 'boss' in him, eager to supplant, to dominate (or even to crush), but from the more superficial point of view of the part played by certain ideas in a work, It was an unexpected discovery over the last six weeks to what extent my friend's work, which took off the year we met, would continue to be nourished by what I had passed on to him. I had imagined, when I left the mathematical scene fifteen years ago, that 'the little' I had given my friend-non-student (a 'little' whose role in his impressive initial impetus I could see clearly) would be a springboard for a flight that would take him far beyond his starting point, *away* from my work and my person. What happened, however, was that my friend remained *attached to* that starting point to this day,

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(\*\*) (14 June) This deliberate intention is quite apparent in the way I finally decided to talk about him (as if by doing so I were breaking some obligation of reserve or modesty towards someone who liked to distance himself from me...) four months ago, in the note "Jesus and the twelve apostles" n° 19.

Attached to the very work that it was a question of disowning, of handing over to derision or oblivion, and of 'using', this is the typical case of a conflictual link to the father or mother, which indefinitely holds back in the orbit of those it is destined to leave and surpass, the person who takes pleasure in cultivating this conflict within himself, instead of setting off to meet the world...

I see today that by my deliberate intention to treat my young friend as a 'being apart', and not simply as one of my pupils who seemed to have more resources than the others - and by my deliberate intention to minimise or forget in my relationship with him the value of what I was passing on (and the *power* that I was putting in his young hands as a result) - by these attitudes in myself, I was unknowingly feeding a fatuity and a conflict in him, both of which remained hidden from me....) - through these attitudes in myself, I was unwittingly feeding a fatuity and a conflict in him, both of which remained hidden from me. At the same time, I was entering into a certain game - or rather, there was a game between the two of them in perfect harmony, and I'd be hard pressed to say who 'started it' (assuming the question makes any sense): myself out of 'modesty', claiming that my young friend was far too brilliant to be anyone's pupil, and that the little I had been able to give him wasn't really worth talking about - and himself distancing himself (even before I left) from my person and my work, disowning (under my complacent eye) the soil that had indeed nurtured him.

It's only by writing this note that I'm finally seeing clearly this game, of which a diffuse perception must have been present for only a week or two. And I also see that this 'modesty' or 'humility' in me was a false modesty, a false humility: a lack of simplicity, of seeing things simply for what they are. In this game there was a complacency towards my young friend - seeds that have proliferated a hundredfold! - and, more subtly, an indulgence in myself, by making a kind of pedestal of a 'privileged relationship', extraordinary and all (\*). (Just as any lack of simplicity, perhaps, is basically a self-indulgence... . )

(<sup>68</sup>) (27 April) To tell the truth, I have never thought about the meaning behind the strange vicissitudes of the SGA 5 seminar. Its oral proceedings in 1965/66 had not given rise to any particular difficulties, whereas the drafting by successive and often failing volunteers

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(\*) Compare with the note of 10 May "L'ascension" (n° 63<sup>68</sup>) where for the first time I perceive this ingredient of complacency in what was my relationship with my friend Pierre. This perception had remained isolated and fragmentary until today, when it became clearer in the course of the reflection that has taken place

in the present note "L'être à part".

dragged on for *eleven years*(\*\*)! It was in 1976 that Illusie finally took matters into her own hands, writing up what was left undone and publishing the whole thing. Today is the first time (after almost twenty years since that seminar) that I realise that 'there is something to understand'. Maybe I'm the only one...

The first idea that comes to mind is that among the more or less active listeners of the seminar, and also more or less familiar with the previous SGA 1 to SGA 4 seminars, there must have been a phenomenon of *saturation* in relation to the tide of 'grothendieckeries', breaking over them like a sort of tidal wave without reply(\*\*\*). Clearly, faith was lacking in some of the editors, who must not have had a very good sense of where all this was going, and why on earth I had been so stubborn, for a whole year, in wanting to turn the book round and round in every direction until I had completely mastered the essential formal properties of stale cohomology, and the whole arsenal of new notions associated with it. The fact that no trace remains of either the final presentation of the seminar, setting out open problems and conjectures (never published to my knowledge), or the introductory presentation reviewing formulae of the Euler-Poincaré and Lefschetz type in various contexts, is a particularly eloquent sign of a general disaffection. I don't remember perceiving this disaffection at the time (or even afterwards, until today (\*)), caught up as I was in my tasks at the time.

The fate of SGA 5, which originally had as strong a *unity* as any of my other seminars, and which saw itself gradually *dismantled* (⁶⁸<sup>□</sup>) over the eleven years of non-editing that followed, might have shown me that the major projects I was pursuing so

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(\*\*) Writing the whole seminar, based on my detailed notes for the oral presentations, would have taken me just a few months.

(\*\*\*) This is in line with the impression of students who remained "a little stunned", expressed in the letter quoted in the note "Echec d'un enseignement (2) - ou création et fatuité" (n° 44).<sup>□</sup>

(\*) (26 May) It was after I'd got a bit more 'into the swing' of the SGA 5 seminar that I remembered an uneasy feeling I'd had when I'd leafed through (it must have been 1977, the year of its publication) the copy of the published seminar I'd just received. This impression of 'mutilation' (which then remained in a diffuse, informal form) was due above all, perhaps even entirely (I must not have spent much time looking more closely, although it would have been well worth it...), to the absence of the introductory and final papers, and above all (I think) to the casualness with which this absence was announced, as something almost taken for granted - why on earth would anyone have bothered to include them! At some level I must have 'sensed something', which I only took the trouble to let rise and examine this month (nearly seven years later!), in the note 'The massacre' and the two notes 'The remains . . and the body" that follow it.

The projects I was working on so hard, and for which I had found people to help me out for several years, had by no means become a joint undertaking, but remained personal to me. My programme gave rise to occasional collaborations here and there, without becoming a driving force in any of my students at the time - a force that would have spurred him on to longer-term work with a broader vision than the one he had pursued with me in his thesis, whose main role in his life would have been to help him learn the mathematical profession he had chosen.

It seems to me that the only person to have grasped (if not made his own) a certain overall vision, going beyond the framework of a particular 'collaboration' on a particular type of question or for the development of particular tools, was Deligne. This is why I must surely have seen in him (without ever having to say so) much more a designated 'heir' than a 'pupil'. The term 'heir' here captures better what I want to express than the term 'continuator' which came to me at first, but which could suggest the idea of a work that would be limited by an inheritance received. On the contrary, I felt that this 'heritage' was simply a *contribution* that I was in a position to make to the development of a personal vision, which would be nourished by many other contributions (as was in fact the case even before I left), and which was called upon to surpass without effort all that had preceded and nourished it.

To return to the sad fate of SGA 5, the thought that occurred to me yesterday was that this fate was perhaps not unconnected with the ambiguity of Deligne's relationship with me and my work, particularly given the influence that his strong mathematical personality could not fail to exert on all my students (\*). Surely he must have found some inner satisfaction in the vicissitudes that affected the notes of this seminar, stripped of what made up the unity and impetus of the oral seminar. On reflection, it is clear, however, that the primary and espe-

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(\*) (28 April) A concrete and eloquent sign of this ascendancy is that SGA 5 was not published until Deligne saw fit to signal to Illusie to take an active interest in it - in other words, at the *precise moment* when he himself needed it as a basic text for his 'digest' of SGA 4 $\frac{1}{2}$ , intended to replace it. (On this subject, see the end of the introduction to SGA 5, written by Illusie.) This sheds light on, and gives full meaning to, the statement (which I still described as 'mysterious' the day before yesterday in the 'Clean slate' note (note no.° 67)) that 'the existence of SGA 4 $\frac{1}{2}$  will soon make it possible to publish SGA 5 *as is*'. The 'as is' here is a touch of humour that I was probably the only one to sense (from the day before yesterday), and to appreciate at its true value! (Given the 'dismantling' that the published version represents compared with the original seminar).

of these vicissitudes. Without yet clearly discerning this cause, there is no doubt that it concerns above all my own person *and* the people who pretended in 65/66 to take charge of writing the seminar; surely it lies in their relationship to my person, or perhaps also in their relationship to a certain way of doing mathematics (or to a certain programme, or to a certain vision of things) that I embodied for them. The fate of SGA 5 now seems to me to be an eloquent and tenacious *revelation* of something that I have never yet taken the trouble to examine, for lack of even realising it, and which at the moment I am still only glimpsing(\*\*). Perhaps these lines will encourage one of the protagonists of this collective misadventure to share with me his or her own impressions on the subject.

Perhaps there is, however, a lesson (at least a provisional one) that I can now draw from the SGA 5 episode, which first foreshadowed, and then illustrated, this spectacular *halt* after my departure, almost across the board, from the famous 'programme' on which I had embarked. Contrary to what I must have believed more or less in the euphoric sixties (happy as I was to have finally found some goodwill to back me up!), it seems to me today that the realisation of a vast personal vision through tenacious and meticulous work cannot be in the nature of an adventure or a *collective* undertaking. Or rather, if there is such a thing as a "collective undertaking", it is not one that would be achieved by working for ten or twenty years (or even thirty) around the same person. If the vision is to become a common heritage for all, it will take shape here and there under the pressure of needs alone, through the day-to-day work of this or that other person who may only know the predecessor by name (and even then!), whose vision had been too vast for his arms alone to be enough to bring it to fruition (\*).

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(\*\*) (26 May) This is the very 'something' referred to in the penultimate footnote, and which has come to the surface in the course of reflection over the past few weeks, and especially from the moment (12 May) when I finally took the trouble, for the first time since its publication in 1977, to look a little more closely at what had become of 'a splendid seminar' in the hands of my cohomology students, in the massacre edition that was made of it eleven years later.

(\*) (28 April) Perhaps "my arms alone" would have been enough to carry out the vast programme of work that I envisaged towards the end of the sixties, but on condition that I made myself the exclusive servant of this programme for the next twenty or thirty years. I'm glad today that I didn't follow that path, which could have been mine and whose pitfalls and dangers I can now clearly see.

(<sup>68</sup>) (28 April) As an example (among many others(\*\*)) of this dismantling, I thought back to the fate of one of the key presentations in SGA 5, which ended up being written by none other than Deligne (who had been in charge of it, I think, since 1965, in order to 'fulfil' his commitment eleven years later... ) according to my oral presentation, to be incorporated without further ado into SGA 4 1/2 ! This is the formalism of the cohomology class associated with an algebraic cycle on a regular scheme, which is easily developed by passing to cohomology "with supports" in the support of the cycle under consideration. Like almost all constructions in stale cohomology (which are also useful in many other contexts, where they have become common practice), I developed this one at the end of the 1950s in the context of coherent cohomology (here, Hodge and De Rham cohomologies, which, in the context of 'abstract' algebraic geometry, were first studied in one of my first Bourbaki lectures). It is so natural that it obviously implies the usual compatibility with cup-products (\*).

As I write these lines, I realise that the sleight of hand involved (putting this crucial talk in SGA 4 1/2 ) has led to the brilliant result that Deligne, who did take part in the SGA 5 seminar in 65/66 (\*\*), *is not listed* on the cover as one of my 'collaborators' (something that had already struck me yesterday, when I leafed through the published volume Lecture Notes n° 589) and that *I am* the one entitled (eleven years after the seminar) to write

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(\*\*) (28 May) I only decided to take a look at this 'dismantling' in the reflections of 12 May, in the note (more appropriately named) 'The Massacre' (no.° 87).

(\*) (28 May) For a coherent framework, see my Bourbaki lecture no.° 49 (May 1957), §4. In the note "Les bonnes références" (n° 82) of 8 May, I discovered that these ideas, as well as those I had developed in the same SGA 5 seminar for the homology classes associated with cycles (and many others) had been taken up by J. L. Verdier, without a word about the existence of an SGA 5 seminar or about me. This operation took place in 1976, a year before the "SGA 4 1/2 operation" (with which it seems to me to be closely linked), and in full view of all the former auditors and participants of the 1965/66 SGA 5 mother seminar.

(\*\*) (28 May) And it was even there that he first heard of the things he so brilliantly exposes. The first edition was published in the volume-pirate SGA 4 1/2 ! On this subject, see yesterday's note 'L'être à part' (n° 67<sup>¶</sup> ). Compared to the methods used by his friend Verdier the year before, and to those he himself practised on other occasions, my friend here maintains himself below the limit of patent plundering, since he presents me as the author of the paper on cycles (with, it is true, the brilliant result of being able to present me as his collaborator), and he does not yet pretend to be purely and simply unaware that I have something to do with the theory of stale cohomology, the formula of traces, and so on. For decisive progress in this direction, see however the note "L'Eloge Funèbre (1) - ou les compliments" (n° 104).

Deligne's collaborator'. It's quite a brilliant *turn of events*, I must say! At the time of publication of SGA 4 1/2 , to which I was unknowingly contributing, I had stopped all public mathematical activity for seven years - so much so that I never bothered to publish poor SGA 5, which for me was part of a past that I had left behind me...

(30 April) As for SGA 5, it now appears to be a collection of somewhat heteroclite texts, with neither head nor tail (these have been lost along the way!), and which 'stand up' only by reference to the text SGA 4 1/2 . Remarkably, and something I am only now noticing, the *very name* SGA 4 1/2 suggests that this text *precedes* SGA 5, *which exists only by reference to it*(\*\*\*). If the author of this text had been in a less friendly mood (\*), and for sentimental reasons wished to insert his 'digest' ('plus a few new results') into the SGA series in which he had played his part, the obvious name would have been SGA 5 1/5 .

I see this as a second sleight of hand, which makes me realise that Deligne's share in the fate of SGA 5 is greater than I thought just three days ago. It also brings me back to the feeling expressed the day before that SGA 4 1/2 *was not a swindle*. If apparently nobody (starting with Illusie, whose good faith is certainly not in question(\*\*)) noticed the 'operation', this is undoubtedly due to that

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(\*\*\*) (28 May) For a deeper meaning of this 'violent insertion' of SGA 4 1/2 between the two indissoluble parts SGA 4 and SGA 5 of a whole, forming the heart of my written work, see the note 'La dépouille...'. (n° 88).

(\*) (28 May) The expression "ambiguous provisions" is definitely an understatement here!

(\*\*) It's high time we took this opportunity to thank Luc Illusie for the care and self-sacrifice with which he has managed to bring to a successful conclusion the drafting of certain distressed papers and the publication of the 'package'; and all this under conditions that were certainly not very encouraging, not least of which was my total absenteeism!

(26 May) In the light of subsequent reflections, pursued in notes n° 84 to 89 and especially in the note 'The Massacre', these thanks lavished on Illusie take on an enormous and unforeseen comic dimension, which I had no inkling of when I wrote these lines! It's true that I wrote them against some reluctance on my part, which expressed itself in particular by 'forgetting' to include the thanks (already planned) in the 'main' text of the note, so I had to 'make up for it' with a footnote. This reluctance was undoubtedly due to the unease I had already felt from the first time I held in my hands this volume called SGA 5 (and which I didn't have the opportunity to hold in my hands again, I think, until the last few weeks), an unease I mentioned in the footnote (dated today 26 May) to the previous note "Le

I've already noticed his "ascendancy", and also, I think, the charm of my friend's person, both of which put him above suspicion!

(<sup>69</sup>) (27 April) Around the age of eleven or twelve, when I was interned at the Rieucros concentration camp (near Mende), I discovered compass tracing games, and was particularly enchanted by the six-pointed rosettes obtained by dividing the circumference into six equal parts using the opening of the compass, which is placed on the circumference six times, so that it falls right back on the starting point. This experimental observation convinced me that the length of the circumference was exactly equal to *six* times that of the radius. Later (at the lycée in Mende, I think, where I ended up going), I saw in a textbook that the relationship was supposed to be much more complicated, that we had  $A = 2\pi R$  with  $\pi = 3, 14 \dots$ , I was convinced that the book was wrong, that the authors of the book (and no doubt those who had preceded them since antiquity!) must never have drawn this very simple line, which clearly showed that we simply had  $\pi = 3$ . Typically, I realised my mistake (which consisted in confusing the length of an arc with the length of the string that joins the ends) when I expressed my astonishment at the ignorance of my predecessors to someone else (a prisoner, Maria, who had given me some voluntary private lessons in maths and French), just as I was about to show her why we should have  $A = 6R$ .

This confidence that a child can have in his own lights, trusting in his own faculties rather than taking things learned at school or read in books at face value, is a precious thing. It is, however, constantly discouraged by those around it. Many will see in the experience I relate here an example of childish presumption, which had to bow to the knowledge received - the facts finally revealing a certain ridiculousness. As I experienced this episode, however, there was no sense of disappointment, of ridicule, but rather of a new discovery (after the one I had hastily interpreted by the false formula  $\pi = 3$ ): that of an error, and at the same time that we should have  $\pi > 3$ , because obviously the length of an arc is *greater* than the length of the rope.

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signal". This inattention illustrates well the importance, in meditation, of vigilant attention to what is happening within oneself in the very moment. In the absence of such vigilance, the reflection here remained below the level of meditation, at a superficial level - whereas attention to this reticence would have led me to probe its origins, and thus to take a closer look at what had become of this fine seminar (something I didn't do until two weeks later).

which joins the two ends. This inequality was, moreover, very much in line with the rejected formula  $\pi = 3,14\dots$  which, as a result, looked reasonable, at the same time as I must have realised that there were perhaps people who weren't as stupid as all that who must have looked into the matter. At the time, my curiosity was satisfied, and I don't remember wanting to find out more about the ins and outs of this number, so important, it would seem, that it was the subject of a letter of its own (\*).

This experience was undoubtedly one of the very first to teach me a certain prudence, when my own lights seem to contradict generally accepted knowledge: that such a situation may merit careful examination. Prudence, which is a fruit of experience, marries and complements (without altering) the spontaneous confidence in our own capacity to know and discover, and the assurance given by the original knowledge of this power in us.

(<sup>70</sup>) (28 April) Thinking back last night to this story about the cover of SGA 4 1/2 , in which I unknowingly appear as a 'collaborator' of my illustrious ex-student, the whole thing seemed so incredible that a doubt came over me as to whether I had not been betrayed by my memory, and had not indeed been consulted and given my agreement without thinking too much about it. But this assumption goes so far against the grain of my attitude up until last year, namely that there was no question of my publishing maths again (and even less so, not as a 'collaborator' with someone, and not even as a 'collaborator' with someone whose relationship with me already seemed to me to be fraught with profound ambiguity) - that it was far more 'incredible' than what it was supposed to 'explain', and that there was basically nothing mysterious or inexplicable about it for me! As a matter of conscience, I did check my friend's letters between 1976 and the present day (there aren't many of them and it was a quick job), without finding, of course, any reference to the publication of SGA 4 1/2 . I did, however, write a few lines to the person concerned himself, to ask him if he could give me the following information

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(\*) (28 April) The above evocation brought back other memories, which show that this famous number  $\pi$  intrigued me more than I first thought I remembered. The approximate value 355/133, found in a book (perhaps the same one), had struck me - it was so pretty that I found it hard to believe that it was only approximate! At the time, I didn't know any numbers other than fractional numbers, so I was intrigued by what the numerator and denominator of the irreducible fraction that expressed  $\pi$  might look like.  
- they must have been quite remarkable numbers! Needless to say, I didn't get very far with my childish thoughts on squaring the circle.

explanations about this "hoax" that I didn't really appreciate...(\*)).

When, three days ago, I mentioned the turning point in my relationship with my friend Pierre, when I lost interest in continuing to communicate with him on mathematical questions (see "Two turning points", note (66)), I remembered a certain impression that had been strongly present at the time. To put it into perspective, I should first point out that during the ten years that had elapsed, when my friend had played for me the role of practically the one and only mathematical interlocutor, I had expected him (as much a matter of course as the role I was making him play) to *relay* the mathematical reflections and ideas I had shared with him, in order to communicate them in turn to mathematicians who might be interested in them. As I have explained elsewhere (see section 50, 'The weight of a past'), it was the feeling of having such a relay interlocutor that gave my sporadic periods of mathematical activity a deeper meaning than that of satisfying a craving, by linking them to a collective adventure that went beyond my own person. It was also this feeling, no doubt, that meant that for so long I felt no desire to publish what I found, and even less regret at having withdrawn from the mathematical scene (any such regret, incidentally, never appeared, and I 'reappeared' on the said 'scene' without any deliberate intention, and before I even realised it!)

I cannot say to what extent my friend fulfilled this expectation - it is possible that he played the expected role for as long as he maintained towards me that mathematical availability, driven by curiosity and affectionate sympathy at the same time, which had

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(\*) (26 May) My friend kindly honoured me with a reply, which finally dispelled the last trace of doubt. He had indeed listed me as a 'collaborator' because of the presentation of SGA 5 that he had written and included in SGA 4 $\frac{1}{2}$  - and he had not thought it necessary to ask me for my agreement to this transfer, or to be listed as a 'collaborator', nor had he thought it necessary to send me a copy of this volume to which I had collaborated so well, given that 'I hadn't done maths for seven years'.

(5 June) I have just received (better late than never!) a letter (dated 30 May) from Contou-Carrère, replying to a letter of 14 April in which I asked him (as a matter of conscience) if he had ever seen a copy of SGA 4 $\frac{1}{2}$  among my books. It would seem that there was such a copy, which Contou-Carrère had kept with him (unless he had bought it and no longer remembered?). On the other hand, Deligne's reply seems to confirm that he had not thought it useful to send a copy: "It might indeed have been a good idea to send you a copy of 4 $\frac{1}{2}$  ; I doubtless thought that you would not then have seen the point of it" (letter of 15 May).

made possible and quite natural the exceptional role he played in my relationship to the world of mathematicians (and also, to a certain extent, in my relationship to mathematics itself). When I asked myself the previous question, a day or two ago, I received (as if in immediate partial response!) a letter from Larry Breen, sending me copies of various correspondence from 1974 and 1975, including two lines from Deligne in 1974, together with a copy of a letter (which I had just written to him about Picard's field formalism), which asked him for his opinion about my letter. He refers to me as 'the master', in which I think I sense an intonation that is half-pleasing, half-affectionate. I can't remember any other occasion when I heard from others about things I had told my friend since I left in 1970. It's quite possible that there were and that I've forgotten, not to mention the fact that even during the periods of my mathematical activity, it was relatively rare for me to feel the need to consult my friend, and until 1977 or 1978 the thoughts I occasionally shared with him were limited in scope. So there wasn't much to 'relay', strictly speaking, until about that time (\*).

Things changed in 1977, when for the first time since the sixties, I got very strongly 'hooked' on a substance of exceptional richness. This was the beginning of my reflections on maps, and one thing leading to another (around the same time), on a

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(\*) I could make an exception for my first thoughts on a theory of the unscrewing of stratified structures, which I must have mentioned to Deligne in the early 1970s. He greeted my expectations on this subject with indulgent sympathy, rather like that accorded to a grown-up child who doubts nothing (these were attitudes he often had in his relationship with me, and which were certainly often well-founded!) My friend's scepticism, motivated by his knowledge of certain phenomena of savagery of which I was unaware, did not, however, convince me - rather, the facts he was pointing out made me suspect from that moment on that the context of 'topological spaces', commonly adopted for 'doing topology', was inadequate for flexibly expressing certain topological intuitions that I felt to be essential, such as that of 'tubular neighbourhood'. Over the next ten years I hardly had the opportunity to return to these reflections and I had to forget my 'suspicions' for a while, which became current again (and then became an intimate conviction) through my reflections of December 81 - January 82, stimulated by the needs of a theory of 'unscrewing' the 'Teichmüller tower'. (Compare *Esquisse d'un Programme*, par. 5, 6).

(5 June) As another exception, I could count my reflections on virtual relative patterns and virtual motifs (above a general basic pattern), which I seem to remember sharing with Deligne. As these were things closely related to a yoga he had decided to bury (until the exhumation in 1982), it's not surprising that he didn't pretend to take to the ideas I explained to him, which, of course, delighted me. For some indications about them, see note n° 469 .

new approach to regular polyhedra (see Outline of a Programme, par. 3 and 4). From that moment on, it was clear to me that the facts I had just put my finger on opened up unsuspected perspectives, of a breadth and depth comparable to those I had glimpsed (and more than glimpsed, subsequently) with the birth of the notion of pattern.

It is strange that, on this occasion, I should still have approached my friend with the expectation that he would echo these things that had amazed me and what they made me see - whereas the total silence that had surrounded the very name 'motif' for seven or eight years already was eloquent enough to tell me that my expectation was illusory! This astonishing lack of discernment illustrates the deliberate intention I had (even after discovering meditation a year or two earlier) not to pay any attention to my relationship with mathematics or mathematicians, which were supposed to be part of a distant and long-gone past! My first reflection along these lines (\*) was in 1981, the year of the second 'turning point' in my relationship with my friend, which I have already mentioned. But even in this meditation, which lasted for several months, the relationship with other mathematicians was barely touched upon, and the relationship with the one among them who had undoubtedly been the closest of all (at least in terms of our shared passion) was not even touched upon, as far as I can remember. But it would have been very useful!

Looking back and reflecting on it now, it is clear that what happened at that moment, which surprised and frustrated me so much (the sudden appearance of a disdainful disregard, where I had expected to share the still fresh joy of a discovery that had made a deep impression on me), was indeed what had to happen. It was precisely the *scope* of what I had to communicate, which had motivated my expectation of an interest in tune with my own, that was to arouse in my friend, for the first time in his relationship with me, the reflex of *discouragement*. This reflex must have been all the stronger because I was already 'pre-buried' by the publication of SGA 4 1/2 . When I came back three years later, just as my friend (armed with his beautiful theorem on absolute Hodge cycles) was about to take care of the burial in due form, with the 'memorable volume' published the following year(\*\*), this same reflex came into play, but with a completely different brutality. (This episode put

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(\*) On this subject, see "The troublemaker boss - or the pressure cooker" (s. 43).

(\*\*) This is the volume Lecture Notes 900, see note "Souvenirs d'un rêve - ou naissance des motifs".

end to communication at a mathematical level, but without "discouraging" me...)

In both cases, the disinterest was obviously sincere, as it had been in other cases too, when it had been expressed towards people other than myself. This was not the first time that I had seen in him (or in others) forces other than the thirst for knowledge neutralise it and replace the mathematician's flair.

It was on these two occasions, in 1978 and again in 1981, that I glimpsed for the first time, as if in a flash, the '*price*' of this contradiction in my friend which had been known to me for many years, but whose significance, as a hindrance and as a limitation in his work and in his understanding of mathematical things, had never appeared clearly to me until then. But it was only in the course of the meditation I have been carrying on for the last month, on the meaning of a certain *burial that has been taking place* insidiously since I left, that this significance gradually came to the fore.

On a manifest level, the funeral that I have discovered over the last few days and weeks, which I had been anticipating for several years but without thinking of attributing a particular role to anyone, has been above all the funeral of *my mathematical work*, and through it and above all, of *myself*. The best placed of all, of course, to help with this burial (which many others, in their heart of hearts, were hoping and praying for), and to preside over the anonymous funeral, was the friend who, in the eyes of all, had once been the legitimate heir. If he presided over the funeral, he was certainly not alone! But at a deeper level, the person my friend was burying discreetly throughout those twelve long years was none other than *himself*; that thing in him that doesn't impress anyone, a delicate and elusive thing like the scent of a flower or a piece of fruit, and which has no price. (→71)

(<sup>71</sup>) But following the thread of associations, I drifted away from my purpose, which was to evoke a certain 'strong impression', the memory of which has come back to me insistently over the last three days. This impression occurred at the 'turning point' in my relationship with my friend, when I was confronted with signs (at once muted and brutally obvious) of a kind of deliberate contempt - the signs that made me put an end to our relationship on a mathematical level. I realised then that the moment had arrived when I no longer had anything to

(n° 51).

The 'decision' was made on its own, without division or regret, as the first fruit of this belated (and very partial) understanding.

There was no anger in me, and even less bitterness (I don't remember in the course of our relationship feeling any movement of anger towards my friend, nor any bitterness, except at the time of my departure from the IHES, when he was not the only one to be included in it). But there was a sadness, as I turned that page in my relationship with someone who continued to be dear to me, when the strongest bond that had attached me to him had dried up and perished. And like a sting that remained in the years that followed, there was also this unresolved frustration, this joy that I had brought to share with him, to the one who seemed closest and best placed to share it, and which had come up against the closed doors of complacency. This frustration was finally resolved, it seems to me, by the meditation I am pursuing at the moment. Even today, it is once again showing me that what happened to me was what had to happen, and that the person primarily responsible for this frustration is none other than myself, who had seen fit to indulge in an illusory image of a certain reality, rather than using my healthy faculties and looking at this reality with awakened eyes!

It was against the backdrop of this sadness, and also of the frustration of an expectation, that this strange impression appeared, which came not as the fruit or outcome of reflection (which did not take place at the time), but as an immediate and irrefutable intuition. It was that everything I could say to my friend in mathematics, and everything I had said to him over the years, I was entrusting or had entrusted to a *tomb*. Although I have never spoken of this impression to anyone, nor have I written it down in black and white in the course of any subsequent reflection, I do remember that it was this image of a *tomb* that was present at the time, and the very word that expresses it (in French), which I have just written down. This 'impression' or image must have arisen, at that moment, as the visual expression (so to speak) of some understanding that, at some level, must have been forming and present for a long time, as the fruit of a whole set of perceptions that must have taken place over months and years, without our attention retaining them or our memory registering them; perceptions that were simple and obvious, no doubt, but which I hadn't 'retained' because they seemed undesirable to someone inside me who often has the power to sort them out as he pleases... Neither at the time, nor since, has this peremptory image been associated with any precise, tangible memory of a

"The memory of this sudden image must rarely have occurred to me afterwards, and today is the first time I've dwelt on it in any way. The memory of this sudden image must rarely have crossed my mind afterwards, and today is the first time I've dwelt on it in any way.

If no memory or association arose at the time, it must have been because I wasn't sufficiently available to take it in. Strangely enough, I was engaged at the time (if I place the moment correctly (\*)) in a meditation on my relationship with mathematics, without this episode, which spoke to me strongly enough, after all, of a certain past through a present, making me think of interrupting the 'thread' of my reflection, to include a reflection on the ins and outs of what had just happened and which was not without consequence in my life.

The first (and in fact the only) association that came to mind just now (having just evoked this image and said that on the spot it had appeared disjointed from any memory or association. . . ) was the fate that had been reserved for my 'dream' of patterns - the mathematical vision of all that had been dear to me, in my past as a mathematician. If that past perhaps still had some secret hold on me, it was through that dream - and that secret hold (which I think I glimpse as I write these lines) itself had the force, beyond words, of the dream. If, as the legacy of a past investment, a passionate investment in mathematics, an unspoken and profound frustration had arisen over the past ten years, it was that of seeing a deathly silence surround these things that for me were alive, and that I had entrusted to my friend as living and vigorous things, ready to leap into the light of day! With me gone, it was he and no one else who had the power and vocation to see to this blossoming, to make available to everyone what he alone (with me) could feel intimately. And without ever saying it to myself in these or any other terms - without ever pausing (as far as I can remember) even for the space of a thought about the fate of what I had left behind - somewhere inside me I had to understand, over the years, that this dream that was always dear to me, it was to a 'tomb' that I had entrusted it.

And suddenly, with this evocation and with this first association that it arouses in me, I see an influx of other associations appearing in the wake of this one, revealing to me that I have indeed just touched a nerve centre - the point of all, perhaps, by which

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(\*) (11 June) Cross-checks confirm that this is indeed the case. This "second turning point" occurred in the second half of 1981.

the weight (long ignored) of my past as a mathematician.

But this is not the place, it seems to me, to follow these associations, as this 'final' stage of my reflection is already getting long. It seems to me that I've said enough in this reflection about my friend Pierre and about the motives - and surely too much for many people's taste! And I think it's time, as far as these notes are concerned, to bring them to a close with a sort of *assessment* of what this reflection on a double funeral is teaching me, for the time being.

## VI. The return of things - or the Unanimous Agreement

(<sup>72</sup>) (29 April) ... .... .... .... .... .... ..

..... (\*)

It seems to me that most of the work of description and decanting that had to be done on the subject that concerns me has been completed, as far as the 'partial images' of a certain situation are concerned. (It's obvious, moreover, that the present notes, intended for publication, only give an abbreviated account of the actual work, while it's out of the question here to spell out in minute detail all the elements that contribute to the formation of such and such a partial 'image'. )

Surely, through this same work, a certain overall image cannot have failed to take shape, still hazy, and waiting to be formulated so that it can take shape and life and tell me what it has to say. After yesterday's reflection, I feel it's ready to blossom, and it's pushing me to give it a voice.

To tell the truth, what yesterday's reflection (which I've just reread) taught me above all *concerns no one but myself*. It's with a certain relief that I see the reflection returning to the firm ground of a reflection on myself, whereas for the past week it has often given me the feeling of involving someone else's person more than my own. Yesterday's reflection finally revealed to me something that is surely quite obvious: the strength of my attachment to a certain past, to my 'mathematical past', and the particular role that this famous 'dream' of motives played in it.

Once the point is finally made, its obviousness is obvious - the most recent and clearest sign perhaps being the emotion triggered by the discovery (two years later)

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(\*) I thought it wise to spare the reader a good page of considerations on meditation in general, which were a way of beating around the bush - a sign of the resistance to getting to the heart of the matter.

of a certain 'event', of this 'furtive' (and belated) re-entry of motifs into the mathematical menagerie, under the leadership of my former 'pupil' and friend! This emotion was immediately reflected in the resumption of a process of reflection that seemed to have come to an end - a resumption that was followed by a fifty-page flood of retrospective reflections! As a result (and I've already realised this several times in the course of this untimely resumption), it would seem that I haven't yet 'got off the merry-go-round' as much as I thought I would a month or two ago, in the exultation of the end of a stage and the feeling of liberation (by no means illusory) that this stage had brought me - with the teaching that 'I wasn't better than the others', and that 'I shouldn't be surprised if the pupil surpassed the master' (\*). Yet this teaching didn't stop me from being surprised - it was enough for the 'pupil' to overtake me in a direction I hadn't anticipated at all! But if teaching hasn't prevented me from being 'surprised', it has nevertheless been invaluable to me on more than one occasion in the course of the past reflection, to save me from the usual traps (or at least *some of* these traps).

To come back to the strength of this 'hold', to the strength of my attachment to this dream of motifs, it has already appeared in many other places in the present volume, in Harvest and Sowing (where motifs are mentioned several times and in quite eloquent terms), as in the Sketch of a Programme (where "objectively" the motifs had nothing to do), or in the Thematic Sketch (where the motifs are a bit like unhatched eggs in a flock of vigorous chicks). In this last text, which dates back twelve years and is obviously written in a distant mood, this last paragraph on motifs is the only one, it seems to me, where we suddenly feel a warmth...

The remarkable thing is that this attachment never occurred to me in the fourteen years since I left, until yesterday when I finally glimpsed the obvious, and finally formulated it for myself today. During the meditation almost three years ago (July to December 1981), I came to realise the first obvious fact, namely that I still had a passion for mathematics, which had expressed itself eloquently over the years. But my attachment to a past, as far as I can remember, went unnoticed at the time, and has remained so to this day.

I must have started to glimpse it, though, with the reflection 'The weight of a past', which came to me as a matter of conscience after the meditation on my past as a mathematician seemed to have been completed (except that I hadn't yet been able to perceive the *weight* of that past!). I

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(\*) See "No more merry-go-round", n° 41.

In fact, as I was writing it, I felt that I was still on the surface of things, without really penetrating them. The notes that I was led to add later (first (46)(47)) led me in a direction that for a good while distanced me from myself, by focusing my attention on a mathematical work (and on the aspects of it that seemed most 'important' to me), then on the vicissitudes of this work and the role of others in them, rather than on myself.

I've just reread this reflection 'The Weight of a Past' (s. 50). Towards the end of it, I begin to glimpse that the 'tipping force' (towards a mathematical investment other than episodic) could be due to an 'attachment to the past' (as a mathematician), but rather to 'the past of these last ten years, the past 'after 1970', and not the past of things already written in black and white, of things done, those before 1970'. A few lines later I remember, though only 'in passing', that in the 'vast programme I had before my eyes at the time... only a small part of it has been achieved'. In writing these lines, I must have been thinking above all of those parts of the "vast programme" that were immediately realisable, but whose motivating force (!) fell far short of that represented by the "dream of motives". (Its justification (but by no means its formulation...) appeared at the time to be one of the great tasks 'on the horizon'...)

It's clear that my attachment to the 'dream of motives' is (as I'm sure all attachments are) primarily (if not exclusively) egotistical. It is the desire not only to *contribute* to a collective work, but also to have that contribution *recognised*. Assuming that the 'vast picture of motifs' had indeed been painted to the full extent that I saw it since the late sixties, but that my part in the birth of this vision had been silenced, my displeasure would no doubt have been no less (and perhaps greater?) than the displeasure I felt on reading the 'memorable volume' (in which I see certain notions and ideas that I had identified and brought to light reiterated, but (so I felt, at least) deprived of the breath and intense life that had so fascinated me in them) (\*).

Until this egotistical desire to see such things from my distant or more recent mathematical past "recognised" has been consumed, it is no doubt premature to claim that I have "emerged from the past".

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(\*) (14 June) This 'displeasure' is due above all, it seems to me, to this impression of impudence, of deliberate disregard for a link that one affects to ignore, to hold as negligible. The situation is quite different when ideas or results that we have discovered are rediscovered by others, which happens all the time.

merry-go-round'. The mathematical 'merry-go-round' no longer *contains* me, as it once did some of my friends. But I certainly still have a foot in it, and I suspect that foot will stay there for as long as I keep doing maths!

(<sup>73</sup>) (30 April) Earlier I was thinking about the fate of the SGA 5 seminar, and how that fate was linked to the publication of SGA 4 1/2 . A situation that had been confusing, and which I only examined in the last few days by glancing at it in passing, now appears very clearly to me. I have just added a footnote (\*) on this subject to my thoughts of three days ago (see 'The signal', note (<sup>68</sup>)), and it seems to me that with the comments I had already made before yesterday (also in footnotes) and with the thoughts of the day before ('Clean slate', note (<sup>67</sup>)), I have expressed myself clearly enough for there to be no point in giving yet another overview of a situation that is now sufficiently eloquent(\*\*).

Having reached this point, it's important to note that the first and foremost person responsible for the 'sad fate' that befell SGA 5, and for the use that was made of a situation of abandonment, is none other than myself. If the various 'volunteers' (who were responsible for writing work they didn't really want to do) were clearly not in tune with themselves, neither was I, who stubbornly refused to heed the lesson of a situation that spoke for itself, and relied on unconvincing 'collaborators' instead of taking matters into my own hands and doing the writing work myself, which from then on was my responsibility. After all, three whole years elapsed between the end of the oral seminar and my departure from the world of mathematics (which was immediately reflected in my almost total lack of interest in my published work over the next fourteen years). It is true that during those three years I was fully occupied with my other tasks, including continuing the SGA seminar (with SGA 6 and SGA 7), writing the EGA, reflecting on the often juicy questions arising from day to day, and among these, the gradual maturation of an overall vision of motifs... Taken up with these tasks, I chose to turn a blind eye to the fate of a past seminar, which (together with SGA 4 from the previous year) constituted the most profound mathematical contribution that I was able to make, in terms of work entirely accomplished, I mean, and also the one that has undoubtedly had the most far-reaching impact on my work.

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(\*) This prohibitively long footnote has been converted into a separate footnote entitled "Le renversement" (n° 68 ).<sup>2</sup>

(\*\*) I return to this subject on 9 May and the following days, see notes n° s 84-89.

scope.

The situation could only deteriorate further after my unavoidable departure, allowing the most prestigious of my ex-students to carry out the ingenious operation of inserting his famous SGA 4 1/2 between the gangue of nonsense and superfluous details of SGA 4 and SGA 5, by doing me the honour of promoting me to collaborator on what is presented as the central key-text, intended (as he says with that candour that makes up his charm) to make us charitably 'forget' the heavy gangue that surrounds it...

In short, the choices I made before and after I left had consequences for the fate of my published work, or (in the case of SGA 5) work in the process of being published, as well as for the part of my 'work' that remained a dream - an *unpublished* dream, that is. I don't regret my choices, and it's not for me to complain when I see today certain consequences of those choices that are not to my taste! On the other hand, it's up to me to examine these consequences (and all the more so when I don't like them!), to get an overall picture of the facts (\*) (which I've done), and to learn what I can from them. That's what I still have to do, and today's reflection will perhaps, at the very least, be a first step in that direction. A number of things have been coming together for me over the last few days, and I'd like to start by putting them in black and white.

The main force, the 'drive' behind my investment in my pupils in general, in the first period of the sixties, was the desire to find '*arms*' to carry out '*tasks*' which my instinct told me were urgent and important (at least from my own mathematical point of view). This 'importance' was certainly not purely subjective, it was not simply a question of 'tastes and colours', and often (I think) the student who took on such a task that I proposed to him felt that it 'carried the weight', and also, perhaps, what its place could be within a wider plan.

However, as far as this 'drive' was concerned, this motivating force within me that propelled me towards the completion of the tasks, it was not a certain 'objective' importance that was at stake - whereas the 'importance' of Fermat's conjecture, of Riemann's hypothesis

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(\*) (28 May) Read here "facts known to me". The following day, entirely unexpected new facts rekindled my thoughts on the Burial and led me to triple the volume of the notes on it.

or Poincaré's left me perfectly cold, I didn't really 'feel' them. What distinguished these tasks from all others, in my relationship with them, was that they were *my* tasks; those that I had felt, and made my own. I was well aware that having felt them was the culmination of delicate and profound work, creative work, which had enabled me to identify the crucial concepts and problems that were the subject of this task or that. They were, and no doubt still are (to a large extent) a part of who I am. The link that bound me (or still binds me today) to them was by no means cut and dried when I entrusted a particular task to a pupil - on the contrary, this link took on a new life, a new vigour! This link didn't have to be said (and I'm 'saying' it here, if only to myself, for the first time). This link was as obvious to the student who had chosen to work with me, and on the task of his choice, as it was to me, and also (I'm convinced) to anyone else. It's the profound link between the person who conceived a thing, and that thing - and which is not altered, but (it seems to me) strengthened by those who, after him, also make that thing 'theirs' and bring the best of themselves to it.

It's a link I've never examined closely. It seems to me to be deeply rooted in the nature of the 'T', and universal in nature. It's a link that we sometimes try to ignore, as if we were above such pettiness - it's even possible that I've sometimes fallen into such an affectation (\*). But on the few occasions in recent years (or in recent days and weeks) when I have been confronted with an attitude in others that affects to ignore this link (of which they are aware) that connects me to some task that has been accomplished (by another, or by myself) or merely designated, I am touched in a sensitive place. We can call this place 'vanity' or 'fatuety' and label it with other words - and I don't claim that these terms are out of place here, but whatever we call it, I'm not ashamed to talk about it or to be as I am, and I know that the thing I'm talking about is the most universal thing in the world! No doubt this attachment to 'one's work' does not have the same force from one person to another. In my life, where 'Doing' has been the constant focal point of my great investments of energy since childhood, this link has been strong and remains so today.

I can therefore say that the main force driving my relationship with my students was that I

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(\*) What's certain is that I was following the 'correct tone', which consists of ignoring this kind of thing, contrary to the images of de rigueur!

(30 May) On this link, see the note "... and the body", n° 89.

I saw them as welcome 'helpers' in carrying out 'my' tasks. The wording may seem cynical, but it simply expresses an obvious reality, one that was surely felt by my students as well as myself. The fact that they were 'my' tasks in no way prevented them from making them 'theirs' - and it was this identification in them with their task that mobilised in them the energy necessary for their accomplishment; just as the identification with this same task had mobilised in me the energy that had brought it into being and taken shape, and continued to mobilise the energy that I continued to invest in the subject. This energy was essential if I was even to 'function' as the 'master', that is to say as the elder who teaches a craft (which is also an art), and which cannot be done without mobilising considerable energy. Never in my teaching past have I felt a contradiction in the fact that the same task was profoundly 'his' for the student working with me, while remaining just as profoundly 'mine'. I don't believe that this situation was in the least conflictual, nor that it ever gave rise to any desire for conflict (\*). In this situation of simultaneous investment in the same task and identification with it, both the pupil and myself were (it seems to me) satisfied, in a working relationship which was perfectly clear, and which in itself (it still seems to me) contained no element of conflict. On a personal level, on the other hand, this relationship remained superficial - which in no way prevented it from being cordial, even friendly and sometimes even affectionate.

The investment I made in my tasks, and *through them* in my pupil-collaborators for these tasks, was (as I said) egotistical in nature (like any investment, no doubt). Of course, carrying out these tasks was above all, for the 'I', a means of expanding itself, by creating an overall work of vast proportions that 'my arms alone' would not have been able to bring to fruition. From a certain point in my life as a mathematician, there was this constant ambiguity of a cohabitation, a close interpenetration between *the child* and his thirst for knowledge and discovery, his wonder at the things he saw and those he saw up close, and, on the other hand, the *ego*, the '*boss*', rejoicing in *his* works, eager to expand and increase his glory by multiplying his works, or by the relentless and unceasing pursuit of an overall construction of grandiose proportions! In

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(\*) If, encouraged by a certain context, one of my pupils has wanted to take over a role that had been mine, in a piece of work done with me, this was done at a time when he had long since ceased to be a pupil.

In this ambiguity, I see a division that continues to weigh on my life and leave a deep mark on it - a division that may remain for as long as I live. Such a division is certainly not unique to me, but perhaps in my life, filled with the 'best' and the 'worst', this division has taken more extreme forms than in others.

I can therefore say that, for this invasive and eager-to-expand 'me' (who was not alone in the place, but who was indeed there!) my students were above all welcome 'collaborators', not to say 'instruments' - welcome 'arms' for the construction of an imposing work that would say 'my' glory! (\*\*) It seems to me that this is something that emerged quite clearly during my meditation three years ago on my relationship to mathematics (and beyond that, to 'doing' in general), even if I sometimes forgot about it afterwards. It's the thing that's been on my mind over the last few days, in close connection with this other remarkable fact: that it was precisely through one of my students (with inverted commas, mind you!) at that time, and through one of my students (with inverted commas, mind you!) at that time, that I was able to make this connection.) from that time, and by the one who was closest to me of all, and the only one to 'feel' effortlessly and as a whole these great plans in me that seemed to push me relentlessly to bring them to fruition - that it was he of all people who, after I left (and in his heart of hearts, no doubt even before that...) put into action the great plans in me that I had been working on for so long....) put into effect over the years this *Burial* on the scale of the Work (the capital letters here are not too much!), and who finally 'presided over the Funeral' (with an extra capital letter, for good measure!).

What is striking about this situation is the Ubuesque, enormous, irresistible *comedy of the whole thing!* I must have sensed this comedy in a vague way over the last few days, but it has only just revealed itself to me in its true nature at this moment, when I placed the last capital letter over my solemn funeral - in a sudden and irresistible burst of laughter! It was precisely the *laughter* that had been lacking until now in this so-called 'final' stage of reflection, where the dominant note was rather the pained air of the 'good man' disappointed in his legitimate expectations (or even abominably deceived), when the pained air gave way to sarcastic and well-sent comments (one is used to expressing oneself, or one is not!).

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(\*\*) I wrote this sentence with some hesitation, weighing up my words, knowing full well that it could be seized upon as a sort of cynical admission by the horrible mandarin finally throwing off the mask! But I am well aware that I will not prevent anyone who wants to drown an embarrassing fish from doing as they please. That won't stop me from pursuing my aim of uncovering and stating the obvious, including the humble truth written above, which will only surprise those who have never bothered to look inside themselves.

I have a definite feeling that I'm back on the right track, after this long digression (that word reminds me of something...) into sad tones.

And just now I've come up with a name for this 'note' (I'm not sure what it's a note to, but whatever...) that it's time to close. It will be "*The Return of Things*". (→74)

(<sup>74</sup>) I finally feel - phew! - that I'm nearing the end of this 'final stage', which has stretched over twelve days, each of which (as in the past) was presented as 'the last'. Perhaps the final word was spoken just a few minutes ago. My (symbolic) funeral was a *return of things*, a harvest of seeds sown by my own hands (And my burial in the flesh, if I have the good fortune to die leaving behind me living men and women who can bury me, will also be a return to something I left at birth...(\*)). It seems to me that all that remains to be added will be little more than an *epilogue*.

The famous 'dearest pupil of them all' wasn't the only one of my dear pupils to bury me with gusto, and those who did indeed do their bit are perhaps not the only ones among them, present at the funeral without displeasure! But it doesn't really matter to me who did this and who did that! (Knowing more about it, if nothing else, won't tell me anything more). I've finally understood this 'return of things', and having understood it I'm reaping the benefits.

However, I have not yet reaped the full benefit of this blessing. I'm not yet clear on exactly *what it was* about me that made some of my ex-students take advantage of the funeral and burial. Is it just this 'greed' that I mentioned, which (it seems to me) doesn't distinguish me so much from the other 'bosses', and which they easily accommodated (and probably didn't even notice, at least not on a conscious level) when they were first working with me? So it was the 'occasion' (my departure etc.) that would have 'made the thief', and which would have been the *revelation of a*

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(\*) (28 May) This sudden association with my own death presented itself forcefully. I was tempted to dismiss it, and then to delete this unexpected parenthesis, which seemed to come like hair on the soup. I refrained from doing so, out of a kind of respect. Strangely enough, the next day I learned that on the same evening of 30 April that I was continuing my reflection, in the commune where I live, the sister (seriously ill) of a friend had died. I saw Denise for the first time, on her deathbed, that very day. The following day, 2 May, I joined my friend and many other living men and women to lay her to rest on a beautiful spring day...

*Is it because of a general propensity*, in them as in the 'pupil of all', to bury his 'master' or his 'father', when the circumstances are right? Perhaps I was more 'master' (or more 'father'...) than I was natural, and this circumstance played a part in triggering this 'burial syndrome' with a vengeance? For the moment I can't see! Perhaps the echoes I gather (I hope) will help me to see more clearly, and to better assimilate the unexpected food before which I am now sitting.

There weren't any students there to participate discreetly in the funeral and burial, even though no non-ex-pupil was in a position (as far as I know) to play a prominent role. Apparently a lot of my old friends had a good time. It doesn't seem too mysterious to me. As I've had occasion to say in passing, more than once I've been able to see the deep unease created in my old friends by my untimely departure from the mathematical scene. It's the unease that arises from anything that obscurely feels like a *provocation* to profound questioning, to renewal. In this particular case, it was natural that this unease among mathematicians should be strongest among my friends, among those who had known me, and who could feel the full force of the investment I had made in the values that are still theirs; not to mention the fact that each of these friends has himself made, and continues to make, an investment of comparable strength in these values, and in the substantial 'returns' they offer him. I had already had ample opportunity to observe such unease among other scientists, from the very beginning of the Survivor period. But that didn't stop me from being surprised every time I saw unequivocal signs of distancing, and sometimes enmity, among one of my old friends, to whom I still felt the same sympathy. What must have made my 'abandonment' particularly intolerable to some of them was precisely the fact that I was supposed to be one of the 'best' of them, surely the last one they would have suspected of playing such a trick on them! (And I did think I sometimes sensed a tone of *resentment* in some of my old friends in the mathematical world). It's only natural, then, that they should find it in their hearts to see all this 'grothendieckery', after all, as a lot of paper for very little money etc etc. A single person, no matter how prestigious, is not enough to create a fad - the fad you want to launch has to meet an expectation, a secret desire, in many others, before it becomes the consensus and the law (\*).

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(\*) (28 May) See in the same vein the note of 14 May, "Le Fossoyeur - ou la Congrégation toute entière",

In the fourteen years since I left, I have perhaps tended to underestimate the unease that my departure created in the 'wider world' - whereas for me my departure in June 1970 was so natural that there was not even a 'decision' to be made: new tasks had taken over from the old ones overnight, which had suddenly receded and been absorbed as if from the distant past! (It's also true that I didn't experience such unease among my colleagues at the University of Montpellier, who form a completely different environment from the one I had left). Perhaps I'm also underestimating the role that such unease may also have played among my ex-students 'before 1970', many of whom belong to this same milieu, and 'go the extra mile' in their mathematical investment. It's possible that this unease played no less of a role in them than in the other friends I thought I had in that same milieu. In any case, each situation (between one of my former friends or students and myself) is a unique case, different from all the others, and the general assumptions I can make are very limited and provisional.

Returning once again to the more solid ground of the cases in question, I am struck by the fact that the two ex-students whose active participation I was able to observe at the funeral of the dear master, are also the very ones who had first drawn my attention to themselves by attitudes of contempt, by a desire to discourage: towards younger mathematicians who were 'post-1970 students', where the influence of my ideas and my approach to mathematics was clearly visible. This coincidence certainly came as no surprise (although, of course, I was surprised at every turn!). Another interesting coincidence is that both were among those with whom the personal relationship was the most friendly and even affectionate (and for one, this relationship has continued, and in this tone, until today). This is consistent with the general observation that it is the closest relationships that have the greatest power to attract and retain the forces of conflict.

Yet another coincidence struck me. Among all the students I have had over the last twenty-five years, there are two who stand out for me both because of their exceptional 'resources' and because of their commitment to mathematics. (An investment of a strength comparable to that which I myself made during twenty-five years of my life). For both of these reasons, moreover, I have made a scruple of

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n° 97.

count them among my students, even though it is true that both of them learnt things from me that were useful to them (\*). It was in the nature of things that both of them would discover their own tasks, without me having to suggest any that I had (or have) in reserve - and the thesis work of both of them was done independently of me(\*\*). That's a lot of common ground! As a point of dissimilarity, I would say that the younger of the two (unless I am mistaken) is today 'at the pinnacle of honours' (which I will spare the reader, and to his known modesty, a detailed enumeration), and that he is one of the most influential mathematicians, that is to say, also one of the most powerful; the other is currently a deputy assistant, in a position that the incumbent will take over next year. There are other points of dissimilarity, which explain to some extent this difference in fortunes - just as there are other points of similarity on which it is pointless to dwell here. Except for the fact that of all the students I have had, it was with both of them that my personal relationship was the closest and the most friendly, while a common passion had from the outset created a strong bond between each of them and me. Now the *coincidence* I want to talk about is that, as far as I know, they are also the only students (in inverted commas, that's a given!) who, in the eyes of the 'big world', have done everything possible to minimise or erase, as far as possible, this very simple and obvious link to me.

It's a really striking coincidence, the meaning of which still escapes me as I write these lines, but for both I could invoke reasons of circumstance, different from one to the other. And it is quite possible and even probable that in both cases,

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(\*) (28 May) That's an understatement, as I later found out to my chagrin!

On this subject, see yesterday's note "L'être à part", no.° 67<sup>¶</sup>.

(\*\*) (28 May) That's not quite true. Both of them made essential use in their work of tools that I had fashioned and which they learned from me. Beyond this role, Hodge-Deligne's theory in the work that constitutes his thesis (*Théorie de Hodge II*, Publications Mathématiques n° 40, 1972, p. 5-57) stems directly from the yoga of patterns that he got from me - 'mixed Hodge structures' being the 'obvious' answer to the question (also 'obvious' from the point of view of patterns) of 'translating' in terms of 'Hodge structures' ('in a suitable sense') the notion of a not necessarily semi-simple pattern over the body of complexes. Beyond a brilliantly executed 'translation exercise', there are of course original and profound ideas in this work that are 'independent of me'. But it is also clear that the Hodge-Deligne theory would not exist today (nor, no doubt, almost all of the work of Deligne or of any of my other students) if they had not had access to the ideas and tools that I introduced into mathematics and which they learned about from me.

At a certain level, which is probably no longer that of fully conscious intentions, such a reason (futility in one case, prudence in the other) has come into play. I doubt, however, that this ready-made explanation will provide an understanding of the matter in either case. Surely, at an even deeper level, other forces must have been at work, the real ones, behind the familiar appearances of futility or pusillanimity. Surely, these acts that express them have something important to say to each other. But surely, too, the appearance of the same acts in two such different people, as if they had given each other the word (something certainly unthinkable, given the difference in fortunes!), also has something important to say to *me*, and about none other than myself. Could this be nothing more or less than a reproduction of the eternal *rejection of the Father*? And yet the Father is spoilt for choice when it comes to expressing himself! Or is it because that sure instinct of the unconscious, which makes it touch 'right' in the most sensitive or vulnerable places (when it comes to 'touching'), has meant that both have fallen on the *same* spot? I'd actually be inclined to think so. But that's something inferred, not something *seen*, and in the absence of eyes with the gift of seeing clearly and deeply, I feel a bit like a blind man groping around in the dark, trying as best he can to 'see' with his hands or his ears or his epidermis, which aren't really made for seeing... .

So as not to end on this note of *perplexity* (prejudicial to my reputation), but on a happy note for a benevolent and hypothetical reader, I will only say the concluding name, which appeared earlier, and which seems to me to express the common content of the various considerations of this *epilogue* (to a reflection on a funeral), namely:

*The Unanimous Agreement!*

## C. THE BEAUTIFUL WORLD

### VII. The Colloquium - or Mebkhout and Perversity bundles

(<sup>75</sup>) (2 May) I'm definitely still learning! I have just become aware of two texts that shed unexpected light (for me at least) on the 'cover-up' (of Mebkhout's work) already mentioned ('L'inconnu de service et le théorème du bon Dieu', note (<sup>48</sup>)). It concerns the role played by the two illustrious colleagues and former students whose disdainful indifference towards Zoghman Mebkhout I noted, without however questioning their professional good faith. Both texts are part of the Proceedings of the *Luminy Colloquium* (6-11 July 1981) entitled *Analyse et topologie sur les espaces singuliers*, published in Astérisque n° 100 (1982).

The first of these texts is the introduction to the Colloquium, signed by *B. Teissier* and *J. L. Verdier* (the same man who acted as Z. Mebkhout's official thesis supervisor). This one-and-a-half-page text begins with explanations about a certain 'Riemann-Hilbert correspondence', which is clearly destined to play a leading role in the Colloquium (and which is none other than the 'theorem of the good Lord' alias Mebkhout). In this correspondence (and this is what gives it its charm and depth, and necessitates the introduction of derived categories) to a regular holonomic *module* (i.e. a regular holonomic complex re-

duits to degree zero) is associated with a constructible *complex* of C-vector bundles, which are can be characterised (it is said) by purely topological properties that make sense for constructible complexes of étale bundles over a variety that is not necessarily smooth, defined over any field. This, it is explained, is the starting point for the "main theme" of the Colloquium, the theme "*perversity, intersection complex, purity*" - the so-called "*perverse*" (\*) bundle (complexes) being none other than those which, "morally", correspond ("à la Mebkhout") to the simplest complexes of regular holonomic differential operators, expressing themselves using a single  $\mathbb{Q}$ -module.

The second text is part(\*\*) of the long article by *A. A. Beilinson, J. Bernstein* and *P. Deligne* on perverse bundles, referred to in the introduction as the central work of the Colloquium. As can be seen from the table of contents and the other pages of which I

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(\*) (4 May) See note no. 76, "La Perversité", about this strange application.

(\*\*) (4 May) I have since received the full article, which confirms what I had already seen in the part I had available.

In other words, this article marks the sudden resurgence of derived and triangulated categories in the public arena, in the wake of Mebkhout's obscure work and the famous 'Riemann-Hilbert' theorem.

Incredibly, yet true, in both texts the name of Z. Mebkhout is absent, just as it is absent from the bibliography. Mebkhout is absent, just as he is absent from the bibliography. I should point out that not only was J. L. Verdier perfectly aware of Mebkhout's work (and with good reason!), but so was Deligne (and it would be difficult to imagine that it could be otherwise, for someone so well informed about current mathematical events, and when it comes to the subject that affects him most closely(\*\*\*)).

I don't know what happened to B. Teissier(\*\*\*\*) and the other participants in the Luminy Colloquium, in particular the two co-authors with Deligne of the article cited(\*\*\*\*\*). It seems that none of the participants was very curious to know the authorship of the ideas and the key theorem that had had the virtue of mobilising them. I presume that it was taken for granted, somewhat (very much) as in the volume of Lecture Notes LN 900 which the following year was to mark the return of the motifs to this same 'public square' (\*\*\*\*\*), that authorship belonged to the most brilliant of the brilliant mathematicians who had taken the initiative and led the Colloquium. What everyone was sure of, however, was that it was neither Riemann nor Hilbert, otherwise the brilliant Colloquium would have taken place in 1900 and not in 1981.

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(\*\*\*) I would point out in particular that Mebkhout's work and his 'theorem of the good God' constitute a decisive advance on Deligne's earlier work (from 1969), which Deligne refrained from publishing. On this subject, see note no.<sup>o</sup> 48<sup>¶</sup> already cited.

(\*\*\*\*) (12 June) B. Teissier has long been interested in Mebkhout's work, and had been one of the very few to have an encouraging attitude towards him. He was therefore perfectly aware of the scam, to which he knowingly lent his support. He justified his actions to Mebkhout by assuring him that he "couldn't have done anything about it".

(\*\*\*\*\*) (28 May) I have since learned that A. A. Beilinson and J. Bernstein have been informed of the results of Mebkhout by P. Deligne (in October 1980) and by Mebkhout (in very detailed terms in November 1980, at a conference in Moscow). These two authors made essential use of the bon Dieu theorem in their demonstration of a famous conjecture known as the Kazhdan-Lusztig conjecture even before the Luminy Colloquium in June 1981. Compare the quotation from Zoghman Mebkhout's letter in the note "A feeling of injustice and powerlessness" (note no.<sup>o</sup> 44 ).<sup>¶¶</sup>

(3 June) For further details on the solidarity of all Colloquium participants, see the following note "The Colloquium", no.<sup>o</sup> 75<sup>¶</sup>.

(\*\*\*\*\*\*) See notes<sup>o</sup> s 51, 52, 59.

years after Jean-Louis Verdier defended his thesis on l'Elève Inconnu.

The kind of operation I have witnessed here is perhaps commonplace today (\*) and perfectly acceptable, as long as it is practised by mathematicians who are at the top of the game, and the person who pays the price is a vague unknown (even though they were kind enough to invite him as a favour). The fact that one of these men who practises it is, by his means as well as by his works, a great mathematician (which immediately puts him above suspicion), changes nothing in the nature of the matter. Surely I'm old-fashioned - in my day this kind of operation was called a *swindle* - and this one strikes me as a *disgrace* to the generation of mathematicians who tolerate it.

The brilliance of genius takes nothing away from such a disgrace. It adds a new dimension, perhaps unique in the history of our science(\*\*). Behind the apparent absurdity and gratuitousness of the act (carried out by someone who has been blessed beyond measure by fate, and yet delights in plundering . . .), we can glimpse the action of other forces that may well be at work. ), the action of forces other than the mere desire to shine, or the gratuitous desire to humiliate or despair those who feel defenceless and voiceless.

Since here I am in the midst of a 'tableau de mœurs', I would point out (almost as a matter of course) that my name is equally absent from the texts quoted. Yet I was pleased to note that there is not a single page of the article quoted (among those in my possession (\*)) that is not deeply rooted in my work and bears its mark, even in the notations I introduced and in the names used for the no- tions that come into play at every step - which are the names I gave them when I first got to know them before they were named. There are, of course, rigorous adjustments - for example, the biduality theorem that I drew up in the 1950s(\*\*) is renamed for the occasion 'Verdier duality', still the same Verdier, there is no such thing as a duality.

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(\*) I am referring to two other "operations" along the same lines, which resulted in the publication of LN 900 (cf. b. note on previous page) and APG 41/2 five years earlier (see notes n° s 67, 67<sup>2</sup>, 68, 68 ).<sup>2</sup>

(9 May) For a third such operation, closely related to the previous ones, see the note "les bonnes références" (n° 82) on another "memorable article", this time by J. L. Verdier.

(\*\*) Nor have I ever heard of anything like this happening in the history of any other science or any other field. art than mathematics.

(\*) (4 May) And the others too, of which I have since become aware.

(\*\*) The same goes for the theory of étale duality, which becomes "Verdier duality" under the pen of his

error...(\*\*\*)). However, it has not been possible for my name not to appear at least implicitly, through occasional references to texts that are still irreplaceable (despite SGA 4 1/2 , which does not quite fulfil its purpose), namely EGA and SGA. (In the explanation of the acronym SGA = Séminaire de Géométrie Algébrique du Bois Marie, my name of course does not appear, but in EGA, one is honest or one is not, the complete designation is given, with the names of the authors including mine...) Another detail which struck me, and which testifies to the obsessive strength of the burial syndrome (in someone who in no way has the "profile" of an obsessive): the two references I've seen to SGA make it a point each time to spell out "M. Artin's theorem in SGA 4. . . .", lest the misguided reader get the idea that the said *theorem* might be due to the carefully unnamed person, when it is quite clear that the *presentation* was indeed made, thank God, by a nameable author! ( )<sup>77</sup>

All this, it seems, is fair game in today's 'beau monde'. Without giving me any pleasure (and that's not what it's there for . . . ), this guéguère is not really prejudicial to the anticipated deceased, whose symbolic remains have thus been left to the vagaries of this horse-trading, which I have been discovering with wonder for barely two weeks. It does not gnaw at my life with the feeling of *iniquity* suffered helplessly. It has not broken the joy and impetus that carry me to the encounter with mathematical things and those of the world around me, nor has it burnt in me the delicate beauty of these things. I can consider myself happy, and I am...

And I'm happy too about my unexpected 'return', the meaning of which had escaped me. If it were to teach me only what I have learned in these past days, this return will not have been in vain, as it has already fulfilled me. (→76)

(!<sup>75</sup>) (3 June) I had some details about the other participants in the colloquium, which dispelled all doubts. Although no talk by Mebkhout had been scheduled in the Colloquium's official programme, Verdier was obliged to ask him on the spot and in extremis to give a talk, to make up for the gaps in one of the official talks (which had been entrusted to Brylinski,

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generous friend Deligne!

(\*\*\*) (5 May) Compare with notes n° s 48<sup>78</sup>, 63<sup>79</sup>. Throughout this long funeral, which has been going on for nearly fifteen years, and throughout the discovery that the principal 'anticipated deceased' has just made over the past month, J. L. Verdier appears to have been inseparable from his prestigious friend, who lavished him with the wreaths of flowers that are de rigueur on this funereal occasion.

little familiar with the theory of  $\mathbb{Q}$ -modules). Mebkhout was thus able to expose his ideas and results, and in particular the theorem of the good God, in such a way as to leave no doubt as to the paternity of this theorem, and of the philosophy which goes with it, which had allowed the spectacular restart- rage of the cohomology of algebraic varieties, taking concrete form in particular by this colloquium. *All the participants in the colloquium were made aware of this paternity* through this presentation. I also assume that all of them, without exception, have since read the Colloquium Proceedings, and in particular the Introduction and the article cited by Beilinson, Bernstein and Deligne. Not one of them, apparently, found anything wrong with it - or if they did, they did not let on. Zoghman Mebkhout received no such feedback. So all the participants in the Colloquium can justifiably be considered to be in solidarity with the mystification that took place during the Colloquium.

This collective mystification was already clear at the Colloquium, since nobody found anything wrong with the fact that Mebkhout's name was not mentioned in Deligne's oral presentation on so-called 'perverse' phenomena. The lecturer confined himself to stating the theorem of the good God, saying that he was not going to demonstrate it in his talk. He also made it clear (with his customary modesty) that there was "no merit" in guessing the extraordinary and a priori unpredictable properties of the beams he called "perverse", suggested in an obvious way by the "Riemann-Hilbert correspondence" he had just mentioned (\*). Everyone found it normal that he should refrain from naming the person who had had the 'merit' of discovering this providential correspondence, and that he should give the appearance that the author was none other than himself, even though they had just learned, or were going to learn in the following days, that this was not the case. It must have been a sort of inadmissible misunderstanding that a vague participant in the Colloquium should be the author of such a remarkable theorem, and everyone did their utmost to rectify the situation and establish a consensus which attributed authorship to the person who was clearly the right person for the job - the person who *should have* been the author(\*\*).

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(\*) Compare with pages 10 and 11 of the article quoted.

(7 June) For details on the art of escamotage, see the following note "Le Prestidigitateur", n° 75<sup>10</sup>.

(\*\*) (5 June) It all ties together! The reflection that continued in the procession "L'Elève" (following on from the procession "Le Colloque"), and a certain tone as well (particularly in a recent and brief exchange of letters with Deligne, see first footnote to the note "Les obsèques", n° 70), show me that for Deligne and my other cohomology students, it has been clear for a long time that it was Deligne too who should have been the author of the discovery of stellar cohomology, and of its mastery; and at a certain level (that of

Characteristically, *Mebkhout's paper does not appear in the Colloquium Proceedings*. Verdier had asked Mebkhout *not to* write his paper, saying that the Colloquium was intended to present new results, whereas Mebkhout's had already been published for more than two years.

If you don't get bogged down in a technical discourse, and look at what really happened during this brilliant Colloquium, in terms of the forces and appetites that animated the participants, you might think you were watching a film about the reign of the mafia in the underworld of some distant Megapolis. But it's a very local picture, and the actors are among the noblest jewels in the crown of French and international science. The Big Boss, who runs the show with his finger on the pulse, is none other than the man who was once my modest, smiling spiritual son, or at least my (no less modest and smiling) legitimate heir. As for the one who can be drilled and cut, the 'soft' one in a world of 'hard' ones who don't give quarter, by a strange 'coincidence' whose meaning I still don't fully grasp, he too is closely linked to me. He is my 'pupil' as is the Great Leader (and like him, 'pupil' in inverted commas...) - the one who took me on when I had already been declared dead and buried years ago...

(!<sup>75</sup> ) (7 June) In the "memorable article" (referred to in the two preceding notes), one will admire the consummate art of casual evasion. The equivalence of categories that has been the essential motivation of the whole work is introduced for the first time in the course of a sentence on the fourth page of the Introduction (page 10, lines 9 to 15), without giving it a name, only to be followed immediately by the myriad consequences for the notion of the so-called 'perverse' bundle (pages 10 and 11). There is no further mention of it until the end of page 16, where we read (\*):

"On the following points, *which would have found their place in these notes*, we have failed in our task.

- The relationship between perverse beams and holonomic modules. As indicated

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who commands behaviour and attitudes) they are penetrated by the conviction that, *in the end*, it's really him, next to whom I would appear as a sort of clumsy and clumsy auxiliary, who would be more detrimental than anything else to the harmonious unfolding of a theory (leading to the Deligne-theorem-ex-Weil-conjectures) and to a distribution of roles satisfactory to all concerned. ...

(\*) Underlined in the following quote.

in this introduction, it has played an important heuristic role. The essential statement is 4.1.9 (*not proved here*) . . . "

(To continue with other "points that would have found their place... ")

I hasten to look for this "essential statement" that the authors have not found the leisure to include in their work, or at least, not the demonstration. Let's look for it: 4.1.9. . . I come across a "Remark 4.1.9", that must not be it, I'm looking for an "essential statement", a theorem in the form or scholia, with a reference *where* the authors have proved it or are going to prove it, since they don't prove it *here*. . . But no matter how hard I look, there's no trace of a "theorem 4.1.9" - there's only one passage that answers the number 4.1.9. So I start reading the "remark" at random (without conviction - there must be a numbering error...), I read that "the analogue of 4.1.1 in complex cohomology is true. . . . Unfortunately, I'll have to go back to 4.1.1 to find out what it's all about. I skipped over it and skimmed through the text that followed - and there I was, no longer believing it, eleven lines later, a sentence that starts with "We know that . . . " and ends with "induces an equivalence of the category . . . with that of perverse beams".

Phew - so that was it after all! But no matter how hard I look, there's not the slightest hint to clarify this cryptic 'We know that...'. The reader who didn't already 'know' must feel like an idiot, not at all up to speed with the situation. What is clear to him in any case (apart from the fact that he is not up to the task), is that this result 'which would have found its place in his notes', which is 'recalled' here in the course of a technical remark as something that the reader should nevertheless know - is that it is obviously due to the authors of the 'notes' in question, or to one of them; the most prestigious perhaps and who wrote the article (there is a 'house style' that is not misleading . ), or the one who gave the oral presentation, and whose well-known modesty prevents him from saying "it's me! - but everyone understood without having to say so..."

It immediately brings back memories of my reflections over the last few weeks. The very first was Deligne's first work in 1968, which I finally (sixteen years later) took the trouble to look at a little more closely in the note 'L'éviction' (n° 63) of 22 April (three days after the discovery of the pot-aux-roses LN 900). Here I find the same style, with variations no doubt due to the intervening thirteen years. In the 1968 article, whose main inspiration came from me, he refers to me in passing as

sybilline towards the end of the article, just to be 'in order'. Here, he no longer takes such care - experience has long since shown him that there's absolutely no point! On the other hand, in the article about his young age, since he felt obliged to name me, he made up for it by completely disregarding the initial motivation for his work (and the yoga of weights with it, only to release it under an alternative paternity six years later, while awaiting the exhumation of the motives eight years later still...). In any case, even hiding (and keeping for his own benefit. . . ) the essential arithmetical motivation of the article, it 'stood up', this article was perfectly understandable, living up to the author's reputation for doing things perfectly. Here, the theory he develops would be incomprehensible without the heuristic motivation. So he points to the latter, referring to it as the 'essential statement', while treating it under the leg - without honouring it with a name, or a statement in the form of a theorem or proposition, there is not even a 'correspondence' (known as the Riemann-Hilbert correspondence) - he left that to his friends Verdier and Teissier. He doesn't have to give it a name (given how little there is (\*)) - surely he could demonstrate it in five minutes!) or name anyone - others will take care of that for him and to his complete satisfaction. There is clearly a yoga, a philosophy, that the author handles with perfect mastery and authority, without having to name anything - this 'little' that he pretends to disdain ('which would have found its place in these notes'), he knows full well that he will have it as well, as long as he knows how to keep quiet and wait. The first time he played this game successfully, the 'few' were 'weight considerations' alluded to in a cryptic remark (in anticipation of bringing out the philosophy of weights with great fanfare, six years later). The second time, as far as I know, was when I left in 1970 - the 'little' was the 'dream of motifs', which for twelve years didn't deserve a word of honour (just think - a dream, and a dead man's dream at that, not to mention unpublished!), while we waited to discover the *real* motifs this time (and what we could do with them) and to claim, as modestly as ever, undisputed authorship(\*\*).

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(\*) (14 June) To put this "little" in context, I would remind you that Deligne devoted a seminar at the IHES to trying to develop a translation of constructible discrete coefficients in terms of continuous coefficients, without arriving at a satisfactory result. On this subject, see the note "L'inconnu de service et le théorème du bon Dieu", n° 48<sup>✉</sup>.

(\*\*) For further comments on this technique of 'appropriation through contempt', see the note of the previous Friday.  
hand, n° 59<sup>✉</sup>.

(<sup>76</sup>) (4 May) I remember well, the first time I heard the name 'faisceaux per- vers', must be two or three years ago, that it struck me unpleasantly; it aroused in me a feeling of unease. This feeling reappeared the two or three times I heard this unusual name again.

There was a kind of inner 'recoil', which remained just below the surface of my consciousness and would probably have been expressed (if I had stopped to examine it at the time) by something like: what an idea to give such a name to a mathematical thing! Or even to any other thing or living being, except at a pinch to a person - for it is obvious that of all the 'things' in the universe, we humans are the only ones to whom this term can sometimes be applied... It seems to me (although I'm not entirely sure) that it was none other than Deligne himself who first spoke to me about the so-called 'perverse' beams, when he came to my house after the Colloque de Luminy (\*). It must even have been one of the last mathematical conversations between us - there were no others after his visit. It was precisely during this visit that this 'sign' appeared, which led me a few weeks or months later (while this sign was being comforted in the exchange of mathematical letters that followed this meeting) to put an end to a mathematical communication(\*\*).

(For this episode, see the note "Two turning points", n° 66.)

Coming back to the so-called (wrongly!) 'perverse' beams, it is obvious that 'normally' these beams should have been called 'Mebkhout beams', which would have been only fair. (On more than one occasion, I have named mathematical concepts that I have identified and studied after predecessors or colleagues who were much less closely associated with them than I was.

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(\*) If this is indeed the case (as I am now convinced it is) credit must be given to my friend's modesty, for I had no idea (on a conscious level at least) that it was none other than he who had introduced and named them. I had to read the 'memorable article' to realise it.

(28 May) To tell the truth, the article in question says no more about this than it says that Deligne is the father of the Riemann-Hilbert correspondence. However, I had no doubts about his authorship of the term 'perverse bundles', and this was confirmed to me subsequently.

(\*\*) On a purely personal level, this relationship continued in the same tone of friendship af- My friend used to come every other year or so to visit me, usually on some hike. My friend used to come every other year or so to visit me, usually on some kind of hike. I did have a visit again last summer, which was a welcome opportunity to get to know his wife Léna and their daughter Natacha, who was still very young. I think it was on the way back from another colloquium at Luminy, about which I heard very little (apart from a few vague, morose allusions from Mebkhou, who had been given the honour of being invited again and who could think of nothing better to do than to get back into the game... ). They stayed at my place for two or three days, and the contact was excellent all round.

Deligne's attitude at the time when he discovered and named this concept derived from Mebkhout's work, preparing to rob him when he himself was already 'fulfilled beyond measure' - this attitude can rightly be called 'perverse'. Surely my friend himself must have felt it in his heart, at a certain level where one is not fooled by the facades one likes to display. In the attribution of this name (which seems aberrant at first sight) I sense an act of *bravado*, a kind of intoxication in a power so total, that it can even allow itself to display (symbolically, by the display of a provocative name whose true meaning, however dazzling, *no one* will allow themselves to read!) its true nature of 'perverse' despoiling of others.

It seems to me by no means impossible that at some deep level I perceived the tone of these dispositions in my friend, and that this contributed to the uneasiness I mentioned (\*). This uneasiness was expressed in particular by my inattention to the explanations he had to give me, although I don't think there had been an occasion before this meeting when I hadn't followed what he was telling me with sustained attention, especially when it was a question of mathematics. There was a kind of blockage in me with regard to this notion called (God knows why) 'perverse' - I didn't really want to hear about it, even though it was very closely linked to questions that I was (and still am to some extent) very close to.

In fact, the whole article by Deligne et al. was typical '*grothendieckery*', which could just as easily have been written by me (except for the name of the main concept)! This is more or less what I said in the second part of the previous note (n°<sup>75</sup>), and what I felt as soon as I read the article quoted - but without this diffuse feeling yet being embodied in the striking *observation* I have just made. It makes me aware once again, in a striking way, of this profound contradiction of the one who cannot help (in a certain sense) reproducing and assimilating himself to the very one he is trying to deny, to hand over to disdain - the one he is trying to bury, and who is *also* at the same time the one he *wants to be* and that (in

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(\*) I would even be inclined to think that this is indeed the case. More than once I have been able to see within myself the extent to which the deep perception of things is of a finesse and acuity that have no comparison with what is touched on at the conscious level or at the flowering of consciousness. The fully 'awakened' person is undoubtedly the one in whom these perceptions are constantly integrated into conscious vision and conscious experience - the person who lives fully according to his *true means*, and not just on a derisory portion of those means.

in a certain sense) we *are*.

The day before yesterday, as I was writing the previous note ('L'Iniquité - ou le sens d'un retour'), I had already been struck by the coincidence that this turning point in the relationship between my friend and me, suddenly impoverished of a communion in a common passion, which had been its *raison d'être* and most powerful spring, came about on my friend's return from that memorable Colloquium, the meaning of which had just revealed itself to me. What had taken me aback when we met in July '81, which on one level was as friendly and affectionate as on the other occasions when we met, was this 'sign', discreet in tone and air, and yet brutally obvious, of a deliberate gesture of disdain. It was like a sort of *down payment* that my friend was making, this time at the level of the personal relationship, on the implicit and equally 'discreet' (and just as 'brutally obvious') disdain that he had just expressed publicly towards me, as a public figure, at the Colloque de Luminy, in the context of a brilliant display of technical virtuosity between the stars of the day. It was the same 'disdain' that had just been expressed (but this time with an altogether different 'perverse' brutality) towards the person who had dared (however slightly) to claim to be me, and who had thereby condemned himself to becoming for my friend Pierre (at a certain level at least) nothing more than 'another Grothendieck' (\*) who now had to be crushed at all costs. . .

(<sup>77</sup>) (5 May) Another detail struck me while reading this memorable article(\*\*) which dominated (so they say) the no less memorable Luminy Colloquium in June 1981. The last chapter, under the suggestive title "From F to C", describes at length a remarkable principle of the I introduced this principle into algebraic geometry twenty years ago - it must have been before the notion of pattern was born (which gives the most profound illustrations of it, via Weil's ex-conjectures). This principle ensures that for certain types of statements concerning schemes of finite type over a field, it suffices to prove them over a *finite* base field (i.e. in a situation "of arithmetical nature") to deduce their validity over any field, and in particular over the field of complexes - in which case sometimes the algebraic-geometric result envisaged can be reformulated by transcendental means (e.g. in terms of integer or rational cohomology, or in terms of Hodge structures etc) (\*). My

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(\*) In our personal relationship, my friend calls me by the affectionate diminutive (of Russian origin) of my first name Alexander, which is also what my family and closest friends have called me since I was a child.

(\*\*) See note no.<sup>o</sup> 75 on the "memorable article".

friend learned it from none other than me and from me, on numerous examples over the years(\*\*). The authorship of this principle (which in an elementary form is even explained in EGA IV - don't ask me which paragraph and which number...) is well known(\*\*\*). So much so that when my brilliant friend was awarded the Fields Medal at the Helsinki Congress in 1978, N. Katz couldn't resist mentioning it in passing in his speech in honour of P. Deligne, thus rectifying (in a minor way) a rather embarrassing systematic 'oversight' by his illustrious laureate. I read this speech just a few days ago, at the same time as the 'memorable article' itself.

The fact remains that in this article, the philosophy behind the transition from 'arithmetic' to 'geometry' is presented in such terms that an uninformed reader can be in no doubt that the brilliant principal author (excuse the oddity...) has just discovered this marvellous principle of such far-reaching significance.

It is true that I did not patent the method, and that my brilliant friend nowhere says that he is the brilliant inventor; nor does he clearly claim that he is the father of this famous 'correspondence' (admire the term, which smacks of the nineteenth century!) mod- estement attribuée à Riemann et Hilbert (hommes digne de parrainer les enfants d'un si prestigieux successeur) - pas plus qu'il ne précise dans le "mémorable volume" (LN 900) que c'est bien et bien lui qui a inventé les motifs, les groupes de Galois motiviques et toute une philosophie qui va avec (et dont il n'a encore sorti qu'un bout). Nothing to say either

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(\*) (6 May) It seems to me that the first example of the use of such a principle is to be found in Lazard's theorem on the nilpotence of algebraic group laws on the affine space  $E$  (over any field). I was very struck by his demonstration, and I drew inspiration from it for a number of other statements, and to turn it into a 'philosophy' that has dominated my thinking on the theory of patterns.

(\*\*) See the note "Eviction" (n° 63) for one of these examples.

(\*\*\*) (5 June) It is perhaps abusive for me to claim to be the 'father' of a principle whose first known application is due to Lazard (see note<sup>??</sup> (\*) above). My role, as on other occasions, has been to sense the generality of another's idea, and to systematise it to the point of making it a 'reflex' or 'second nature'. In the context of the yoga of weights and patterns, it is likely that the first to use this principle was Serre (not me), with his idea of virtual Betti numbers, which put me on the path to precisely a general yoga of weights and patterns. (See note no.° 46<sub>9</sub> for Serre's idea in question.) It is also true that it is common practice to attribute the paternity of a 'principle' of reasoning that has become commonplace, not to the author where we first find a trace of it, but to the person who first perceived its general scope, who systematised and popularised it. In this sense, it can be said that N. Katz's correction (referred to in the following sentence), attributing the paternity of this principle to me, is justified.

for this famous SGA 4 1/2 , where I was even honoured to be listed as a "contributor" to this volume, which so brilliantly develops ab ovo stellar cohomology, deigning to call upon (despite their regrettable gangue of superfluous details etc.) the two satellite volumes SGA 4 and SGA 5, doomed to oblivion but to which we generously acknowledge the merit of providing a few supplements and technical digressions (some of which are even "very interesting") (\*).

In all these cases, and in many other micro-cases that I have witnessed over the last five or six years, without the idea ever occurring to me to *identify my discomfort* and give a name to what I was witnessing or co-acting(\*\*) - in all these cases, I recognise the same *style*. My friend is always and totally '*on the ball*' - he can help himself at ease, with the complete good conscience that comes from the admiration (as well-founded as it gets) of his peers and his blunders, guaranteeing total impunity.

(<sup>77</sup>) (7 May) Of course, those who see my friend Deligne at work and who are at least a little 'in the know' about the ins and outs, by which I mean those who are not newcomers and have only just learned about the maths 'being done' in the publications of Deligne himself, or other brilliant (though not always golden) stars of his generation - these colleagues (and they are not so rare after all!) are well aware, at *some level*, of what is going on. They must have sensed in the 'slightly big' cases that particular little unease that I myself have felt more than once when faced with 'micro-cases' a hundred times smaller than these. But what they felt was so *enormous*, so *unbelievable*, that it must never have surfaced - just as it finally began to surface for me, in the course of a piece of *work*, expressed in these two texts about a micro-case referred to in the previous footnote. I haven't heard of anything like it.

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(\*) For details of "operation APG 41/2 , see the four notes "La table rase", "L'être à part", "Le Feu Vert", "Le renversement" (notes n° s 67, 67<sup>¶</sup> , 68, 68 ).<sup>¶</sup>

(\*\*) The first step towards 'pinpointing my discomfort' in a specific case was taken in *Récoltes* and *Semailles* less than three months ago, in the reflection (which turned out to be quite laborious - and for good reason!) "The note, or the new ethic" (section 33). This reflection was taken up again in a note to that reflection, "Le snobisme des jeunes, ou les défenseurs de la pureté" (note no.° 27), and then again less than a fortnight ago (under the impact of the discovery (the day before) of the "memorable volume" (LN 900)) with note no.° 59: "La nouvelle éthique (2) - ou la foire d'empoigne". As I was writing this, there remained in me a tinge of hesitation about using the rather blunt term 'jumble sale'. The discoveries that have followed since have shown me that there was no need for hesitation.

in the history of our science or any other. Instead of 'surfacing', for some people 'it' must have *become the norm*, or at least been considered *normal* - as long as an obviously brilliant man, admired by all, practised it with the greatest naturalness in the world, in full view of everyone and without it ever (as far as I know) eliciting the slightest comment.

Over the last few days, I've been reminded many times of the story "The Dress of the Emperor of China", in which the Emperor, deceived by unscrupulous swindlers and by his own vanity, announces that he will appear in a solemn procession wearing the most sumptuous clothes the world has ever seen, prepared for him at great expense by so-called tailors. And when he appeared in the procession, surrounded in great pomp by his Court in great finery, the 'artists' bowing and scraping, and the entire imperial family, no one in the procession or among the people gathered to contemplate the seventh wonder dared to believe the testimony of their eyes, and everyone made a point of admiring and commenting on the unsurpassable splendour of the clothes with which he had been adorned. Until a little child who had wandered into the crowd exclaimed: "But the emperor is naked! - and then suddenly everyone, as if with one voice, cried out with the little child: "But the emperor is naked!"

And I feel like the little child who believes the evidence of his eyes, even though what he sees is quite unheard of, never seen before and ignored and denied by everyone.

Whether the child's voice will be enough to bring some people back to the humble testimony of their healthy faculties is another story. A tale is a tale, it tells us something about reality - but it is not reality (\*).

(<sup>78</sup>) (6 May) It's only been five days since I was entitled, at the end of the day, to this generous

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(\*) (14 June) After writing this note, the name 'The robe of the Emperor of China' seemed to me a natural subtitle for the Burial, expressing a particularly striking aspect of it. Later, as the focus shifted to my students as a whole, and even to 'the entire congregation' of the Mathematical Establishment, this subtitle seemed less appropriate. However, I have come to realise that the parable that first came to me with my friend Deligne in mind also applies to all the aspects and events of the Burial, which at every step reach the Ubuesque in the unbelievable (which everyone makes a point of modestly ignoring) that is nonetheless true. For reflections in this vein, see in particular the notes "You can't stop progress!", "The Colloquium", "The Victim - or the two si- lences", "The joke - or the complex weights", "The mystification", "The Gravedigger - or the whole Congregation" (n° s 50, 75<sup>¶</sup>, 83, 85<sup>¶</sup>, 97), none of which relates specifically to my friend Pierre.

packages of documents from my friend Zoghman Mebkout, including above all the two texts already examined from the 'memorable Colloquium' - this Colloquium built around a monumental *mysrificarion!* The note 'L'Iniquité - ou le sens d'un retour', in which I try to assimilate the quite incredible meaning of this new 'event', was written on the very day (the day after the first of May) that I received these documents, still in the emotion of discovery(\*\*).

Since 19 April, when I finally became acquainted with the 'memorable volume' of the Lec- tures Notes (LN 900 - see notes (51)(52)), which was the third great discovery on the subject of the solemnities of the Great Burial, it is also the one that seems to me to be of the greatest significance, both because of the light it sheds on the actions of people with whom I have been closely associated, and because of its implications as a 'tableau de mœurs' of an apparently unique period (but it is true that I am ignorant of history . . . ).

The second discovery followed closely on the heels of the first - that of the exhumation of the 'mo- tifs', which had been buried for twelve years. After the 'memorable volume', I was treated to the 'memorable seminar' - this 'seminar' that never took place, given a bogus name (both SGA and number 4 1/2 ), and enriched with the 'State 0' of a ghost thesis, not to mention a central paper from the (real) SGA 5 seminar (which appears later, even though it predates it by twelve years); ex- posed 'borrowed' for the purposes of the operation without further ado. This brilliant operation, and the role it played in the strange vicissitudes that befell this poor SGA 5 seminar (dismantled from the head, the tail and the middle!) were gradually revealed in the course of a reflection that continued between 24 and 30 April. (See on this subject the five notes "Le compère", "La table rase", "L'Etre à part", "Le signal", "Le renversement", n° s 63□□□, 67, 67□ , 68, 68□ .)

As soon as I had digested this discovery, while my retrospective reflection on 'Mon ami Pierre' was drawing to a close, and just as on 30 April I had proudly put the final and definitive dot (that was it - this time I was finally there!) under this interminable Burial, with the 'final note' with the doubly euphoric name 'Epilogue - or the Unanimous Agreement' - I received this package of misfortune, which called into question the final dot, epilogue, page layouts and numbering... A quick look at the documentation and annotations and I'm ready to go.

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(\*\*) Along with the section 'The note - or the new ethic (1)', this note is the only note or section that I've had to rewrite several times, because what 'came out' in the first version (and even in the next one) was still burdened with all the inertia of a vision of things that I was accustomed to, and which remained far below the

reality that had to be examined.

The letters that accompanied it made it clear that I was finished, and the beautiful arrangements for a first-class funeral, the final details of which I was about to finalise - I was ready to get back into the harness of master of ceremonies...

God knows my friend Zoghman had plenty of time to inform me of the situation! It must have been going on for ten years in latent form, and three years at least in 'acute form' (and that's putting it mildly) - ever since the Colloquium in question, where he must have sensed the wind without having to wait for the publication the following year of the highly official 'Proceedings' under the patronage of his illustrious ex-patron and protector.

A few months after defending his thesis (in February 1979), he came to bring me a copy in the village where I had lived for six years. Unluckily, I had just left (never to return, except in passing...) a few days before, to retire in solitude. He only met my daughter, who later gave me the thesis. I think it was the following year that we finally got to know each other, at Montpellier University, where we chatted for an hour or two. I wasn't really into maths at the time and I don't think I remember much about the thesis I had to look through in a few minutes, or the name of its author. That didn't stop the contact from being warm. I well remember an immediate current of mutual sympathy. We didn't talk so much about maths (not that I remember), but mostly about more or less personal things. Zoghman told me afterwards (something I'd forgotten) that he was still able to explain to me a bit about the 'philosophy' of the  $\mathbb{Z}$ -modules, and that he'd been pleased with the meeting, to have felt me 'vibrate' if anything by learning from him about things that were new, and yet also (in a way) 'expected'. What I remember most of all was the impression he made on me - an impression of stubborn, calm strength, that of a 'go-getter'. At the time, much more than when we met last year or during the correspondence that followed, I had the impression of a strong affinity of temperaments - this 'go-getter' side in particular. But the two or three years that have passed between the two meetings seem to have taken their toll...

I don't remember Zoghman telling me at our first brief meeting about the isolation in which he had worked, the lack of any encouragement from the 'luminaries' who had been my students. If he hinted at it, he must not have insisted. Even then it was no surprise (\*). I can't say whether it was before

or after the Colloque de Luminy in June 1981 (\*\*). If it had been afterwards, he would still have had something hot on his stomach - and he really didn't give that impression. Rather the impression of a man who knows what he wants to do and what he wants, and who goes his own way quietly, without seeking trouble and without being sought out.

We didn't continue to write to each other. But I remembered him well, and at the beginning of last year I wrote him a note, out of the blue, to ask him if he might be available to tackle a magnificent work on the foundations of a 'moderate topology' which (it seemed to me) was just waiting for someone of his calibre to get down to it. Although Zoghman didn't make it clear to me at first, it turned out that he wasn't really interested in this prospect - on the other hand he seemed happy to seize the opportunity of a new meeting. At the time, I was too out of the loop to fully appreciate the situation; I imagined that the theory of  $\mathbb{Q}$ -modules was now a done deal, as is, say, the theory of coherent duality (<sup>78</sup> 1), and that Mebkhout had perhaps run out of 'big tasks'. It was only when we met last summer that I realised that there was no shortage of 'big tasks' in the very theory he had started - and some had not even been started, because they had not even been seen! In any case, it was a perfect opportunity for a second meeting, and this time it wasn't as quick as the first. Zoghman must have stayed with me for perhaps a week last summer, in June I think. In mathematical terms, our meeting served mainly to bring me up to speed as best I could with the yoga of the  $\mathbb{Q}$ -modules. I was slow to 'thaw out', having somewhat lost touch with my former cohomological loves, and being mostly embroiled in writing 'The Pursuit of Fields', which is set in rather different registers. Zoghman was not discouraged to see me listening with a slightly distracted ear, and he returned to the charge without tiring, with a touching patience. I think I was finally triggered when I realised that these famous  $\mathbb{Q}$ -modules were nothing other than what I had long ago called *module crystals*, and that as such they kept their character.

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(\*) (30 May) That's not quite true - I'm reprojecting more recent disillusioned attitudes onto the past. When I met Zoghman last summer, I remember being surprised that none of my cohomology students (more particularly Deligne, Verdier, Berthelot and Illusie) had supported Zoghman in his work. This surprise was repeated when Deligne came to see me about ten days later (I must have mentioned something about Zoghman to him, but I got no response) and subsequently in a telephone conversation with Illusie (on this subject, see the note 'The mystification', n° 85<sup>78</sup> ).

(\*\*) (3 June) That was before - in February 1980, a year after he defended his thesis.

a sense of singular spaces. All of a sudden, I could see a whole network of intuitions from my crystalline-differential past rising up from forgotten depths, and slightly rusty reflexes from my 'six operations' past being reactivated...

Perhaps it was Zoghman who was a bit out of his depth at the time, or perhaps it was more that he decided afterwards that he wouldn't risk his fingers in that particular gear (any more than my friend Pierre wanted to put his - although he'd been all fire and brimstone while I was around...). (→78 )<sup>¶</sup>

<sup>78</sup> 1) There are, however, a number of "fine" results of coherent duality, notably on the structure of "modules of dualising differentials", their relation to modules of "naive" differentials, and trace and residue applications in the non-smooth flat case, which I had developed towards the end of the fifties and which have never been published to my knowledge. This does not alter the fact that, for the most part, the theory of coherent duality (in the schematic framework at least), like that of stale duality (and its variant for the discrete co-homology of locally compact spaces, developed by Verdier on the stale model), or linear algebra or general topology, appear as theories that are essentially *complete* (\*), in the nature of *ourils that are* perfectly developed and ready for use, and not of a somewhat unknown *subsrance* that needs to be penetrated and assimilated.

<sup>78</sup><sup>¶</sup>) We met in an atmosphere of friendly trust and affection. This atmosphere, however, did not live up to its promise. I realise now that from that moment on my friend's trust was far from complete. It was two years after the famous Colloquium, and a year after the publication of the 'Proceedings' in Astérisque(\*\*) - at a time when he was paying the price for a scandalous spoliation. But he was only willing to inform me of this four days ago! When he came last year, he was returning from another Colloque de Luminy(\*\*\*) (this time squarely on the theme of  $\mathbb{Q}$ -modules), where

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(\*) (12 June) This is not quite true for stale duality, as long as the purity conjectures and the "biduality theorem" are not proved in all generality.

(\*\*) (9 October) Zoghman tells me that these "Acts" were not published until the beginning of 1984.

(\*\*\*) (7 May) There's a slight memory lapse here - I think he was getting ready to go to the colloquium. From that moment on, of course, there was no lack of reasons for those 'bitter terms' (and vague ones) that I remembered. But this bitterness was further fuelled by his visit to Luminy after his stay with me. I heard about it in a phone call he gave me on his return from Luminy. From that moment on I had the feeling

He was again generously invited and rushed to attend. He spoke of it in terms that were both bitter and vague, implying that now that he'd got rid of the chestnuts, it was "the others who had done it all". I could imagine the picture

- Verdier, in particular, suddenly remembered that he was the father of the triangulated categories (and derived categories too, while we're at it!) which he had ignored for ten or fifteen years, just tolerating that his 'pupil' Mebkhout used them in his work... ( ).<sup>81</sup>

Although he didn't want to explain himself clearly at the time, Zoghman seemed to have a lot on his mind about Verdier, which was quite understandable given his ex-boss's less than encouraging behaviour. However, my other cohomology students, Deligne, Berthelot and Illusie, hadn't bothered to take an interest in what he was doing or to support him in any way. But it was almost as if, for Zoghman, this could only be taken for granted, as he had never (or so it seemed) experienced any other attitude than that among his elders. If he held a grudge against any of my former students, it was solely and exclusively against Verdier.

From Zoghman's allusions (which he obviously didn't want to specify), I understood that 'they' were systematically minimising the significance of what he had done - full stop. That is, after all, the most common thing in the world. Because judging the importance of something is to a large extent subjective, it's common and almost universal to attribute more merit and importance to one's own work, to that of one's buddies and allies, than to that of others, especially those whom one feels like downplaying for one reason or another. (And the 'reason' in this case was not really a mystery to me

Nothing could have led me to suspect that, far beyond such common attitudes, there was here an operation of pure and simple swindling, in which there was no question of 'minimising', but rather of *concealing* Mebkhout's authorship of the ideas and results that were breathing new life into what had been stagnation...

And yet, if there was one person in the world to whom it was natural for my friend to turn, it was me, whose work had inspired him during those years of obstinate work, sometimes bitterly, against the tide of the fashion of the day.

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that he had come to Luminy for the pleasure of being abused by 'the people' (without really asking me who they were) who had generously invited him, for the pleasure of being able to treat him as a negligible quantity. I must have told him or let him know, which must not have improved my friend's attitude towards me.

what he enjoyed teaching me (\*).

After my friend had passed through an atmosphere of warm affection, there was an immediate 'backlash'. I had the impression that he had decided to transfer to me the mistrust and bitterness that had built up in him over the past eight or ten years, under the sting of the indifference and disdain he had encountered in some of my students. In the months that followed, the correspondence between us never left the aigredoux register - it finally stopped with a New Year's greetings card, which never received a reply.

It was only at the end of March that I contacted Zoghman again, to send him 'Le poids d'un passé' and the notes I had then added to this section (n° s 45, 46, 47, 50). It was to ask him if he would agree to my including him, as I had done, in the short reflection on my work (in the note 'My orphans', n° 46), when it would be clear to everyone that I was using information he had given me, which he might consider confidential. I wasn't at all sure that my friend wouldn't prefer (like others before him) to 'crumble rather than displease'. I would have been sorry if that had been the case.

It took me a long time to get her reply, which I received only ten days later. I kind of expected it to be half-flesh, half-fish - but this time it was frankly warm. He gave me his unreserved approval, moved even, with the terms in which I spoke of him.

It is on page 6 of his long letter (eight pages) that he points out, as if in passing, that

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(\*) Zoghman didn't talk to me about mine, and he didn't talk about his own funeral either, even though he'd had a front-row seat to the proceedings for nearly ten years! To tell the truth, his 'protectors' (who were a little reluctant around the edges) had even agreed to let him carry a small corner of the coffin carrying my remains - but they couldn't forgive him for being the only one of the guests who sometimes took the liberty of uttering the name that everyone else was keeping quiet about!

So my friend must have felt at odds with himself in his relationship with me, and he couldn't find it in himself to take on a past full of ambiguities (as mine was) and speak to me straightforwardly and clearly. Talking about his funeral also meant talking about mine and the role he had played in it... . The fact remains that if I ended up discovering this famous funeral in all its splendour, it was against a sort of 'conspiracy of silence' that encompassed my friend Zoghman as much as my friend Pierre - and also no doubt most of the friends I had in the 'great mathematical world'.

(3 June) For further details, see<sup>o</sup> !78<sup>②</sup>.

about the "impressive number" of applications of his theorem ("both in the framework of stale topology and in the transcendental framework") that it still appears in the literature under the name of the "Riemann-Hilbert correspondence" (\*). He says it in such an almost incidental way, and with such a delightfully illegible handwriting, that it almost went completely unnoticed! I remembered it anyway, and it really was a strange thing. So strange, in fact, that it hardly seemed believable, and then maybe my friend was exaggerating, visible, he was angry with everyone, including me, even though I only wanted good things for him, it was quite clear. So I added a note (holy Zoghman, I thought I'd finished it!) called 'L'inconnu de service et le théorème du bon Dieu', in addition to two others: 'L'instinct et la mode - ou la loi du plus fort' (I'd also thought a lot about him, among others, when writing it) and 'Poids en conserve et douze ans de secret'. I was so full of contradictions that I wondered what I was getting into by simply echoing him, without really knowing the facts for myself. It hadn't occurred to me that there might be a scam going on, let alone that Verdier or Deligne themselves were involved. There was nothing in what Zoghman had told me to suggest that...

Yet both of them were so closely linked to this theorem of the good Lord, that its authorship could hardly be concealed without at least their tacit agreement. I must have been working on this in the days that followed. I remembered that Deligne had given a lot of thought to this problem, which had been solved (ten years later) by Zoghman - and Verdier, after all, acted as his research director; even if he didn't go out of his way for his pupil and would rather have beaten him cold and discouraged him than anything else, he must at least have known what the two main theorems in this work were - Zoghman must have explained them to him, during those famous 'interviews' that Verdier was kind enough to grant him! I therefore enriched the note with a comment on the relationship between Mebkhout's work and an earlier attempt by Deligne, and a b. de p. note on Verdier's role. It was also a sounding board for my friend Zoghman...

You'd think that Zoghman would jump at the chance to finally reveal his batteries, which have been hidden for the last three years, and that this would finally bring out the clear truth and help the cause of the oppressed to triumph! But not at all! Fifteen days of silence, followed by a

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(\*) See the quotation from his letter in the note "A feeling of injustice and powerlessness", n° 44<sup>✉</sup>.

a letter in which everything is discussed (in maths) except God's theorem - or rather, he confines himself to giving me the precise reference in his thesis, which I had asked him for. (I still wanted to know where this famous theorem, to which I was so firmly committed, had been proved!)

In my reply to this letter, I had to say a few words to him about the 'vast swindle being perpetrated on my work' that I had just discovered (with the 'memorable volume' LN 900, and moreover 'promising me much pleasure' in the coming days in getting to know SGA 4 1/2 in the university library) - so that after another ten days' silence, my friend finally got in touch!

This time, at last, he 'pulled out all the stops' - a *large* package of judiciously chosen documents, enabling me (who hardly ever haunts libraries, or even the piles of separate prints that pile up in my office at university...) to get a balanced idea of an 'atmosphere' in which many of those who did not take part in my long and solemn funeral are still living (\*). Alongside the main 'piece of evidence' (the two articles from the famous Colloquium, exposing the incredible mystification), and another 'memorable article' (this time from the pen of Verdier(\*\*)), there was N. Katz on the Fields Laureate Deligne, in addition to a paper by Langlands and another by Manin at the same Helsinki Congress in 1978; then Deligne's "Hodge Theory I" at the Nice Congress in 1970 (in which line 3 again alludes to a "conjectural theory of motives").

de Grothendieck" (<sup>78<sup>1</sup></sup> 1)), and "Weights in the Cohomology of Algebraic Varieties" by the same author.

Deligne, Vancouver Congress 1974 (where my name is not mentioned (<sup>78<sup>2</sup></sup> 2)); plus finally a correspondence with A. Borel (yet another old friend, whom I learn at the same time is back in Zürich...), and two notes to Mebkhout's CRAS, one of which from 1980 is a summary of Chap. V of his thesis (passed the previous year), putting a little more emphasis on the theorem of the good God (\*). Not to mention another document, shhh! communicated under the seal of secrecy, and of which I will not say another word here . .

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(\*) (12 June) Katz, Manin and Langlands do not appear to be among them. .

(March 1985) For a different view of Katz, see the note "Dotting the I's", no.° 164 (II5), and "Manoeuvres" (no.° 169), "Episode 2".

(April 1985) Similarly for Langlands, see the note "Pre-exhumation (2)", n° 175<sup>1</sup>. 1

(\*\*) On this article, see the note "Les bonnes références", no.° 82.

(\*) For a precise reference for this note, Mebkhout's thesis and the theorem of the good God, see the note "Le pavé et le beau monde - ou vessies et lanternes", n° 80.

Two letters accompanied this substantial mailing (letters dated 27 and 29 April), one very long and both substantial. Now that he has finally let the cat out of the bag (the real one, this time!), Zoghman continues to urge me to be extremely cautious, as he has been doing ever since I contacted him again. If I listened to him, I'd be careful not to make public my reflective notes, which would remain an absolute secret between him and me - at least not the part that implicates anyone, given that 'they' have 'all the power' and that 'everyone is with them'(\*\*)! And yet I had warned Zoghman that these notes, from which I sent him the extracts concerning him, were intended to be made public as soon as possible.

All the elements seem to be in place at last for the just cause of the oppressed to triumph, but the 'victim' seems to be doing his utmost to continue to muddy the waters as he pleases - as if out of some secret regret (it seems) at having sold that famous 'fuse' of which Zoghman must have been (until the fateful 2 May) the one and only holder. This ambiguity shines through in every line (I'm hardly exaggerating), right up to the last letters I have just received - including the very last one, in which he sends me, with an air of sombre triumph, the 'memorable article' in its entirety (whereas with the 'large package' he sent first, he had only managed to part with the first twenty pages of this masterpiece of evidence(\*\*\*)).

As for Pierre's friend, I mean Deligne (who is neither Pierre nor a 'friend' to everyone...), it's only fair that he doesn't sing his hearty praises - so it seems that it's no longer he, Zoghman, who is the 'victim', but no, it's Deligne, poor fellow, who has been so badly influenced by those around him - the only villain, and the one who has surrounded him so badly, is Verdier (and yet... follow my gaze).... follow my gaze... ): I really 'must have done something' to Verdier for him to be so nasty just for the pleasure of doing harm, not to mention the fact that I was also his boss and I was also the one who awarded him the title of doctor and the glory and all the rest - the means, in short, of 'absolute power'! (\*)

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(\*\*) (30 May) Carried away by my impetus, I am exaggerating a little here. At no time did Zoghman suggest that I refrain from publishing any part of my notes. Lately, he's even been insisting that these notes should indeed appear in book form, for the benefit of 'posterity', whereas a limited edition like a preprint seems to him a bit 'like a shot in the dark'.

(\*\*\*) (9 October) Zoghman told me that he did not in fact have a Xerox of the full article, which he only drew on later.

(\*) It's not the first time I've heard this argument about "absolute power", by which they mean "absolute power".

Clearly, if my friend has a grudge against anyone, it's not really against his illustrious ex-boss, whom he's only had the honour of meeting for an 'interview' three times in ten years (if I've understood correctly what he wrote to me just recently) - a man who is vertiginously distant, entirely out of reach - but it's the one he can come and see whenever he likes, and share his bread and board.... . (\*\*).

Each time Zoghman takes a new step to disclose something new, making me a little more aware of a situation of despoilment in which he is the victim (and which may help a little to unravel it), I feel that it is like a *wrench*, the culmination of an exhausting inner struggle. There's a *role* with which he seems to have identified body and soul, clinging to it as if it were his most precious possession - this role of *vicrime* that he can only maintain by keeping this role and the situation that justifies it in absolute secrecy (\*). And he can be torn apart and resent me more than ever, at this moment when, with his reluctant collaboration (snatched away, as it were, by the logic of a situation created by none other than me, with those unfortunate reflections on a Funeral without fuss.... . ), this secret will come to an end, and with it perhaps also this role in which it has pleased him to maintain himself, I can't say for how long.

This 'burial' of my friend Zoghman was achieved by the combined efforts of *two silences*, each responding to the other and provoking it in turn, in a seamless round in which the role of one closely mirrored the role of the other - the despoilers and the despoiled. On more than one occasion, I was struck by the fact that the 'burier' was at the same time, and more profoundly, his 'victim'.

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convince himself of his own powerlessness and justify it. If anyone has invested anyone with 'absolute power' over himself, Zoghman, it is none other than Zoghman himself!

(\*\*) (8 May) It is surely no coincidence that the unequivocal signs of conflict, in the relationship of my friend to me, appeared in the very aftermath of this stay where he 'shared my bread and my lodging' in an atmosphere of unreserved affection, abolishing a feeling of 'distance' that our first brief meeting undoubtedly could not entirely erase. Here I encounter a situation with which I have been familiar for a long time, and which I discuss (in relatively general terms) in the two notes "The Enemy Father (1), (2)" (sections n° s 29, 30). I had no idea, when I wrote them as a commentary on the reflections that had preceded them, the extent to which the archetypal situation that I describe there would constantly find itself at the centre of a long reflection yet to come, just as I thought I was nearing the end of this journey!

(\*) (30 May) Since these lines were written (6 May), my friend's attitude has changed dramatically and I have recently seen no signs of attachment to the role of victim. It goes without saying that the lines that follow (like those that preceded) concern certain episodes in my friend's life, and in no way claim to define a temperament or describe a permanent bias.

When I saw my own 'buried', I was just as struck to see in another friend a 'buried' who is at the same time, and more profoundly, his own 'burier' - in close collusion with the very people whose consenting victims he takes pleasure in being.

And I can see that the person primarily responsible for his own despoilment is none other than my friend Zoghman himself, who for three years has acquiesced by his silence to his humiliation by those who take their pleasure in him. He had everything in his hands to fight - and for three years he chose to forget that he even had hands, and to be defeated without having fought(\*\*).

(<sup>78</sup> 1) I had never held in my hands this short preliminary communication, but only the more detailed publications "Hodge's Theory II, III" which appeared in Publications Mathématiques. This is why I had been under the impression that Deligne had never thought it useful to allude to a role played by the theory of motives in the genesis of his ideas on Hodge's theory. I thought that if he had wanted to mention any role that I might have played for him (\*), he would probably have done so in "Hodge Theory II", which is his thesis work, which was the perfect opportunity to mention such things(\*\*). I've just seen that he's fulfilled the formality of mentioning me once and for all, with this pithy line(\*\*\*) alluding to "Grothendieck's conjectural theory of motives", with even a reference in the key (to Demazure's talk at the Bourbaki seminar).

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(\*\*) (30 May) This is certainly a subjective view of someone with the temperament of a fighter, of someone in whom this fibre seemed to be absent. It would seem that since these lines were written, my friend's fighting spirit has been reawakened, and he is determined to fight against an iniquity he has suffered.

(\*) (30 May) Until a few weeks ago, I systematically downplayed this role.  
On this subject, see the note "L'être à part" n° 67<sup>7</sup>, dated 27 May, where I first became aware of this attitude in myself and understood its meaning.

(\*\*\*) (30 May) I don't remember being asked to sit on the thesis jury either.  
The funeral was already well under way...

(\*\*\*\*) Serre also appears implicitly in the same line by the cross-reference sign [3] - the curious reader will find his name in the bibliography at Hodge I. This expeditious reference line is the only one between 1968 and the present day where there is any allusion (however sybilline) to the 'sources' it mentions in a single breath: Serre (alias [3]), motifs, Grothendieck...

(28 May) However, I have since come across another such allusion, very interesting in view of the very special occasion. On this subject, see the note "L'Eloge Funèbre (1) - ou les compliments" n° 104, and the end of the note that precedes it ("Le Fossoyeur - ou la Congrégation toute entière" n° 97), situating this "particular occasion".

Once again, nothing to say! The idea did not occur to him to specify that he had learned this theory (all conjectural, let's not forget!) from *another source* than this meagre text by Demazure, which can give no image of a theory of great ichesse (all conjectural!), which can be seen as a filigree throughout Deligne's subsequent work on weight yoga - while waiting for the escalation of the 'pirate volume' LN 900, where the motivic Galois groups are finally exhumed (fifteen years later) (this time without even a laconic reference line containing the name of the deceased...).

On reflection, in this laconic quotation, I recognise the same "thumb! - a purely formal quotation, to be fair, with a reference that is in no way likely to enlighten the reader (in this case, on obvious and profound relations with ideas that it is precisely about hiding (\*)) - and which remained hidden for the twelve years that followed), but *of narure to rromper him*.

(<sup>78</sup><sup>¶2</sup>) I didn't have to hold this text(\*\*) in my hands (which I only learned about a few weeks ago) to know that my name wasn't in it. Nor was Serre's either, who was the first to glimpse a "philosophy of weights", which I subsequently worked out in great detail.

(!<sup>78</sup><sup>¶3</sup>) (3 June) Zoghman explained to me that he only gradually became aware, in a confused way at first, of the 'swindle' that was going on around my work. The manuscript that Verdier had given him in 1975 (see 'The right references' note n° 82) had been providential for him, in particular in introducing him to the notion of constructibility and its essential properties, as well as to the biduality theorem, from which he had drawn inspiration for the biduality theorem (or 'local duality') in the context of  $\mathbb{Q}$ -modules. It was only years later, while reading SGA 5 (a massacre edition to be sure, but not massacred enough nonetheless to give the lie to an attentive reader like him) that he began to realise something. For a long time, he was filled with admiration and gratitude for

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(\*) As I was writing these lines, it occurred to me to associate them with a first revealing incident involving 'weights', which took place two years earlier and was mentioned at the beginning of the note 'Canned weights and twelve years of secrecy' (no.° 49), and in more detail at the beginning of the note 'The eviction' (no.° 63). For the "pouce! style" in general, see the reflection in the note "Pouce!" (n° 76). It's a style I'm starting to become very familiar with!

(\*\*) "Weights in the Cohomology of Algebraic Varieties", by P. Deligne, Vancouver Congress 1974, Actes, pp. 78-85.

his distant elder, convinced that the ideas from which he drew so heavily were his own. It would even seem that for years he was convinced that the theory of duality known as 'de Verdier' was in fact due to Verdier, or at least to 'Serre-Verdier', and that the idea of duality that he calls 'de Poincaré-Verdier' was in fact due to Verdier. It was only around 1979 (the year he defended his thesis) that he began to realise that something was wrong - but I presume he had to be careful not to let anything show about it to his prestigious 'boss', any more than to me, when we met in February 1980 and June 1983. It was only with the Colloque Pervers, in June 1981, when he began to sense that his own work was being suppressed, that he also began to realise more clearly the world he had strayed into (\*)! Surely, for him, I must have been part of that world, where my former pupils (or at least some of them) had the upper hand and plundered the posthumous pupil with the same casualness as the deceased master. The only difference, perhaps, was that I was dead and they were very much alive and proved it conclusively...

I can imagine that even after the Pervers Colloquium, Zoghman still found it hard to believe the testimony of his healthy faculties, which told him quite clearly what had happened. He only received the famous Introduction to the Colloquium Proceedings, signed by B. Teissier and his 'patron-sic' Verdier, in January 1984. After denying the evidence for nearly three years, the shock was all the greater, I understand. It was two months later that I contacted him again, sending him at the end of March the notes 'Mes orphe- lins' and 'Refus d'un héritage - ou le prix d'une contradiction' - and it was another month later that he finally decided to 'let me in on the joke' and tell me about the 'Mystification du Colloque Pervers'.

(<sup>79</sup>) And now I am about to finish and make public this reflection which will put an end to the secrecy that Zoghman himself has maintained around the spoliation of which he is the victim, and from which he is also reaping the obscure benefits(\*\*). Perhaps it will be unwelcome to him, just as it may be unwelcome to my friend Pierre, to whom I shall hand it over personally as soon as I can.

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(\*) Zoghman ended up having such a low opinion of his ex-boss that he was convinced that everything Verdier had done in the sixties (which I review in a b.p. note to note no.° 81 "Thèse à crédit et assurance tout risques") had been more or less dictated to him, or at least dictated by me.

(\*\*) (30 May) I would remind you that this reflection is inspired by provisions in my friend that seem to now out of date. (Compare two b. de p. notes dated 30 May with note no.° 78<sup>✉</sup> ).

it will be completed and the text edited and printed(\*\*\*). Perhaps the best thing I have to offer my friend Zoghman and my friend Pierre will be received by both of them as the worst: as a calamity, or as an insult. All the worse, because my testimony is public - just as the silences of both of them have been public acts, binding on one as they are on the other.

Whether they reject or accept my testimony is their choice, and the same goes for Jean-Louis, whom I counted among my friends, just as Zoghman and Pierre do today. These choices affect me closely, and they are not mine. I have no temptation to predict what they will be. It won't be long before I know, and I await what the weeks and months ahead will bring with intense interest, suspense - and without a shadow of anxiety. My only concern and my only responsibility is that what I offer is the best I have to offer - that is, to be true.

Some may be surprised that I should speak so bluntly of people whom I call friends, and who will see in this name a stylistic clause, or even an intonation of irony that is absent. When I refer to Zoghman Mebkout or Pierre Deligne as 'friends', it is as a reminder of the feelings of sympathy, affection and respect that are within me as I write. Respect tells me that I don't have to 'spare' a friend, any more than I have to 'spare' myself - like me, he is worthy of encountering the humble truth, and he doesn't need sparing any more than I do.

If I do not refer to Jean-Louis Verdier as a 'friend', it is in no way because I consider him less 'good', or less 'deserving', than my friends Zoghman and Pierre, or myself, but because life has taken us apart. The feelings of sympathy and affection that bound me to him fifteen years ago and more have more or less faded with time and have not had the opportunity to be revived by any kind of personal contact. The few attempts I have made to re-establish such contact have met with no response, and I don't know whether reading these reflections will revive a relationship that had frozen. But even though I don't consider him a 'friend' now, I don't think I'm showing him any disrespect by treating him any less kindly than I do myself, or my

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(\*\*\*) I did not believe, however, that I would have the opportunity again, in the years remaining to me, to return to the capital for a few days. But my friend Pierre has travelled often enough, for more than ten years, to meet me deep in the remote countryside, for me to travel on this exceptional occasion, in response to an invitation that has been repeated many times and never yet taken advantage of.

friends, and I know that if I did the opposite I wouldn't be doing him or anyone else any favours. Not to mention that both he and my friend Pierre, if they insist on 'defending' themselves (or attacking) rather than taking the risk of looking at themselves, have no shortage of resources or support. Not to mention the fact that where they have had the opportunity to discourage or crush, on more than one occasion both have done so, ruthlessly and without mercy.

(<sup>80</sup>) (9 May) It's about time I finally gave a reference for this famous theorem of Riemann-Hilbert-(Deligne who doesn't say his name)-Adam and Eve-good God-(and especially not Mebkhout), which everyone quotes at length (including myself), and for which nobody has apparently thought to ask where it is proved. Having understood from my friend Zoghman that the 'memorable theorem' was to be found in his thesis, I did indeed find it in the table of contents, under the name (admittedly down-to-earth and worthy of a cad) 'Une équivalence de catégories', Chap. III, par. 3, p. 75. To make matters worse, it's not even entitled to the name of "theorem" but is called "Proposition 3.3" (and what's worse, my name appears, underlined again, on the same page). I'll even admit that, since I hadn't read the previous 75 pages to be sure, I wasn't entirely sure if that was it - Zoghman confirmed that it was, and I trust him. The demonstration (it would seem) is the subject of Chap V of the same thesis

- which was passed at the University of Paris VII on 15 February 1979 before the Jury formed by D. Bertrand, R. Godement, G. Houzel, Le Dung Trang, J. L. Verdier. Anyone who is interested and has not yet received a copy from the author (who sent his thesis to all those he suspected, rightly or wrongly, might be interested) need only ask him, and he will be pleased to do so. ... He did, of course, send a copy to each of my former cohomology students, none of whom has been heard from since. They must have changed subject in the meantime, unluckily...

It has to be said that Zoghman definitely doesn't have the knack of selling his wares, of presenting them in a clear and appealing way - these are things that have to be learned, and he wasn't as lucky as my former students to learn the ropes from a virtuoso of the trade who spared no time. But he can't complain, he's had his 'three interviews', and perhaps one day one of the 'luminaries' will have the idea of acknowledging receipt of his indigestible pamphlet. He must have realised himself that his pamphlet didn't go down well (even if it wasn't lost on Riemann or Hilbert...): he wrote a note to the CRAS, it's

even shorter, to draw attention to his famous theorem, I'll give you the title: "On the Hilbert-Riemann problem"! I was well aware that my friend Pierre Deligne was no better at history than I was, so all he had to do was restore the chronological order, and add the pretty folkloric designation 'correspondence', and that was it, Z o g h m a n really had it coming... This Note is dated 3.3.1980, Series A, p. 415-417.

Verdier must have learned of the theorem in one of the 'three interviews' he gave to his student (or during the defence), but he must not have realised anything if that's the case. As for Deligne, he eventually realised something, I can't say when, but what is certain is that he knew about it in October 1980, and so did Bernstein and Beilinson, according to what he himself says. Mebkhout himself went to Moscow to explain his results (at length) to Beilinson and Bernstein (in case they had trouble reading him). I don't know whether they or Deligne read the said thesis or the note to the CRAS that followed, but they must have understood what was in it, since next year's 'memorable Colloquium' at Luminy focused on this very subject, by the greatest of coincidences.

To sum up, and taking into account the latest information that my intelligence service was kind enough to provide me with, there were at least five people perfectly aware of the situation, who took part in the mystification known as the "Perverse Colloquium", namely (in alphabetical order of the actors) A. A. Beilinson, J. Bernstein, P. Deligne, J. L. Verdier and Z. Mebkhout - plus a whole Colloquium of sharp people, surely brilliant mathematicians to boot, who apparently wanted nothing better than to be mystified and to take bladders for lanterns (\*). Which proves once again that we mathematicians, from the illustrious Medalist to the obscure unknown student, are not a hair more ma-lin or wiser than the average person.

## VIII. The Student - aka the Boss

(<sup>81</sup>) (8 May) It seems to me that the time has come to give a more detailed account of the 'ghost thesis' affair, which I had only mentioned 'in the aftermath' in two previous notes (notes (<sup>48</sup>) and (<sup>63</sup>)). An inattentive or ill-disposed reader might say that I am reproaching

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(\*) (3 June) In fact, it appears that all the Colloquium participants without exception had been briefed on the situation on the spot. On this subject, see the note "The Colloquium", n° 75, written today.

at the same time to my former student J. L. Verdier for two contradictory things - for having 'buried' the derived categories, and for having 'published' them (in SGA 4 1/2 ) and claiming authorship; just as the same reader would say that I reproached P. Deligne for having both 'buried' the motifs, and for having exhumed them (in LN 900). So it is perhaps not superfluous to give a retrospective of the situation, from 1960 to the present day.

Around 1960 or 1961 I proposed to Verdier, as a possible thesis, the development of new foundations for homological algebra, based on the formalism of derived categories that I had developed and used in previous years for the purposes of a formalism of coherent duality in the context of schemes. It was understood that in the programme I was proposing to him, there were no serious technical difficulties in prospect, but above all a conceptual work whose starting point had been established, and which would probably require considerable development, of dimensions comparable to those of the Cartan-Eilenberg book of foundations. Verdier accepted the proposed subject. His work on the foundations continued satisfactorily, culminating in 1963 in a "Etat 0".

on derived and triangulated categories, multigraphed by the IHES. It is a 50-page text, reproduced as an Appendix to SGA 4 1/2 in 1977 (as stated in the note <sup>(63)</sup>) (\*).

The reason it was not defended in 1963, but in 1967, was that it was unthinkable that this 50-page text, the embryo of a fundamental work still to come, could constitute a doctoral thesis - and of course the question never even arose. For the same reason

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(\*) This text alone may seem a rather meagre result for two or three years' work by a gifted young researcher. But most of Verdier's energy was then devoted to acquiring the essential basics of homological algebra and algebraic geometry, in particular by attending my seminars and working one-to-one. His contributions to the formalism of duality (see below) came later, once Artin and I had developed the formalism of stale duality in detail in SGA (1963/64), when I suggested to him (alongside his work on the foundations of derived categories) that he should develop this same formalism in the context of 'ordinary' topological spaces and the readable morphisms of such spaces. It was around the time that I began with SGA 1 the series of my "Seminars on Algebraic Geometry" (in 1960) that I was contacted by Verdier, at the same time as by Jean Giraud and Michel Demazure, asking me if I had any work for them - and they were knocking at the right door! Coincidentally, from the moment I wrote the note "Mes Orphelins" (n° 46) when the three of them contacted me, they had just formed a small seminar called the "Séminaire des orphelins" (on the theme of automorphic functions, the zinc strand approach to calculations), as their boss (or godfather at the CNRS?) had just left for a year without warning, leaving them hungry and a bit empty. This void was quickly filled...

For this reason, when the thesis was defended on 14 June 1967 (before a jury including C. Chevalley, R. Godement and myself, who presided), there was no question of presenting this work as a thesis. The text submitted to the jury, 17 pages long (+ bibliography), is presented as an *introduction* to a major work in progress. It outlines the main ideas behind this work, placing them in the context of their many uses. Pages 10 and 11 give a detailed description of the chapters and paragraphs planned for this fundamental work.

If the title of Doctor of Science was awarded to J. L. Verdier on the basis of this 17-page text, outlining ideas which he himself says are not his own (\*), this was clearly a contract of good faith between the jury and him: that he would undertake to complete and make available to the public this work for which he presented a brilliant introduction. This contract was not kept by the candidate (\*): the text he announced, a text on the foundations of homological algebra from a new point of view that had proved its worth, was never published.

Clearly, if Verdier's work between 1961 and 1967 had been confined to writing the skeletal

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(\*) Read at the beginning of the thesis:

"This thesis was written under the supervision of A. Grothendieck. The essential ideas it contains are due to him. Without his initial inspiration, his constant help and his fruitful criticism, I could not have completed it. I would like to express my deep gratitude to him.

I would like to thank Claude Chevalley for chairing my thesis jury and for his patience in reading this text.

I would like to thank R. Godement and N. Bourbaki for introducing me to mathematics".

The term 'this thesis' can hardly refer to anything other than the body of foundational work undertaken, of which the text submitted constitutes the introduction - work which was not, strictly speaking, 'completed' at the time of the defence.

(30 May) This inconsistency reflects the ambiguity of a situation for which I was primarily responsible, as thesis director and (if the cover of the copy of the thesis in my possession is to be believed) as president of the Jury. There was a lack of 'rigour' on my part towards a brilliant student, a complacency which goes in the same direction as the one I had shown towards Deligne (see the note 'L'être à part', n° 67<sup>12</sup> ), and which contributed its share to bringing about the same results.

(\*) It is all the more remarkable that J. L. Verdier refused my offer to sit on the thesis jury.  
de Contou-Carrère in December 1983, with J. Giraud, and myself acting as research supervisor, considering that the thesis (although entirely written and carefully read by J. Giraud) and the jury did not offer sufficient guarantees of seriousness, without referring to the control of a Commission des Thèses des Universités Parisiennes (sic).

"In 1963, the jury would not have considered accepting this 'thesis on credit'. At the time, the writing of his work had to be sufficiently advanced to allow it to be completed in a year or two, and for practical reasons it seemed appropriate that Verdier should have the title without waiting for the work on which it was based to be completed.

It should be added that between 1964 and 1967, Verdier had made some interesting contributions to duality formalism (<sup>81</sup> 1), which, together with the foundational work he was supposed to be pursuing, could justify the credit given to him. His contributions to duality as a whole could, at the very least, have constituted a reasonable doctoral thesis. Such a thesis, however, would in no way have been in the style of the work I usually propose, which all consists of the systematic development, to the end, of a theory whose need and urgency I feel (<sup>81</sup> 2). I don't remember Verdier thinking of raising the question of presenting such a 'thesis on titles', and I doubt that I would have accepted, since such a thesis would not have corresponded in any way to the 'contract' that was made between him and me, when I entrusted him with the beautiful subject of derived categories, with the task of developing foundations on a vast scale.

As J. L. Verdier's thesis supervisor and chairman of the jury, I accept full responsibility for my thoughtlessness in awarding him (jointly with C. Chevalley and R. Godement, trusting in the guarantee I was giving) the title of doctor for work that had not yet been done(\*\*). I have no right to complain if I now see some of the fruits of my carelessness. But that does not prevent me from making the observation publicly, and that the actions of my former student J. L. Verdier engage his sole responsibility, and that of no one else.

Not to keep the contract I had made with him and with the Jury who had trusted him, was a way of burying the point of view of the derived categories that I had introduced and that he had taken on the task of founding through a major piece of work. This work may have been done, but it was never made available to the user. This was a way of 'writing off' an important project.

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(\*\*) To this responsibility, I should add that of not having ensured, during the two years that followed (before my departure from the mathematical scene) that Verdier actually kept to the contract he had signed. It has to be said that my energy was so focused on pursuing the fundamental work that I myself had taken on, not to mention motivational reflections and the like, that I didn't have to think too much about the unpleasant task of reminding others of their obligations. I had to learn of Verdier's decision to abandon the publication of the planned work in the early 1970s, at a time when I was absolutely no longer interested in maths, and when the idea would not have occurred to me to 'react'.

set of ideas that he himself had helped to develop.

The revival of the notion of derived category in Mebkhout's work met with no encouragement from Verdier (nor from any of my other students who were considered to be cohomological "luminaries"). The de facto boycott of derived categories seems to me to have been total until about 1981 (\*), when they made their comeback in force at the "memorable Colloque" at Luminy (see note (75)), under the sudden pressure of need.

Yet State 0 of Verdier's "thesis" had already appeared four years earlier, in 1977, as an appendix to volume SGA 4 1/2 (see note n° 63□□□) - that is, ten years after the defence of his thesis, and at a time when (to my knowledge(\*)) Mebkhout was the only one to make use of derived categories in his work, going against the fashion of the seven years that had preceded. Unless I am mistaken?? (\*), he remained the only one, until the time of the great 'rush' around the famous 'Riemann-Hilbert correspondence' at the Colloquium already mentioned, where Deligne alias Riemann-Hilbert was seen as the father of this 'correspondence'-sic, and Verdier (with his providential Etat 0 abundantly quoted by his generous friend) was seen as the father of derived categories and homological algebra 2000 style, with no mention of my modest self and even less of Mebkhout(\*\*).

In the light of these events, I think I understand the reason for the unexpected publication of this Etat 0 which (it is said in the introduction to SGA 4 1/2 by the same friend) 'had become untraceable', and which no one then bothered to 'find', except at most (perhaps) Zoghman Mebkhout (\*). So there was just this one unfortunate fellow who, in his corner and against all odds, persisted in using these notions of a bygone age, without anyone really knowing what he was getting at - so stubborn, in fact, that we began to doubt whether one day this fellow would not come up with something that would do the trick, you never knew... . After all, the person to whom he sometimes imprudently referred as one of

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(\*) (30 May) These somewhat dubious forms of style are in fact out of place. As Zoghman Mebkhout confirmed to me (and he paid to find out), what I said dubiously about the status of homological algebra "Grothendieck style" does in fact correspond to reality.

(\*\*) Compare with the comments in the notes "Le compère" and "L'Iniquité - ou le sens d'un retour".  
(n° s 63□□□ and 75).

(\*) In any case, it was while browsing through the bibliography of a work by Z. Mebkhout that I had just received, towards the end of April, that I learned of the publication of this 'Etat 0'. Mebkhout that I had just received, towards the end of April, that I learned of the publication of this 'Etat 0', when I had even forgotten the existence of this text from another age. ...

his sources of inspiration (in addition to the Master's works), he had at one time proved or found things with all that, things that you couldn't pretend to forget even if you forgot their author - and hadn't the Master himself, Jean-Louis Verdier himself, made his start to fame with this 'Lefschetz-Verdier' formula that he would have had a hard time even writing down, let alone proving, without all those notions fit for the dustbin...

While my influential ex-student had been *betting against* derived categories for nearly ten years (since he had dispensed with a certain tedious formality...) and was still going to bet against them up until time X (of the famous Colloquium), he must have thought it prudent (we never knew but...) to be ahead of events that might occur, an 'all-risk insurance policy' in short, by publishing (not of course the large-scale work that was supposed to constitute a thesis one day, but) a 'text on the subject'.) to take the precaution of anticipating events that might occur, an 'all-risk insurance policy' in short, by publishing (not, of course, the large-scale work that was supposed one day to constitute a thesis, but) a 'witness-text', a sort of piece of evidence 'in case...'; a text that would attest to his claims to paternity over an *orphan* whom it had pleased him to take a dislike to, and whom he continued, while awaiting events, to disown(\*\*).

<sup>81</sup> 1) The contributions in question are: 1) Foundations of a duality formalism in the context of locally compact spaces and 2) that of Galoisian modules (in collaboration with J. Tate); 3) the Leschetz-Verdier *formula of fixed points*; 4) duality in locally compact spaces.

Contributions 2) and 3) are 'unexpected' compared to what was known. The most important contribution seems to me to be 3). It is easy to prove using the duality formalism (for both 'discrete' and 'continuous' coefficients), but this does not prevent it from being an important ingredient in the arsenal of 'all-purpose' formulae available to us in cohomology. The existence of this formula was discovered by Verdier, and came as a (pleasant!) surprise to me.

The duality formalism in the context of locally compact spaces is for

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(\*\*) If J. L. Verdier had really wanted to make known the yoga of derived categories, which has been buried for seven years, he would have chosen to publish the introductory text which makes up his thesis, rather than a technical text which nobody cared about and which is only of interest for the background of yoga and its many uses. But it is understandable that he had no desire to append to the 50-page text the 17 pages of his thesis, containing now embarrassing statements about the role of the one who must not be named...

Essentially, it was the 'necessary' adaptation of what I had done in the context of the spread cohomology of schemes (and without the difficulties inherent in this situation, where everything still had to be done). However, he introduced an interesting new idea, that of the direct construction of the functor  $f^!$  (without any prior lissification of  $f$ ) as a right adjoint of  $Rf_!$  with an existence theorem. This procedure was taken up by Deligne in stellar cohomology, allowing him to define  $f^!$  in this framework, without any lissification hypothesis.

These comments make it clear, I think, that by 1967 Verdier had demonstrated his capacity for original mathematical work, which, of course, was the determining factor in the credit he received.

(<sup>81</sup> 2) As another example, I would point out the detailed development of the duality formalism in the context of locally compact spaces, in the spirit of the "all-purpose" formalism of the six operations and derived categories, of which Verdier's talk at the Bourbaki Seminar would constitute an embryo. Even in the context of topological *variates* alone, to my knowledge there is still no satisfactory reference text for Poincaré's duality formalism.

(5 June) There are two other directions in which I note with regret that Verdier did not see fit to go to the end of a work that he had started in a sufficiently strong way to *get the credit for* it (I mean, by starting a duality formalism in the context of discrete coefficients and locally compact topological spaces), whereas the essential ideas are not due to him and he does not care (any more than for the derived categories) to be the *servant of a task* and to make available to the user a complete formalism (as I tried to do in the three seminars SGA 4, SGA 5, SGA 7).

The duality programme that I was planning and that I suggested he develop was set in the context of general topological spaces (not necessarily locally compact) and applications between such spaces that are "separate" and that are locally "smoothifiable" (i.e. locally compact).

the source is immersed in a  $Y \times \mathbb{R}^n$ , where  $Y$  is the goal space). This was what was suggested to The analogy with the framework of the stale cohomology of *arbitrary* schemes is obvious. Verdier was able to see, in the context of locally compact spaces, that the assumption of local smoothness of applications was useless (which came as a surprise). This does not alter the fact that the context of locally compact spaces (thus excluding "parameter spaces" which are not locally compact) is obviously a little tight. A more

satisfactory would be the one that would cover both the one chosen by Verdier, and the one I was planning, i.e. the one where the topological spaces (or even topos?) are (more or less?) arbitrary, and where the applications  $f: X \rightarrow Y$  are subject to the restriction of being 1) separate and 2) "locally compactifiable", i.e.  $X$  is locally immersed in a compact  $Y \times K$ ,  $K$ .

In this context, the fibres of an "accepted" application would be any locally compact spaces. Another step would be to admit that  $X$  and  $Y$ , instead of being topological spaces, are "topological multiplicities" (i.e. topos which are "locally like a topological space"), or even topos of any kind, by re-stretching the applications in a suitable way (to be made explicit), so as to find fibres which are *locally compact multiplicities*, subject if necessary to additional conditions (close perhaps to the point of view of Satake's *G-varieties*), for example (and at the last rigour!) to be locally of the form  $(X, G)$ , where  $X$  is a compact space with *finite* operator group  $G$ . To my knowledge, even the "ordinary" Poincaré duality has not been developed in the case of smooth compact topological manifolds (smooth: which are locally like a topological variety). The case of a classifying space of a finite group seems to show that one can hardly hope to have a (global absolute) duality theorem except modulo torsion, more precisely, by working with a ring of coefficients which is

a  $\mathbb{Q}$ -algebra. With this restriction, I wouldn't be surprised if Poincaré's duality (style "six operations") works as it is in this context. It's not surprising that no one ever looked at it (except unrepentant differential geometers, pretending to look at the cohomology of the 'leaf space' of a foliation), given the general boycott of the very notion of multiplicity, instituted by my cohomology students, led by Deligne and Verdier.

To put it bluntly, what is missing is a reflection on the foundations of the following type: describe (if you can) in the context of any topos and bundles of "discrete" coefficients on them, notions of "cleanliness", "smoothness", "local cleanliness", "separation" for a morphism of topos, making it possible to derive a notion of "admissible morphism" of topos  $f: X \rightarrow Y$ , for which the two operations  $Rf_!$  and  $Lf^t$  make sense (one adjoint of the other), so as to obtain the usual properties of the formalism of the six operations. Here the topos are considered to be non-ringed, or perhaps to have Rings (which are assumed to be constant or locally constant), assuming (initially at least) that the ring topos morphisms  $f: (X, A) \rightarrow (Y, \mathcal{S})$  are such that  $f^{-1}(\mathcal{S}) \rightarrow A$  is an isomorphism<sup>(81) 3.</sup>. The above considerations suggest that

when we restrict ourselves to Rings of coefficients of zero characteristic (i.e. which are Q-Algebras), we can be much broader in the notion of "admissible morphism", so as to encompass "fibres" which are, for example, multiplicities (topological or schematical) spaces), rather than ordinary (topological or schematic) 'spaces'.

The first steps in this direction (apart from the cases treated by myself and then by Verdier on the same model) were taken by Tate and Verdier, in the context of discrete or profinite groups. The memory of this initiation encouraged me to pursue a reflection along these lines last year, in the context of small categories (generalising discrete groups) serving as homotopic models. Without going very far, this reflection was nevertheless enough to convince me that there must exist a complete formalism of the six operations in the Cat context of the category of small categories. (See on this subject the "Pursuit of Fields", Chap. VII, par. 136, 137.) The development of such a theory in Cat, or even in Pro Cat, just like a theory of this type in the context of topological or schematic spaces and multiplicities, would have for me the principal interest of being a step towards a better understanding of "discrete duality" in the context of general topos.

Illusie told me last year that he had struggled with duality perplexities in the case of semisimplicial spaces (or schemes). It seemed to me that it was always the same tobacco - managing to detect the existence of a six-operation formalism in a particular case, and understanding it. But it would seem that the mere prospect of a reflection on the fundamentals has the knack of freezing each and every one of my former students - at least my cohomology students. If I took the trouble with them, it was with the conviction that they would not stop right where they had left off with me (in terms of conceptual work), and remain wringing their hands every time a new situation showed that the work they and their friends had done with me was insufficient. The conceptual work we do is *always* insufficient in the long run, and it is by taking it up again and going beyond it, and not otherwise, that mathematics progresses. Between 1955 and 1970, each year again I realised that what I had done in previous years was not enough, and I went back to work as quickly as possible, at least when someone else (e.g. Mike Artin, with the point of view of 'algebraic varieties' in his sense) had not already started. But it would seem that my students have also buried the example I set them, along with myself and my work.

(<sup>81</sup> 3) I seem to remember that in the formalism of the six variances in (say) staggered cohomology, the assumption that the bundles of rings serving as coefficients are locally constant is unnecessary - the essential assumption is that they are prime torsion bundles with residual characteristics, *and that*  $f^{-1}(\$) \rightarrow A$  is an isomorphism. When we abandon this last assumption, we have to enter into a theory (never yet explicitated, to my knowledge) which "mixes" the "discrete space" duality, and the "coherent" duality (relating to the rings of coefficients and their homomorphisms). As a result, we plan to replace, on the diagrams (or more general topos)  $X, Y$ , the Rings of coefficients  $A, \$$  by relative diagrams (not necessarily affine)  $X^\square, Y^\square$  on  $X, Y$ , and the morphisms of ringed topos  $(X, A) \rightarrow (Y, \$)$  by commutative diagrams of the type

$$\begin{array}{ccc} X^\square & \longrightarrow & X \\ \downarrow & & \downarrow \\ Y^\square & \longrightarrow & Y \end{array}$$

with a "six operations" formalism in a context of this type. When  $X, Y, \dots$  are the point topos, we should find the usual coherent duality.

(<sup>82</sup>) (8 May) This is J. L. Verdier's article "Classe d'homologie associée à un cycle", which appeared in Astérisque n° 36 (SMF), p. 101-151 in 1976. In a way, this rather unbelievable article (although nothing should surprise me any more...) is a counterpart to the "article per- vers" by Deligne et al. With one reservation, it consists practically of *copying over* fifty pages, in a slightly different context, concepts, constructions and reasoning that I had developed at length ten or fifteen years earlier, - terminology, notations, everything is there verbatim! I would have thought I was back at a session of the APG 5 seminar held in 1965/66, where these things were spelled out (apparently to the satiation of the participants (\*)) for a whole year. After that seminar at least, all these things

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(\*) For comments along these lines, see notes n° s 68, 68<sup>□</sup> "Le signal" and "Le renversement", where I examine the strange vicissitudes of the writing of this seminar, and the relationship between these and Deligne's "SGA 4 1/2 operation". The reflection that follows reveals another unforeseen aspect of these vicissitudes and of the dismantling of the mother seminar by the combined efforts of Verdier and Deligne. The publications by both Verdier and Deligne which consecrate this dismemberment date from 1976 and 1977 - they constitute the 'green light' given to Illusie to prepare (eleven years later. . . ) the publication of SGA 5 (which, as Deligne says in SGA 4 1/2, 'can be considered as a series of digressions, some of which are very interesting').

belonged to the realm of the 'well known' for those in the know(\*\*). Verdier had attended, of course, as had Deligne (the only one who was never left out in the cold, even though it was the first time he'd set foot in my seminar (\*)) - it had to be done.... . ). It's true, well, well, that in 1976 the 'writing-sic' of this famous seminar by 'volunteers-sic' who were fed up with it had been dragging on for ten years - I see now that one of these 'volunteers' took charge of the 'writing' in his own way, even before the publication of SGA 5 in 1977! It seems that the vicissitudes of this unfortunate semi- nary did not benefit only Deligne, who took advantage of the situation in his own way. But at the time, Deligne still took care, while dismantling SGA 5 from one of his key lectures to join them to his SGA 4 1/2 as something due, to mention in his essay (on the cohomology class associated with a cycle) "after a lecture by Grothendieck". (It is true that he found in this the compensation of being able to use it to present me as his 'collaborator'! - see the note "Le renversement", n° 68<sup>¶</sup> ).

To come back to the *homology* class (not to be confused!) associated with a cycle (which, according to the title, is the subject of Verdier's article), I had developed this formalism in great detail, in several presentations, during the oral seminar, before an audience that was begging for mercy (except for Deligne, who was always dashing and fresh...). It was one of the innumerable 'long exercises' that I developed that year on the formalism of duality in the étale framework, feeling the need to arrive at a complete mastery of all the points that seemed to me to require a thorough understanding. The interest here was to have a valid formalism on an ambient scheme which was not necessarily regular - the passage to the *cohomology* class in the regular case, and the link with my old construction using cohomology with supports

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(\*\*) For a reflection in which I return to this "hasty" impression, see the note "Silence" (n° 84).

(\*) The year of this seminar was the year (I think) in which I met Deligne, who must have been nineteen at the time. He 'got into the swing of things' very quickly, and even took on the task of writing my lectures on étale duality from the previous year (which he must have known from my explanations and my notes), and also the lecture on the cohomology class associated with a cycle, which was discussed in the note cited at<sup>¶</sup> 68<sup>¶</sup> ('Le renversement'), and which will be discussed a little more in this one. The fact that, with the means at his disposal and a complete mastery of the subject, he waited eleven years to write the essay, and then included it in his SGA 4 1/2 without informing me, now shows me, in retrospect, that as early as 1966 (and not just 1968 as I may have assumed - see note n° 63, "The eviction") - in other words, from the very first year of our meeting, there was a profound ambiguity in my friend's relationship with me, expressed from that moment on in a perfectly clear way, which I have refrained from reading up to the present day!

and giving immediate compatibility with the cups-products, being immediate. I also noticed that this part of the seminar is one of a number that was not included in the published version - no doubt Illusie (on whom all the work of preparing a publishable edition (hmm) eventually fell) must have been quite happy that Verdier took care of it, mutatis mutandis (i.e. here: without changing anything!).

As the saying goes, "it hardly needs to be said" that my name does not appear in the text or in the bibliography (except implicitly by the perennial reference SGA 4, which we would still have to find a replacement for...). There is no allusion to a 'Seminar on Algebraic Geometry' under the acronym SGA 5, which the author might have heard of - although I seem to remember seeing him busy taking notes (like everyone else, except Deligne of course. . . ).

I have exaggerated just a little by saying that my name is absent from the text - it makes a single, mysterious and lapidary appearance on page 38, section 3.5, "Fundamental cohomology class, intersection" (here we come to the crux of the matter!). The reference consists of a cryptic sentence whose meaning escapes me, I confess: "The idea of systematically using weight complexes (??? those damn weights again!) is due to Grothendieck and was put into form by Deligne" - without any further explanation of these mysterious "weight complexes" whose idea I had and about which I hear mention here for the first time. There will be no further mention of them in what follows (nor was there any mention of them in the 37 pages before that). Understand who can

! As far as the content of the said section is concerned, it is copied without more from the SGA 5 seminar which had taken place ten years earlier (and by then this construction was already five or six years old, see note n° 68<sup>¶</sup>), a seminar which he is careful not to quote. The reference to Deligne (who is said to have 'perfected' an idea that had already been perfected when my friend was still at lycée!) is a 'flower', the idea of which no doubt came to the author because the young and newcomer Deligne had indeed taken on the task of writing my paper on this subject (and refrained from doing so for eleven years, for the benefits that we know, see note cited). This 'flower' is part of the exchange of courtesies between inseparable friends.

There is, however, a (doubtless) new and very interesting result in the article (Th. 3.3.1., page 9), on the stability of discrete bundles analytically constructible by higher direct images by an analytic and proper morphism. Verdier had learned the notions of all-round constructibility from me some fifteen years earlier, as well as the stability

conjecture, which I had posed to myself (and had told anyone who would listen)

in the late fifties, before I had the pleasure of making his acquaintance. Reading the article, it would never occur to an uninformed reader (but these are becoming rare... I'm repeating myself again, I'm afraid) that the author is not serving up hot-off-the-press notions and statements that he has only just discovered. He doesn't have to say it's him - because it goes without saying. It's the famous 'thumb' style, which has obviously caught on.

Apart from this detail (which, I have the impression, is in line with the new canons of the profession), there must still be about ten pages (out of fifty), around this interesting result, which present the author's personal work. All things considered, what strikes me most about Verdier, as with Deligne, is that he is perfectly capable of doing fine mathematics. Even in this sad article there is a sign of this with the theorem quoted. But by keeping himself (like his friend) in a *fos-soyeur* frame of mind, he is operating, like his prestigious friend, on a derisory part of his means. One sign (which astounded me) of an apparent mediocrity in a mathematician who has nevertheless given proof of astuteness and flair, was his total lack of instinct for sensing the scope of the work of his 'pupil' Mebkhout, whom he took pleasure in treating from the height of his greatness, without ever having been able to produce work of comparable depth and originality himself (\*). It's not that he isn't just as capable as Mebkhout or me. But he has never given himself any chance of doing great things, that is to say, of letting go of the reins to a passion - rather than making of mathematics and its gifts the *insrrumenrs* to dazzle, to dominate or to crush. Up until now, he has been content to take on board as it were concepts and points of view that have already been cooked up. In fact, he seems to have completely lost touch with what a *Marimariic crearion is all about*.

But I seem to remember that when he worked with me, that sense was still there. Nothing external to him prevents that sense from resurfacing. Just like in his friend, in whom I have often felt this same eclipse of something delicate and lively, blocked by the same fatuity.

This incredible 50-page article, which appeared in a standing magazine, throws a new light on the subject for me.

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(\*) The same astonishing lack of flair was shown on this same occasion by Deligne, who only 'felt the wind' (the importance of Mebkhout's ideas) in 1980 it seems, whereas Mebkhout had been working in this direction since 1974. More than once I have had occasion to observe my friend's natural flair being blocked by complacency, especially since 1977 (or 78) - which seems to have been a first 'turning point' (see on this subject the notes 'Two turning points' and 'The funeral', n° s 66, 70).

New light on the "Note - or the new ethics" incident (s. 33), where a note to the CRAS of *a few pages*, summarising a solid and *original* work, on an important subject (in my humble opinion), the fruit of *two years' work* by a highly gifted young mathematician, was rejected by two eminences as "devoid of interest"(\*). One of these eminences was none other than Pierre Deligne - the same Deligne who did not disdain to copy in toto and in person the humble doctoral thesis of one of my students (whom he made a point of quoting). (This duplicate, enhanced by a prestigious signature, makes the largest article in the 'memorable volume' LN 900 of a no less prestigious collection! On this subject, see the end of the notes (⁵²), (⁶⁷).)

The 'tableau de moeurs' is certainly growing by the day, without my having to come out of retirement and hit the pavement to mingle with the 'big world'. A few hours spent here and there leafing through a few well-chosen 'great texts' will have been enough to edify me.

...

(⁸³) (8-9 May) I thought again about this 'weight complex' mentioned in the 'reference — inch' in Verdier's memorable article(\*\*) - a reference that is a joke, pure and simple nonsense. As soon as I saw this absurd reference, an association came to mind that kept running through my head. It's far from the first time I've been confronted with something that appears bizarre, that seems to defy rational explanation - even though the meaning is clear and unambiguous and clearly perceived, but at a different level from conventional logic. This was the only one on which I functioned at a conscious level for most of my life. — with the result that I was constantly overwhelmed by 'crazy', incomprehensible events - distressing in their irreducible absurdity! My life changed a great deal from the moment (less than ten years ago) when I began to live within a broader range of my faculties. I realised that every absurdity, every so-called 'nonsense', has a *meaning* - and the mere fact of knowing this, and therefore of being curious about the meaning behind the nonsense, often opens me up to its obvious significance.

In this nonsense about 'weight complexes' I think I sense an act of *bravado* of the same kind as in calling them 'perverse bundles' (\*) - in this case the pleasure of proving to oneself that one

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(\*) For details on this subject, see the note "Cercueil 4 - or topos without flowers or wreaths", no.° 96.

(\*\*) See previous note "The right references".

(\*) See "Perversity", n° 76.

*fear of being allowed*, in a magazine of standing and in a text which claims to be a standard reference text(\*\*), to say a related absurdity, and that no *one* will dare to ask even one question! And I am convinced that the gamble contained in this bravado, in the eight years since the article appeared - that this gamble *has been won* to this very day: that I was the first today to put the naive question to the author.

Of course, the moment (or the place) when a saugrenuité appears, in this case at the precise moment of the one and only reference to my person, is by no means a coincidence; nor is the form it takes, in this case by allusion to a type of concept, 'weight', entirely foreign to the theme of the whole article, and by the improvisation of a composite concept 'weight complex' that never existed! The association that immediately presented itself to me could well provide the key to the more precise meaning of the saugrenuité, beyond the bravado, the demonstration of power. It was the association with an allusion that was just as sibylline and just as purely formal (but without yet having the extra dimension of saugrenuité

!) in the article by Deligne quoted at the beginning of note (49)(\*\*\*). It was an obscure allusion, in an article where the word "weight" was strictly absent and where no one but Serre or I would have been able to see them, to "weight considerations" which had led me to conjecture (in a less general form, it is clearly stated) the main result of the work. As I explain in the more detailed note "The eviction" (n° 63), behind this allusion of pure form, is the intention to *hide* both my role, and the ideas (concerning "weights" and their relationship to cohomology in general, and that of Hodge in particular) from which he intended to reserve the sole benefit. This intention must have been all the more clear to Verdier as he himself 'operates' on the same diapason (in his relationship with me, at least, which seems to me to be the main cement between the two inseparable friends). In either case, an honest presentation would have consisted in starting the article by clearly indicating the source(s) for the main ideas, or for the question(s) that motivated the article.

Having said that, here is the meaning I see behind the symbolic language of ap- nonsense.

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(\*\*) And it does seem that this text is now a standard reference - in any case for many years it was one of Zoghman's bedside texts (he recently sent it to me). It was there that he learned about the notion of constructibility (which plays an essential role in his theorem), and for a long time he was convinced that Verdier was the brilliant inventor of this notion, which was crucial for him.

(\*\*\*) This is the note "Canned weight - and twelve years of secrecy". For a more detailed examination of this article by Deligne from the point of view that interests us here, see "L'éviction", note no.° 63, quoted below.

parent: I can allow myself, without embarrassing myself in the least, to display before everyone a patent *nonsense*, and at the same time express by this nonsense my true intention, with this absurd allusion-reference to the 'weight-complex': this is because I have no more intention of revealing anything about the role of Gr. in this work, any more than Deligne had such an intention with his meaningless allusion to 'weight considerations' - which allusion made no more sense to the reader than it does now to the imaginary '*weight-complexes*' that I have just invented, for the sake of the cause and for my own pleasure!

I've just copied this note on the net, written yesterday - I was interrupted earlier by a phone call from Verdier, whom I'd tried to reach during the day, to ask him just that question. I explained to him that I was trying to learn a bit about cohomology, something I had never understood, as he well knew, and that Mebkhout had given me an old article by Verdier for my instruction, a work that had long been his bedside text. I was now trying as best I could to read it, but there was this cryptic reference - it was nice of him to quote me, of course - but I had absolutely no idea what he was talking about.

He was quite happy, even a little flattered, but yes, with a broad smile that protruded behind an air of paternal joviality, that I should end up like this in my old age, learning cohomology on this old paper of his. I didn't expect him to even think of contradicting me when I said that he knew I'd never understood anything about cohomology - obviously that had been agreed a long time ago... . As for these famous 'weight complexes', I could feel his

broad smile again at the end of the line (you'll say I'm making it up!), delighted that someone (and the recipient himself to boot) had finally picked up on something that had been overlooked for so long. At the same time, there was also a hint of embarrassment - more that (I think) of not having been able to hide a pleasure (like the pleasure one would take in a slightly salacious story... .), than of not knowing what to answer. As dumped as I was, he really didn't have to worry about that! Without hesitation, he turned to Deligne (whose name I hadn't mentioned) who had given a demonstration in one of his articles and in which he quoted me - he couldn't quite remember where - in any case it was a question of weights but yes, he had forgotten a bit of course - but not arithmetical weights, in fact, I was quite right, it wasn't the same thing... . His tone was jovial and without retort, and he made it clear that he had already given me quite a bit of his time - a slightly hurried air, without losing that debonair tone, a little

protector. I apologised for bothering him like that, with a rather stupid question, and thanked him for his explanation. My apologies were sincere and so were my thanks.  
— he had taught me everything I wanted to know (\*).

## IX. My students

(<sup>84</sup>) (9 May) I was perhaps a little brash yesterday in writing that in 'the correct reference' (see note (<sup>82</sup>)) what the author and ex-student was shamelessly copying 'was part of the realm of the 'well known' for those who are a little in the know'. I tried to explain for my own information who these 'people in the know' were - with the conclusion that *they were no more and no less than the dear listeners at the SGA 5 seminar in 1965/66.*

— listeners, moreover, as I've had occasion to say, often more or less out of their depth — and judging by the vicissitudes of the writing of this seminar in the hands of volunteers whose lack of conviction I didn't want to feel, it was often more 'more' than 'less' (always with the exception of the same Deligne, of course). Indeed, there was no risk of other people 'getting involved' as long as SGA 5 had not been written and published, precisely to allow people to 'get involved' by reading it! This seminar was in fact published (as fate would have it) *after* the two 'memorable publications' by two of my dearest students and comrades-in-arms, namely the article in question by Verdier in 1976 (in which he breathed no word about the origin of the ideas he was developing, published there under his pen and for the first time), and Deligne with SGA 4 1/2 , which has already been discussed at length (\*). After that, we cordially invite Illusie to take care of publishing the rest!

I can't remember in detail who took part in the seminar - whether Artin was there or not, for example. I think that more or less all my students from the first period must have been there in any case - with the exception of Mrs Sinh and Saavedra (whom I hadn't met at the time) and perhaps Mrs Hakim.

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(\*) Even with my airs of defeat, I didn't really feel like I was putting on an act (I don't have the gifts for it), it was perfectly natural - in truth, I'm a bit of a loser in all this stuff that I haven't handled for nearly fifteen years! But I think that even in my old age, when I'm ripe for the hearse, I'll still be able to feel the difference between an empty walnut and a full one. ...

(\*) See in particular notes n° s 67, 67<sup>¶</sup>, 68, 68<sup>¶</sup>.

There was also Bucur (since deceased), Houzel, Ferrand - I'm not counting Serre, who never had a taste for big cohomological fuss, and who would come along from time to time and cautiously put his foot down. While no one except Deligne perhaps had a good idea of where all this was leading, it seems to me that there must have been ten or twelve listeners (not very involved) who followed at least enough to be considered 'in the loop'.

The thought that's been running through my head since yesterday is that among all these people 'in the know', who are therefore considered to be cohomological experts (if not all 'luminaries' like Illusie and Berthelot, with their 'cohomological' theses, which were definitely worth their weight), and even apart from Verdier and Deligne - there must be quite a few of them who've had Verdier's article in their hands! A certain air about Verdier convinces me that nobody ever suggested to him that something might be wrong. And I also know that nobody ever drew my attention to it - I learned of the existence of this article on 2 May, exactly a week ago today, thanks to Mebkhout, who had of course known about the scam for years.

This gives a very concrete meaning to the euphoric observation of the 'Unanimous Agreement' (to bury my modest self) made ten days ago (note (74))! This agreement includes many (if not all) of my 'pre-1970' students - that is to say, many of those who today set the tone in the mathematical world; and it includes (or has included) my friend Zoghman himself, treated as the Cinderella of the beau monde and clinging on against all odds to a kind of 'fidelity to my work' (to use his own expression (\*)), which he has had the temerity and obstinacy to claim for himself at times, with the consequences that we know. Go and understand!

In short, I was wrong to suggest that such and such a journal of standing published a sort of junk article, which merely copied what was 'well known'. What the author was copying in full view (if not of everyone, but) of many witnesses was neither published nor 'well known' (except in the cohomology class of a cycle in the coherent framework, where I had published it a long time ago).

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(\*) (7 June) Reading all the notes on L'Enterrement during a recent visit, Zoghman pointed out to me that the expression he had used of 'fidelity to my work' did not really capture his thinking. What he had in mind was confidence in his own powers of judgement and mathematical instinct, which told him that my work provided him with some of the ideas he needed. So this is fidelity to *oneself*, which is essential if one is to do truly innovative work.

And these were additional ideas which I would be loath to play down, given that I didn't feel I was wasting my time by spending a year developing these and other ideas in a seminar, in front of a large audience. Verdier's article is probably a useful and well-done 'digest' of a small part of the ideas and techniques that I had developed, precisely so that they become 'well known', the daily bread of anyone who uses cohomology (or homology) for objects that more or less deserve the name of 'varieties'. From this point of view, then, Verdier has done what was useful to do (\*), and in the end I have no reason to be dissatisfied. However, from what I have sensed from my ex-student and friend even today, on the telephone, and from many other things that I have been able to sense about him (the 'biggest' of which, or at least the most 'spectacular', is the mystification of the Colloque Pervers) - I do feel that *something is wrong*. That memorable Colloquium was certainly brilliant, mathematically speaking, in many respects. What's 'wrong' is at a completely different level. I could try to define it in words, but I have a feeling that that would not make much sense. Anyone who doesn't feel what's wrong with this Colloquium - and surely with many other colloquia too, without mystification or anything - won't feel it one hair more, once I've made this attempt to 'pin it down' and even managed to do so to my complete satisfaction. ...

The question that remains open for me is whether this 'sign' represented by what is undoubtedly a relatively common occurrence today (of an author presenting as his own the unpublished ideas of others) - whether this sign is that of a general deterioration in morals, So whether it is only a typical sign of a 'spirit of the times' in the mathematical world today, or whether it has more to teach me about my particular person - about who I was and who is now coming back to me, through the attitudes towards me of those who were my students.

The two possible meanings are by no means mutually exclusive. My former students' relationship with me could not have found this way of expressing itself if a certain state of morality had not encouraged them to do so. Even before this 'sign', I saw many others that seem to me to be more eloquent

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(\*) It is true that he did this at the expense of the 'dismantling' of the original SGA 5 seminar, a dismantling in which he and Deligae were the main players and 'beneficiaries'.

(7 June) Reflection on 12 May, three days later (see the note "The massacre", n° 87) revealed that Illusie was even more directly involved than Verdier in what appears to have been more a "massacre" than a dismantling - even though he was not the "beneficiary" and acted on behalf of others.

still at the level of a 'tableau de mœurs'. What struck me about this sign was the peculiarity that sets it apart from all the others: it seems to *involve both the pluparr of my anran pupils*.

Such a circumstance cannot be fortuitous. To put it down to a 'deterioration in morals' (which is all there is to it) would be a way of evading its more personal meaning, which implicates me as it implicates each of my former pupils. If I say 'each and every one', which seems to go beyond the real scope of this sign, I'm weighing my words carefully. For this sign is a timely reminder that it is hardly conceivable that one of my former pupils has not at least been confronted with situations of this kind. For years I have felt a certain 'wind' about me, blowing through the world of mathematicians that I left (a wind whose origin and reasons I now clearly see, it seems to me). It is not possible that one of them has never felt the breath of this wind, whether on the occasion of an 'incident' such as the publication of this gravedigger article, or on any other occasion. Whether he wanted to or not, such an encounter inevitably raised (or raised again) the question of his relationship with me, who had taught him his profession. And the sign I see, apart from the one that has just brought me to this point, is that *I haven't heard a word about it from any of my students* (\*). This is a 'coincidence' whose meaning still escapes me - but which cannot fail to have a meaning (1).<sup>84</sup>

The day is beginning to dawn - I feel it's time to stop. I'm not sure that this is the time or the place, in Harvest and Sowing, to pursue the meaning of this striking coincidence any further. It is a harvest perhaps reserved for other tomorrows, as long as my reflections of this night meet with an echo in one or other of those who were my students. (→85)

<sup>84</sup> 1) (16 May) This perfect agreement between my former students, in this complete silence towards me, is in line with other signs. One is the complete silence that also greeted the episode 'Les étrangers' (see section 24) - a silence about which I have already given some thought in note n° 23v. Secondly, with the exception of Berthelot, who has

(\*) (31 May) Interestingly, the one and only person who has ever hinted at the existence of a funeral is an African friend of mine who did a 3<sup>o</sup> cycle thesis with me about ten years ago (i.e. a 'post-1970 student' of modest status), with whom I have remained on friendly terms. The letter in which he implied this must have been written two or three years ago, at a time when it came as no surprise. I did not then ask for details of his impressions, which he has only recently returned to.

from Deligne, who sent me four (out of fifty or so publications), and one from Illusie, I haven't received any special editions from any of my former students. That says a lot about the ambivalence in their relationship with me. Sending them separate prints, even though it was doubtful whether I would ever use them in my work (\*), would have been the most obvious way of letting the person who had taught them their trade know that this trade in their hands did not remain inert, that it was alive and active. But it is also true that for at least some of them, their publications also testify to their participation in a tacit burial of which it was better not to inform the anticipated deceased, trade or no trade... On the other hand, I have received numerous offprints from several authors working in crystalline cohomology(\*\*), and even a good number of offprints from fellow analysts whom I hardly know by name, when their work takes up (and sometimes solves) questions that I had asked thirty years ago or more, when it was obvious that I would not return to the subject I had left and that, from a 'utilitarian' point of view, they were wasted offprints. But those colleagues must have sensed something that my students didn't want to sense. - Of course, in the sixties my pupils were the first to be served for all my publications, both my articles and the great EGA and SGA series, and every one of them (except Mrs Sinh and perhaps Saavedra) must be in possession of my complete work published between 1955 and 1970 (in the ten thousand pages I presume).

It's true that my ex-students are in good company: none of my former close friends in the 'big mathematical world', including those whose work is very closely related to mine or who played a role in the development of my work programme in the 1960s, thought it worthwhile continuing to send me separate editions afterwards.

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(\*) (31 May) This might even have seemed out of the question until 1976, although in the early 1970s I had made it quite clear that I had no intention of ever returning to mathematics. The lecture I gave in 1976 at the IHES, on De Rham complexes with divided powers, showed quite clearly that I was still interested in mathematics.

(\*\*) (31 May) These are young authors whom I don't know personally, and I presume they have followed the example of Berthelot, who must be their elder statesman. The rather strange thing here is that for at least the last two years (since the Luminy Colloquium of 6-10 September 1982), Berthelot has been actively trying to bury me (see on this subject the b. de p. note of 22 May to the note "les cohéritiers... . "n° 91) - could this be a recent turning point in his relationship with me? I don't remember receiving the reprint of the article - survey sur la cohomologie cristalline et consorts, in which he passes my name over in silence - he must have been careful not to send it to me!

my departure from the common environment(\*\*\*)). Only recently, of the fifteen or twenty old friends (including a few students) to whom I sent the *Esquisse d'un Programme* (which, among other things, announced the resumption of intense research activity, after a fourteen-year hiatus and on themes closely related to those we had pursued together in the past), only two (Malgrange and Demazure) took the trouble to send me a few lines of thanks. The few slightly more detailed (and moreover, warm) feedbacks I have received have come from young mathematicians whom I have only recently met, and from my old friend Nico Kuiper, who is in no way connected to the kind of things I do. He found out about the text through intermediaries, and was delighted with my unexpected 'comeback' (\*).

(<sup>85</sup>) (11 May) The story of the ill-fated SGA 5 seminar keeps running through my head. The 'good reference'(\*\*) certainly sheds new light on this story, and at the same time gives new meaning to the brilliant 'SGA 4 1/2 operation'.

The more I think about it, the *bigger* the story of SGA 5 seems to me. My first impression, when I 'arrived' just a few weeks ago (see notes n° s 68, 68<sup>✉</sup> ), had been

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(\*\*\*) (31 May) Of course, the psychological reasons that might have prompted them to send me some were much weaker than in the case of my students - but, one might naively think, much stronger than among my fellow analysts, or even among the many algebraic geometers from whom I received separate copies, and whom I know little or nothing about personally. Clearly, after my departure from the common milieu, the fact of having been friends created or reinforced, among my former friends in the mathematical world, the automatisms of rejection that I have had occasion to observe. (On the subject of these attitudes, alluded to in passing here and there in *Récoltes et Semailles*, see the note "Le - ou la Congréation toute entière" of 24 May, n° 97.)

(\*) (31 May) This is almost the only echo from one of my old friends (or one of my anciens élèves), in the sense of an acquiescence to my 're-entry'. This is hardly surprising, given that the appearance of the deceased unseemly disrupts the normal course of a funeral ceremony....

(17 June) However, I recently had the pleasure of receiving a warm letter from Mumford, who says he is 'thrilled' and 'very excited' by the ideas sketched out in the *Esquisse*, and who confirms that the key technical result I needed for my combinatorial description of Teichmüller's tower has indeed been proved. This is the first time since 1978 that one of my old friends has taken to my 'Anabelian' ideas, whose exceptional scope (comparable to that of the yoga of motifs) has been obvious to me since the beginning...

(28 March 1985) Since these lines were written, I have also received a very warm letter from I. M. Gelfand (dated 3 Sept. 1984), in response to the *Esquisse*. (\*\*) See note n° 82.

that a situation of disarray among the poor ex-auditors of this seminar in 65/66 had been put to good use in his own way by my friend Pierre, for his famous operation, and that nobody else had anything to do with it. And as for the misfortunes of SGA 5, it was neither he nor anyone else, but rather none other than myself, who unfortunately had not been able to enthuse my volunteer listeners-editors, nor to do for them the work that they stubbornly refused to do while saying that they were going to get on with it quickly. Then it turned out over the last few days that there was one of them, after all, whose enthusiasm was reawakened ten years later, to publish (without any reference to the seminar) what he liked to take from it, thus creating a good reference for his own account, at a time when the other 'volunteers' still hadn't decided to get involved.

What has become increasingly clear to me since yesterday is that it's not just two 'villains', but *every one of my 'cohomologist' students* who are directly involved in the cover-up of this seminar. Unless I'm mistaken, each of them attended this seminar - namely (in chronological order of appearance of my 'cohomologist' students): Verdier, Berthelot, Illusie, Deligne, Jouanolou (I'm not counting Jean Giraud, who operated in registers quite different from those discussed in SGA 5 or its predecessor SGA 4).

This seminar, which I gave *for the benefit of my students* first and foremost, and even though they sometimes begged for mercy - *I don't think it was a piece of shit*. Each of them, during that year, learnt a good deal about his job as a 'mathematician using cohomology'! The things I did to them, taking up again in a much more circumstantial way ideas that I had first developed in a coherent framework

- these things, they could find them nowhere else than in this one seminar made for their benefit, given that nobody before me had ever bothered to do them - and that nobody apart from me even felt what there was to do, and why. (Except always Deligne, who learnt over the months in this very seminar, being quicker on the uptake than the others). It was having taken this seminar (and the previous one) and having worked on it at home as best they could, and nothing else, that meant that they were now 'in the know' about duality formalism - and they were *the only ones* to be. This *privilege*, it seems to me, created an *obligation* for them: to see to it that this privilege did not remain in their hands alone, and that what they had learned from me, and which has been an indispensable baggage in all their subsequent work up to the present day, was made available to everyone, and this in the

reasonable and customary deadlines - of the order of a year at the most, or even two at a pinch. It will be said, not without some reason, that it was up to me above all others to see to that. But if I accepted in good faith when students and other auditors offered their help with writing (writing which, for those who took it seriously, could only do them good) - it wasn't

for the benefit of being able to twiddle my thumbs while they did work that was my responsibility. I continued, with the help of Dieudonné and others (including Berthelot and

Illusie in 1966/67) to develop basic texts which I also felt were urgent, and which no one else would have done in my place or without my assistance (\*). These texts have themselves

become indispensable references, including for my 'cohomology students', who are well aware of the importance of the subject.

happy like everyone else to have them ready when they need them.

With the mastery of cohomological ideas and techniques that they had acquired through their work with me and the seminars that they had attended or participated in, writing this seminar through their joint efforts represented a task of derisory dimensions, if one compares it with the service that was being rendered to the famous 'mathematical community', or perhaps also, later on, with an obligation of loyalty that they might feel towards me. I've already said that for me (the one with the helping hand), it must have taken a few months to write the whole seminar. By sharing the work between the five of them and with the experience of writing that they had each acquired in those years, and with my detailed handwritten notes at their disposal, the investment to be made by each of them was of the order of a month or two at the very least. They were much better equipped to do this than other editors, such as Bucur, who would have liked nothing better than to entrust a task, which was clearly beyond him, to younger and more directly motivated hands.

As long as I was around (so in the three years that followed), I understand that a reflex to rely on me may have come into play - I was supposed to coordinate everything and deal with the 'volunteers'. It's likely that if I'd asked each of them to make two or three presentations in a short space of time, with me to do the same, and get it over with, they wouldn't have objected. It was when I withdrew from the mathematical world that the situation changed completely. They

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(\*) Between the 1960s and 1970s, I had to work at an average rate of a thousand pages a year of texts (EGA, SGA, articles), almost all of which were to become standard references (something that was quite clear to me when I wrote them, or when I encouraged a collaborator to do so with my assistance).

I found myself *the sole trustee of a certain inheritance*, both implicit (in the absence of a will) and very concrete. It's true that from a practical point of view, my departure was tantamount to a *disappearance*

- I was well and truly 'deceased', in the sense that there was no one apart from them to be aware of the inheritance, to be able to use it and to be concerned (for better or for worse. . . ) about its fate.

If during the seven years following my departure, this heritage remained hidden (apart from 'the good reference' in 1976!), it's because *my students didn't want it to become public during that time*. All things considered, the situation doesn't seem to me to be very different from that of 'the yoga of motives', which yoga was thoroughly known only by Deligne (apart from myself), and which he saw fit to keep to himself for his own benefit. If there is a difference at first sight, it is that in this case there is only one 'beneficiary' instead of five, and that there is no common measure between the depth of what was concealed by one, and what was concealed jointly by the five.

I certainly don't know everyone's deepest motivations - even in the case of Deligne I have an apprehension that remains hazy and no doubt will remain so. But on a 'practical' level, Deligne's game (with the SGA 4 1/2 operation - and all the rest) is quite clear. And what is also clear is that these operations could not have been carried out *without the solidarity of Rous*. It seems to me that Jouanolou isn't too much in the picture - he doesn't seem to me to be a 'som-mite', I have the impression that he left the cohomological quagmires a long time ago (<sup>85</sup> 1). But I can't imagine Illusie and Berthelot not having had both SGA 4 1/2 and 'the right reference' in their hands, and they can read as well as I do and are no more stupid than I am. If Illusie suddenly took charge of the publication of SGA 5, at the precise moment when Verdier had helped himself, when Deligne had helped himself, and when Deligne needed a logistical base for his famous SGA 4 1/2 (appropriately debunking the two seminars from which this text and all his work stem), whereas Illusie had had ten years to do it, it is surely no coincidence. If the closing lecture on open problems and conjectures that I gave in 1966 "has unfortunately not been written, any more than his very fine introductory lecture, which reviewed the formulas of Euler-Poincaré and Lefschetz in various contexts (topological, complex analytic, algebraic)", that's surely no coincidence either - but that's a burial I don't know anything about. And it's no coincidence either that it seemed as natural to Illusie as it did to Deligne (and just worth mentioning in passing among the 'changes of detail') to amputate one of his key lectures from the seminar,

which goes into SGA 4 1/2 without further ado (\*).

I don't know what the intentions (conscious or unconscious) of Luc Illusie, whom I like like Pierre Deligne, and who (like him) has always been very kind to me (\*\*), were. But I note that he has become, alongside Deligne, the co-actor of a *shameless mysrificarion*: that which passes off the SGA 5 mother seminar of 1965/66 (the very seminar in which Deligne first heard of schemas, staggered cohomology, duality and other 'digressions') as a kind of shapeless, vaguely ridiculous appendix to a collection of texts with the misleading name SGA 4 1/2 written eight years later, which pretends to present itself as anterior (both by the number appearing in its title, and by the number of publication in Lectures Notes, and finally by the author's unusual comment: "Its existence (of SGA 4 1/2 ) will soon make it possible to publish SGA 5 *rel quel*" - my emphasis) - and which moreover affects to treat with undisguised disdain the works from which this meagre collection is entirely derived.

Without this work, which was treated so casually, *none of* Deligne's great works, which form the basis of his well-deserved prestige, would be written now, or in a hundred years' time (and the same would no doubt apply to Illusie and my other cohomology students). There is an *impudence* in the spirit of this "SGA 4 1/2 operation", of which Illusie is (without even realising it, no doubt) the guarantor, and which could only have been displayed in this way with the tacit approval of a *consensus*. The first people involved in this consensus, apart from Deligne himself, are the very people who were my students and the main beneficiaries of a certain heritage, handed over before their very eyes to the haggling and disdain.

And these airs of peremptory smugness, these paternal and protective airs that I was able to appreciate in my ex-student only the day before yesterday in our conversation on the telephone (\*), and also

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(\*) (16 May) In fact, as I discovered the very next day (see note n° 87), there had been a veritable 'massacre' of the mother seminary (or father!) SGA 5, at the hands of Verdier, Deligne and Illusie.

(\*\*) Even after I left in 1970, Illusie showed me a great deal of kindness - for example during I'm afraid I didn't have to write back very often to thank him and give him a sign of life. I'm afraid I didn't have to write back very often to thank him and give him some sign of life - these signs of faithful friendship came to me like messengers from a past that seemed infinitely distant, and with which I had lost touch.

(16 May) On the other hand, there was no desire on Illusie's part to continue or resume contact at the mathematical level, and even last year (when I contacted him about mathematical questions) I sensed his reluctance. In the fourteen years since I left, I have received one and only one separate print from him, dated 1979.

those more discreet airs of condescension that I was able to appreciate in my friend Pierre from the afternoons of the brilliant double operation 'SGA 4 1/2 - SGA 5' (of which I was far from having the slightest suspicion at the time and for another seven years) - these airs are *not* the products of a soli- tude, but the signs of a consensus *that has never been questioned*. These arias tell me something not only about Verdier and Deligne, but also about all those who were my students, and before all others, about those who were (by virtue of the subjects they worked on and the tools they used every day) the first to be affected.

The term 'mystification', which came to me without looking for it, opportunely reminds me of that other mystification, in which the same cynicism was on display - that of the so-called 'Pervers' Colloquium. The two seem to me to be *inextricably, indissolubly linked - it was the same spirit that made both possible*. With the possible exception of Jouanolou, who no longer has much to do with the 'big world', I see these same former cohomology students as co-responsible and united in this disgrace. As far as Berthelot and Illusie are concerned, there is nothing to suggest malice or bad faith (which cannot be doubted in the case of either Verdier or Deligne). But at the very least I note a blindness, a blockage in the use of healthy faculties, the underlying reason for which, of course, escapes me. If it weren't for a deliberate intention of indifference and disdain, surely Zoghman Mebkhout, as the only person in the 70s who openly claimed to be inspired by my work, and on subjects that affected both of them closely (without them deigning to notice), would have had the benefit of the minimum 'favourable prejudice' to make them at least aware of what he was doing, and thus realise the interest of the direction in which he was heading from 1974 onwards, an interest which was *obvious!* Neither of them deigned to notice anything, coming from a vague stranger who still pretended to be a Grothendieck. I don't know if they opened it, or if they went through the shorter, more digestible texts that explain what it's about - the fact remains that they didn't even deign to acknowledge receipt of it (any more than Deligne, who obviously sets the tone).

But that didn't stop them and the other participants in the memorable Colloquium (\*) from taking an interesting look at the remarkable 'Riemann-Hilbert correspondence',

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(\*) For this conversation, see the note "Jokes - or 'weight complexes'" (n° 83).

(\*) (12 June) I have since learned that neither of them took part in this Colloquium (Luminy, June 1981).

See, however, the note "The mystification", n° 85<sup>✉</sup>.

without thinking of asking the slightest question about the origin or paternity or at least (as solid mathematicians) about where it was demonstrated (<sup>85</sup>). But I trust that Deligne was happy to explain this demonstration to them elegantly, surely quite obvious to people like them - precisely the kind of demonstration, u s i n g Hironaka-style resolution of singularities, that they learned a long time ago from none other than me (<sup>85</sup> 2). Riemann-Hilbert, Hironaka abracadabra - that was it!

Clearly, like Verdier and Deligne, they have completely forgotten what a *marshmallow creation is*: a vision that gradually unravels over months and years, bringing to light the 'obvious' thing that nobody had been able to see, taking shape in an 'obvious' statement that nobody had thought of (even though Deligne had tried in vain for a whole year . . . ) - and that the first person to come along can then demonstrate in five minutes, using the ready-made techniques that he had the advantage of learning sitting on the benches of a distant seminar from which he never deigned to learn. ) - and that the first person to come along can then demonstrate in five minutes, using the ready-made techniques that he had the advantage of learning sitting on the benches of a distant seminar that he doesn't deign (or hasn't kept) to remember...

If I have spoken bluntly about Berthelot and Illusie, it's not because I want to smear them in particular (after an initial settling of scores with their two friends). I know that they are no 'worse' or more stupid than most of their dear colleagues or than me, and that the lack of flair and sound judgement that I see in them in this case (and sometimes also the lack of necessary respect for others...) is by no means inveterate, but the effect of a *choice*. Doubtless this choice offered them *returns* they liked - and perhaps this other 'return' that comes with my reflection will be unwelcome to one or other of them. If this were so, it would simply be that he is still reproducing the *same* choice, which is also that of operating on a tiny part of his faculties, even if it means mistaking bladders for lanterns and vice versa, and hopelessly confusing empty nuts (from the boyfriend) and full nuts (from a vague stranger). To each his own! (-→86, 87)

(<sup>85</sup> 1) Jouanolou is the only one of my students, along with Verdier, who did not publish his thesis. This seems to me to be a sign of disaffection with the fundamental work he had developed, namely that of A-adic cohomology from the point of view of derived categories. Since most of his work on this theme took place *after* my departure, at a time when my students, led by Deligne and Verdier, had given the signal of a general disaffection with the

ideas that I had introduced into homological algebra, and in particular

of the derived category, the context hardly encouraged Jouanolou to identify with his work and to do him the (well-deserved) honour of publishing it. As these same Deligne and Verdier, in the wake of the work of Zoghman Mebkhout (alias Elève Inconnu (de Verdier) alias élève posthume (de Grothendieck)), ended up discovering (with great fanfare and mutual publicity) the importance of derived categories (see notes n° s 75, 77, 81), Jouanolou's scorned thesis has, since the Colloque Pervers, regained all its topicality; a topicality that it would never have ceased to have, if the development of the cohomological theory of schemes had continued normally after my departure in 1970. A striking detail which illustrates a certain drastic 'turn' in Deligne's options after my departure: it was Deligne himself (who had understood very well the importance of developing the formalism of A-adic cohomology in the context of triangulated categories) who provided Jouanolou with a key technical idea for a formal definition of the triangulated A-adic categories he was studying, an idea which is developed in the thesis. (See my 1969 "Report" on Deligne's work, par. 8).

(30 May) See also, on the subject of Jouanolou's work, the note "Co-heirs... . ", n° 91.

<sup>(85)</sup> 2) Significantly, it was in this same SGA 5 seminar that everyone learnt this principle of demonstration, which is used both to prove the biduality theorem in stale cohomology (in cases where the resolution of singularities is available), and the finiteness theorems for  $R^i f_*$  without a cleanliness hypothesis on  $f$ , and similarly for  $R\text{Hom}$ ,  $Lf^t$ . (These finiteness theorems were also omitted from the published version of SGA 5, to be added to SGA 4 1/2 , without Illusie even seeing fit to point this out in his introduction - I only became aware of it as I was writing these lines!

good reference" instead) learned the procedure in another place where I had used it (for De Rham's theorem for smooth schemes on C).

He could also learn it from 'the good reference', where my demonstrations are copied in the analytical framework, to establish what my students and listeners at SGA 5 have since liked to call the 'Verdier duality' (which I knew about before I had the pleasure of meeting him). It all ties together! The *same demonsrrarion* (copied from me at the same time as the statement) is used by Verdier as a title of authorship for a duality that he learned nowhere else than in this SGA 5 seminar, dislocated and delivered.

to contempt - and it is used *against* Mebkhout, becoming (by its very "obviousness") a (tacit) pre-text and a means of shamelessly robbing him of the credit for an important discovery. (30

May) It seems to me that the first time I used the resolution of singularities in the Hironaka, and where I came to understand the extraordinary power of resolution as a tool for

demonstration, was for a "three spoonfuls" proof of the Grauert-Remmert theorem, describing a complex analytic structure on certain finite coverings of a complex analytic space, and the analogous statement in the case of schemes of type

finished on C. (It's not impossible that the principle came to me on this very occasion, by Serre). This last result is the main ingredient of the proof of the comparison theorem of the stale cohomology and the ordinary cohomology (the rest being reduced to unscrewings, thanks to the  $Rf_!$  formalism, plus a little more resolution to pass from  $Rf_!$  to  $Rf_*$  to  $Rf^*$ ... ).

(<sup>85</sup>) (3 June) In fact, I learn that they did not have to ask themselves the question of this paternity, given that both Berthelot and Illusie learned of the theorem from Mebkhout, the former in February 1982, the latter as early as 1979 (the year Mebkhout defended his thesis). Although neither of them took part in the Colloquium in question, they are nevertheless in solidarity with the mystification that took place at the Colloquium, because it is impossible that they were unaware of the concealment of Mebkhout's authorship of the Theorem of the Good Lord in particular. I can also imagine that, along with all the other participants in the Colloquium, they were the first to be fooled by the collective hoax organised by their friends Verdier and Deligne (a hoax in which four of my five cohomology students appear to be involved). As far as Illusie is concerned, at least, I was struck, during a telephone conversation with him after Mebkhout's visit to my place last summer, by how little he obviously thought of him - he was quite astonished (almost saddened on the part of his old master, in whom he would surely have expected better judgement...) to see me giving Mebkhout a leading role in restarting the cohomological theory of algebraic varieties. A consensus of considerable force had decided to classify Mebkhout among the vague unknowns, and my friend Illusie lives happily with this triple contradiction, without asking himself any questions: the leading role of the theorem of the good God and the philosophy that goes with it; the concealment of the authorship of these things (a concealment in which he himself participates in many ways); and the fact that Mebkhout has been given a leading

role in the development of the cohomological theory of algebraic varieties.

company); and the low esteem he has for the format and role of Mebkhout (who he knows perfectly well is the unnamed author of these things, which have renewed a field of mathematics in which he himself, Illusie, is a figure of eminence).

I find here again the complete blockage of common sense and sound judgement, even in something as apparently impersonal as judgement on scientific questions, a blockage to which I have had occasion to allude more than once already, and which each time again disconcerts me. And this contradiction that I see here in Illusie's relationship (and surely that of many others) to Mebkhout, my 'posthumous pupil', is surely no more than one of the many effects of a more crucial contradiction to be found in his relationship with me. It is this contradiction, in him more particularly and in my other students too, that is becoming increasingly clear in the reflections in the notes of the present procession to the Funeral, formed by my students of yesteryear...

(<sup>86</sup>) (11 May) As so often happens, it was with some reluctance that I set about this new reflection on the theme of 'SGA 5 - SGA 4 1/2 - Perversity', which might seem to have been examined and re-examined to satiety: "It's not at all elegant to go into details, SGA 5 ci SGA 4 1/2 that's all in the past and doesn't deserve any more toast..." .

Fortunately I haven't allowed myself to be intimidated by that familiar refrain, which would like to prevent me from getting to the bottom of something (at least as far as I'm able to go at the time), on the pretext that 'it's not worth it', that there's nothing to do but let it go... If there have been times when I've discovered things that I consider useful and important, it's always been in moments when I've known not to listen to what presents itself as the voice of 'reason', or even 'decency', and follow this indecent urge inside me to go and see even what is supposed to be 'uninteresting' or of poor appearance, or even shoddy or indecent. I can't remember a single time in my life when I've regretted having looked at something a little more closely, against inveterate reflexes that would have prevented me from doing so. These inhibition reflexes were even stronger in Harvest and Sowing than on other occasions, because this reflection is destined to be made public, which immediately imposes certain constraints of discretion (when I involve third parties), and conciseness (for the sake of the reader). In the end, however, I don't have the impression-

However, these constraints never prevented me from tackling something I wanted to tackle, or from going as far as I felt I wanted to. In the cases that may at one time have seemed like borderline cases, I went ahead with the assurance that, should the need arise, I would always have the resource of not including in *Harvest* and *Sowing* anything that would 'come out' of my indiscreet reflection. These 'borderline cases' arose only when I hesitated to involve others, and never when it came to involving myself. But even in the first case, it turns out (and this came as a surprise to me) that I never had to make use of this 'resource': the text of *Harvest* and *Sowing* represents the complete version of my thinking - at least of the part of that thinking that found its way into writing to express itself.

I feel that the short reflection in the previous note (\*) has considerably clarified the situation. I mean that a certain essential aspect of a situation which had been confusing for pleasure, and which I have just referred to by the triple name of a 'theme' (SGA 5 - SGA 4 1/2 - Perversity), appeared to me in full light: that of a 'solidarity', a 'connivance' that had only been dimly perceived until then. This in no way means that I believe I have fathomed and understood all the ins and outs of a complex situation, involving in a direct and particularly obvious way at least seven people: Zoghman Mebkhout (acting in a sense as a 'revealer' of a certain situation), my five former cohomology students, and myself. I don't even flatter myself that I have perceived all the forces and motivations at work in my own person, in relation to the 'SGA 5 etc. ...' situation. "in the nearly twenty years since this 'unfortunate seminar' took place! But I feel in a much better position than I was yesterday (or only this morning) to understand and place the echoes that I hope will reach me on this subject from at least one or other of the main parties involved.

The main question that arises for me (it seems to me that it was already present at another stage of reflection, and it is reappearing now with new vigour) is (it seems to me) this: is what happened with this Burial by my students, (more or less) all of them, a completely *aryypical* thing, linked to certain particularities of my person and my singular destiny (such as my departure from the mathematical scene nearly fifteen years ago, the circumstances surrounding it, etc. . )? Or is it, on the contrary, something 'quite natural', due to a simple combination of circumstances - following the principle that 'opportunity makes the thief'?

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(\*) This refers to the note "La solidarité" n° 85, dated the same day.

? I hesitate to think so, though I can't discern at the moment, or even glimpse, what particular aspect of myself has had the virtue of creating such perfect and unanimous *agreement* among my former students, to bury both the 'master' and those who claim to be his followers or whose work clearly bears his mark (though they are not 'theirs'). Is it this sort of 'aura' of Father that surrounds me, and which I've had occasion to talk about? Or is it the challenge posed to each of them by the mere fact of my departure? At the moment, I wouldn't be able to say, for lack of eyes that can see... . Perhaps the coming months will teach me something on this subject (\*).

More than once in the last three weeks, I've thought about this other strange 'coincidence': the discovery of the Burial 'in all its splendour' (with the four stages LN 900 - SGA 4 1/2 - SGA 5 - Colloque Pervers, then back to SGA 5 and SGA 4 1/ ).<sup>2</sup> — that this discovery came at a time when I had just completed an in-depth reflection on my past as a mathematician and on my relationship with my students. It was a time when I had just 'come to terms with myself' about this past, to the best of my ability, and as far as the facts known to me at the time would allow, as recounted by memories that were often hazy. Or to put it another way: this was exactly the moment when I was finally *ready to learn*, and to profit from it.

'Chance' did things so well that there was not even a break in the meditation. The reflection that had begun with this short retrospective on the fate of the most important notions (in my opinion) that I had introduced (\*) (a reflection that remained in a certain vagueness, where only a certain basic tone emerged insistently...) - this reflection continued in a quite natural way on this Thursday 19 April. ) - this reflection continued quite naturally on Thursday 19 April. Admittedly, it was still under the influence of the emotion aroused by the impression of 'impudence' (to use the term I used earlier, which also aptly describes something I felt at the time), on reading the 'memorable volume' LN 900.

In this new departure from "the same" thinking, the main driving force was "the boss".  
— my self-esteem and sense of decency, and in writing

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(\*) (30 May) For a reflection along these lines, see the note "Le Fossoyeur - ou la Congrégation toute entière", n° 97.

(\*) See the notes "My orphans" and "Refusal of an inheritance - or the price of a contradiction" of 31 March. (n° s 46, 47).

I was freeing myself from my emotions to a certain extent. It was clearly 'me', 'the boss', who led the dance in the ten days that followed - days marked by the absence of smiles and laughter, by an unfailing seriousness. I probably had to go through this ten-day diversions before my thoughts returned to the centre they had left - to myself. I still remember the relief of that return - like coming out of a tunnel when daylight appears again! It was then that I found myself laughing and smiling again, as if we'd never left each other. It was April 29. The next day, the 30th, the last day of the month, I was happy to put the finishing touches to this ultimate stage of reflection.

It was also the moment, I'm sure, when I was ready to receive the next 'package', this time sent by my friend Zoghman - the 'Colloquium' package received on the weekend. Today is the tenth day that I've been working on assimilating the substance of this package. But at this stage, while I've been gnawing at the bit to get through this re-bouncing that kept on re-bouncing, the smile hasn't fazed me for a single day. And today, I truly believe (for the thirtieth time, it's true!), is finally the day of closure.

Five days ago I had already had the same feeling that I had reached the end, that all that was left was to do some housekeeping: add a few footnotes here and there, retype pages that were too overloaded with cross-outs (each time a sign of a thought that had remained somewhat confused, and which needs to be put in place by this apparently mechanical work, but from which the text always emerges with a new face....)... This was when I had just written what is now the note "Mes amis" (n° 79), which spontaneously became a series of "final chords". However, I ended up separating these chords from the beginning of the note. It turned out that this famous housekeeping work had broken down: the 'footnotes', typed without line spacing, had become real notes (*not* footnotes) of good size, which I had to retype with line spacing, and then try as best I could to fit in here and there. It took days before I realised that another procession, after the one called 'The Colloquium', was forming to join the procession - and that the last of the processions would not (as I had decided in my head) be the Colloquium, but would be led by the *Pupil*. And just today, as the first procession, reduced to a single note, was enriched by a second ("A feeling of injustice and powerlessness"), I also knew who would lead it: it was "*L'élève posrhume*". So the procession, opened by a pupil (posthumously and with a lower case letter, as befits his humble state) and closed by a Pupil again

(no humility this time), finally seems to be in full swing!

It also seems to me that this is the moment, after a first 'false arrival', to return to the chords of a final De Profundis, which are more appropriate today than they were five days ago. Here they are, as I wrote them down then, and which also express my feelings at the moment.

(May 31) In the end, it was another "false arrival" - the "final agreements" were premature this time too! Twenty days went by, during which the "housekeeping work" continually erupted into renewed reflection on this or that aspect that had been neglected. Six other notes joined the "L'Elève" procession, which was supposed to close the parade. The Funeral Van appeared in the wake of the Student, carrying four coffins accompanied by the Gravedigger. He was definitely lacking to give substance and meaning to a funeral procession that didn't seem to be carrying anyone.

Having become cautious through experience, I'm waiting for events to unfold and wouldn't venture to predict whether the procession is finally complete, or whether a forgotten cortège will sneak in at the last minute, so as not to miss the final Ceremony (\*).

(<sup>87</sup>) (12 May)(\*\*) For the edification of the reader who is a bit of a cohomologist, and especially for my own, I would like to review the details of this looting of a splendid seminar, in the hands of two of my former cohomologist students and under the benevolent eye of the others(\*\*\*)�.

— from the same seminary where, twelve years before anyone else and at the hands of the workers themselves, they learnt the basics and the finer points of the trade that has made their reputation.

Two of my oral presentations have never been made available to the public in any form. One is the closing lecture on open problems and conjectures, which 'unfortunately was not written up', given how little - and the author of the introduction to the edition - he thought it unnecessary to even mention *what* open problems and conjectures were involved. And why should he have taken the trouble, when these were just problems (which everyone is free to pose as they please!) and conjectures (not even

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(\*) (12 June) Caution was the order of the day, as a new procession called "Mes élèves" separated from the one originally called "L'Elève", which became "L'Elève - alias le Patron".

(\*\*) This note follows on from the previous day's reflection on "Solidarity" (n° 85).

(\*\*\*) Further reflection reveals that one of these "others" effectively lent a hand in this operation on behalf of others.

<sup>(87)</sup> 1). The other was the lecture that opened the seminar, placing it from the outset in a wider context (topological, complex analytic, algebraic) and reviewing formulae of the Euler-Poincaré, Lefschetz, Nielsen-Wecken type, some of which constituted one of the main applications of the seminar. The "... neither moreover than..." with which the author of the introduction continues to indicate, in the course of a sentence, the disappearance of this presentation, says a great deal about a *casual* attitude which at the time was visibly taken for granted, even though the author of the seminar had been out of circulation for seven years.

I gave a whole series of talks on the formalism of homology and cohomology classes associated with a cycle (regular ambient scheme in the cohomological case)(\*\*\*\*). They were shared equally: cohomology for Deligne, homology for Verdier - who nevertheless spilled over a little into cohomology, even if it meant making a little bow to Deligne with the famous 'weight complexes' (\*). (Not to mention the finiteness theorem for  $R\text{Hom}$  and the bidualité theorem, copied verbatim from the seminar - in any case, the lion's share will go to Deligne, which is to be expected...) The author of the introduction did not consider it useful to mention only the homology lectures. There was no need to, since the previous year his friend Verdier had taken on the task of providing the missing 'good reference' (without referring to a seminar, or to me).

There were oral presentations on the finiteness theorems for the operations  $R^i f_*$  ( $f$  not proper), and as a corollary, for the operations  $R\text{Hom}_*$  and  $Lf^t$ . The key theorem was proved by a singularity resolution technique à la Hironaka (thus valid for only in cases where the resolution is available). These arguments, which I had used, have come into common use since the seminar (see note <sup>(85)</sup> 2)). Deligne has managed to prove these finiteness theorems, as well as the biduality theorem, under other, more useful hypotheses, which have already been verified in most applications. One might have expected him to ask for these improvements to be included in the seminar where he had the privilege of learning about stale cohomology, and the ideas and techniques on which all his later work was based. But this circumstance is used as a 'reason' for amputating this part of the seminar. As for the biduality theorem, under Illusie's pen (and within the framework of the diagrams) it became 'Deligne's biduality theorem' (introduction to Lecture I). It was only

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(\*\*\*\*) For details, see note no. <sup>82</sup> "Good references". (\*) See note  
(83) "The joke - or weight-complexes".

justice, since in the analytical case Verdier had already claimed authorship the previous year (without even having to go to the trouble of finding another demonstration). There is the paper developing a "generic Künneth formula", which was written by Illusie. No one before had thought of developing this kind of statement, inspired by the intuition that "generically" i.e. in the neighbourhood of the generic point of the basis, a relative scheme behaves like a "locally trivial fibre" in the topological context. By means of an elegant demonstration similar to the one mentioned above, Deligne managed to eliminate the hypothesis of resolution of singularities that I had made. It was awarded - the presentation was deleted and 'replaced' by a reference to a presentation by the same Illusie in the seminar called "SGA 4 1/2 .

There is a series of papers on the formalism of non-commutative traces, developed as a means of explicating the local terms of the Lefschetz-Verdier formula in cases that had never been treated. These papers were eventually written, it seems, by Bucur, whose manuscript "got lost in a providential move" - it's turning into a vaudeville! (\*) In the introduction to SGA 5, written by Illusie, these talks become "Grothendieck's theory of *commutative* traces, [brilliantly] generalising Stallings' theory" (which was non-commutative!). The slip of the tongue(\*\*) can only be due to a badly (or too well...) inspired secretary, who must have been involved with my friend Ionel Bucur's movers. (The word 'brilliantly' is an interpolation from my pen, to better render the thought infallibly suggested by this slip of the tongue, which is also providential).

I can't complain, as Illusie has done all the hard work of redoing the work (and even, he tells us, a "more sophisticated" version, since it's been put in the Beamtime sauce - I seem to remember, though, Illusie, that you made more "sophisticated" innovations than that in my day...). He must have spent a lot of time on it, if I remember that I had

(\*) It was this circumstance, no doubt, that inspired Deligne to write a brilliant review of SGA 5. !!!) were not even calculated! (See the note "la table rase", n° 67, about the absurdity of this criticism, which for an informed reader is similar to that of Verdier's famous "weight complex" the previous year (see note n° 83). So it was Verdier who set the example!)

(\*\*) This is the slip of the tongue attributing to me the paternity of a theory of "commutative" traces (for which we don't even know the name). instead of 'non-commutative'. That it has survived into the published edition is all the more remarkable given that Illusie was perhaps the most meticulous of my students, down to the last detail.

my manuscript also got lost in the same providential move, and God knows if one of the dear listeners, overwhelmed by my oratory, was at least able to take comprehensible notes...

Remarkably, and this is something I hadn't noticed before, he didn't insert this talk in the place where it had been scheduled in Lecture XI (which was also probably the place it had been scheduled for in the oral seminar), preferring to leave a gaping hole there and make his talk an apocryphal one, entitled 'Calculations of Local Terms'. The title does seem to correspond to what I think I remember him doing in the oral seminar - strange. But on line 1 of his introduction to the paper, the author is quick to disabuse us of the notion: "This paper, written in January 1977, *does not correspond to any oral presentation in the seminar*". He then goes on to give formulae by Lefschetz-Verdier (although the name rings a bell, and I thought I had indeed developed a theory of non-commutative traces at length, precisely in order to calculate the 'local terms' in certain cases...), then on a formula of Langlands and on a demonstration of Artin-Verdier of 1967 (it was however one year after the final agreements of the oral seminar, which must not have been without influence on these authors, of which at least one if not both followed it). Finally, towards the end of the page, we learn, as if in passing, contrary to what had been announced at the beginning, that there is also a "second part of this talk, of a much more technical nature" (I've already read this language somewhere....) which is (admire the nuance) "*inspired by the method used by Grothendieck* to establish the Lefschetz formula for certain cohomological correspondences on curves", with a reference to Lecture XII of the same seminar and above all to the indispensable SGA 4 1/2 ; Obviously, there was no reason, for so little, to include this lecture in the place of the gaping hole - the "more sophisticated version" of earlier will have done things well. It was even nice of Illusie and Deligne to cite me as a source of 'inspiration', when the example of their friend Verdier the previous year had clearly shown that there was absolutely no point in having such scruples.

I return to Illusie's introduction to the volume known as SGA 5. In it we learn once again, as Deligne had already announced in his introduction to SGA 4 1/2 , that it is indeed *thanks to his friend* that the seminar has finally been published:

"I would like to thank P. Deligne for convincing me to write, in a new version of Lecture III, a demonstration of the Lefschetz-Verdier formula, *lev-ing a new formula, lev-ing a new formula*.

*anr thus one of the obstacles to the publication of this seminar".*

Once again we are in the middle of a farce - repeated as it is by the docile Illusie in the introduction to SGA 4 1/2 ! If the seminar was not published for more than ten years, it was (the whole point was to think about it) because no one (before Deligne saved the situation in 1977) had yet thought that it might be a good idea to write a demonstration of the so-called (and rightly so) 'Lefschetz-Verdier formula', of which none other than his inseparable friend and my ex-student Verdier himself has proudly *been the author since at least 1964* (<sup>87</sup> 2), i.e. for at least two years when my seminar ended, and which was only waiting for goodwill to be made available to everyone!

Finally, as another and last (?) mutilation of the seminar, there was the disappearance of the fine talk Serre had given on the "(Serre-)Swan module" - a talk entitled "Introduction à la théorie de Brauer". It is fortunate that Serre, seeing the turn events were taking, had the good sense to include his talk in his book "Représentations linéaires des groupes finis" (Hermann, 1971), and to make it available to the mathematical public. ( 3)<sup>87</sup>

This time, I think, I've come full circle. The picture of the fate of a seminar in which I had put the best of myself (<sup>88</sup> ) (\*), and which I find myself twenty years later unaware of, massacred by the very people who had been its exclusive beneficiaries - or at least by three of them, and with the assent of all the other participants.

I don't regret having taken the trouble, this time again, to go through with what had gradually come to my attention. This 'return of things'(\*\*) that I noticed at the end of a long retrospective on my relationship with one of my former students, sensing even then that he wasn't the only one to 'bury me with gusto' - I've only just become aware of his breath, his 'smell' (to use an expression that appeared in one of my dreams at the time) - the breath of *violence*. This breath is both hidden and revealed by the (apparently detached and impassive) discourse(\*\*\*) presenting a highly technical substance. What this violence is aimed at, through

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(\*) For the meaning of this expression "of the best of myself", see the following notes "La dépouille...", "... and the body", n° 88, 89. The first of these situates the seminar SGA 5, with SGA 4, which is inseparable from it, as the masterpiece of the part of my work 'entirely completed'.

(\*\*) See the note of this name (n° 73) dated 30 April.

(\*\*\*) This is mainly the discourse in the introductory texts accompanying SGA 5 (written by Illusie), and SGA 4 1/2 (written by Deligne).

a "corpse" given over to mercy, is the very person of the one who was the "master", the "Father". - at a time, however, when the "pupils" have long since taken his envied place, without encountering any resistance; and when they have also long since elected from among themselves the new "Father", called upon to replace the old one and to reign over them.

I feel this breath, and yet it remains something foreign to me, something I don't understand. To 'understand' it, this breath would probably have to live in me, or have lived in me. But four years ago, for the first time, I felt and measured the significance of something in my life that I had never thought about, that had always seemed to me to go without saying: that my identification with my father, in my childhood, was *not* marked by conflict - that at no time in my childhood did *I fear or envy my father*, while at the same time devoting unreserved love to him. This relationship, perhaps the most profound that has marked my life (without my even realising it before this meditation four years ago), which in my childhood was like a relationship with another self that was both strong and benevolent - this relationship was not marked by division and conflict. If, throughout my often troubled life, the knowledge of the strength that lies within me has remained alive; and if, in my life by no means free of fear, I have not known fear of any person or event - it is to this humble circumstance that I owe it, unknown until well into my fifties. This circumstance has been a priceless privilege, because it is the intimate knowledge of the creative force within oneself that *is* also this force, which allows it to express itself freely according to its nature, through creation - through a creative life.

And this privilege, which has exempted me from one of the most profound marks of conflict, is at the moment also like a hindrance, like a '*void*' in my experience of life. A void that's hard to fill, where many others have a rich tapestry of emotions, images and associations, offering them the path (provided they're curious enough to take it) to a profound understanding of others as well as themselves, in situations that I manage (by dint of repetition and cross-checking) to apprehend as best I can, but in the face of which I remain like a stranger - with the desire for knowledge within me still hungry.

(<sup>87</sup> 1) (31 May) This closing talk, surely one of the most interesting and substantial with the opening talk, was obviously not lost on everyone, as I see from Mac Pherson's paper "Chern classes for singular al-

gebraic varieties" (*Chern classes for singular algebraic varieties*, Annals of Math. (2) 100, 1974, p. 423-432) (received in April 1973). Under the name of "Deligne-Grothendieck conjecture", I found there one of the main conjectures that I had introduced in this paper in the schematic framework. It was taken up again by Mac Pherson in the transcendental framework of algebraic variety over the field of complexes, the Chow ring being replaced by the homology group. Deligne had learned this conjecture (\*) from my talk in 1966, the same year that he had appeared in the seminar where he began to familiarise himself with the language of diagrams and cohomological techniques (see the note "L'être à part" n° 67<sup>2</sup>). It's still nice of you to have done me the honour of including me in the name of the conjecture - a few years later it would no longer have been appropriate...

(6 June) I'd like to take this opportunity to explain the conjecture that I had set out in the seminar in the schematic framework, while certainly pointing out the variant that is evident in the complex analytic (or even rigid-analytic) framework. I conceived it as a theorem of the 'Riemann-Roch' type, but with discrete coefficients instead of coherent coefficients. (Zoghman Mebkhout told me, moreover, that his point of view of  $\square$ -modules should make it possible to consider the two Riemann-Roch theorems as constituents in a single crystalline Riemann-Roch theorem, which would thus represent in null characteristics the natural synthesis of the two Riemann-Roch theorems that I introduced into mathematics, one in 1957, the other in 1966). We fix a ring of coefficients  $\square$  (not necessarily commutative, but noetherian to simplify and moreover of torsion prior to the characteristics of the schemes under consideration, for the purposes of stale cohomology. . . ). For a scheme  $X$  we denote by

$$K-(X, \square)$$

the Grothendieck group formed with constructible étale bundles of  $\square$ -modules. Using  $Rf_!$  functors, this group depends functorially on  $X$ , for  $X$  noetherian and morphisms of schemes which are separate and of finite type. For  $X$  regular, I postulate the existence of a canonical group homomorphism, playing the role of the "character of

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(\*) (6 June) In a slightly different form, see the rest of the note, dated today.

(March 1985) For further details, given by Deligne himself, see the note "Dotting the I's", no.° 164 (II 1).

Chern" in the consistent RR theorem,

$$(1.) \quad c_{hX}: K-(X, \square) \rightarrow A(X) \otimes_{\mathbb{Z}} K-(\square),$$

where  $A(X)$  is the Chow ring of  $X$  and  $K-(A)$  is the Grothendieck group formed with  $\square$ -modules of finite type. This homomorphism was to be determined solely by the validity of the "discrete Riemann-Roch formula", for a *proper* morphism  $f: X \rightarrow Y$  of regular schemes, which formula is written as the consistent Riemann-Roch formula, with the Todd "multiplier" replaced by the total relative Chern class:

$$(RR) \quad c_{hY}f_!(x) = f_* c_{hX}(x) c(f),$$

$$\text{where } c(f) \in A(X)$$

is the total Chern class of  $f$ . It is not difficult to see that in a context where we have the resolution of singularities in Hironaka's strong form, the RR formula does indeed determine  $c_{hX}$  uniquely.

Of course, we assume that we are in a context where the Chow ring is defined. (I am not aware that anyone has even tried to write a theory of Chow rings for regular schemes which are not of finite type over a body). Alternatively, one can also work in the graduated ring associated with the usual "Grothendieck" ring  $K^{\bullet}(X)$  in the coherent context, filtered in the usual way (see SGA 6). It is also possible to

replace  $A(X)$  by the even  $A$ -adic cohomology ring, the direct sum of  $H^{2i}(X, \mathbb{Z}_A(i))$ . This has the disadvantage of introducing an artificial parameter  $A$ , and of giving less refined "purely numerical" formulae, whereas the Chow ring has the charm of having a continuous structure, which is destroyed by switching to cohomology.

Already in the case where  $X$  is a smooth algebraic curve over an algebraically closed field, the calculation of  $c_{hX}$  involves delicate local invariants of the Artin-Serre-Swan type. In other words, the general conjecture is a profound conjecture, the pursuit of which is linked to a

understanding higher-dimensional analogues of these invariants.

*Remark.* Denoting in the same way by  $K^{\bullet}(X, \square)$  "the Grothendieck ring" formed with the constructible complexes of  $\square$ -spreads of finite tor-dimension (which ring operates on  $K-(X, \square)$  when  $\square$  is commutative...), we must likewise have a homomorphism

$$(1') \quad c_{hX}: K^{\bullet}(X, \square) \rightarrow A(X) \otimes_{\mathbb{Z}} K^{\bullet}(\square),$$

again giving rise (mutatis mutandis) to the same Riemann-Roch formula (RR).

Let  $\text{Cons}(X)$  now be the ring of constructible integer functions on  $X$ . In a more or less tautological way, we define canonical homomorphisms

$$(2.) \quad K^-(X, \square) \rightarrow \text{Cons}(X) \otimes_{\mathbb{Z}} K^-(\square) \quad ,$$

$$(2') \quad K^+(X, \square) \rightarrow \text{Cons}(X) \otimes_{\mathbb{Z}} K^+(\square) \quad .$$

If we now restrict ourselves to schemes *of zero caracerism*, then (by using Euler-Poincaré characteristics with proper supports) we see that the group  $\text{Cons}(X)$  is a covariant functor with respect to finite type morphisms of noetherian schemes (in addition to being contravariant as a ring functor, which is independent of characteristics), and the previous tautological morphisms are functorial. (This corresponds to the "well-known" fact, which I don't think was proved in the SGA 5 oral seminar, that in *null caracerism*, for a locally constant bundle of  $\square$ -modules  $F$  on an algebraic scheme  $X$ , its image by

$$f_! : K^+(X, \square) \rightarrow K^+(e, \square) \sim = K^+(\square)$$

is equal to  $d\chi(X)$ , where  $d$  is the rank of  $F$ ,  $e = \text{Spec}(k)$ ,  $k$  the base field assumed to be algebraically closed. . .). This immediately suggests that the Chern homomorphisms  $(1.)$  and  $(1')$  must be derivable from the tautological homomorphisms  $(2.)$ ,  $(2')$  by composing with a "universal" Chern homomorphism (independent of any ring of  $\square$  coefficients)

$$(3) \quad c_{hX} : \text{Cons}(X) \rightarrow A(X) \quad ,$$

so that the two " $\square$ -coefficient" versions of the RR formula appear to be formally contained in a formula of RR at the level of constructible functions, which is always written in the same form...

When working with schemes on a fixed basic body (again, of any characteristic), or more generally on a fixed *regular* basic scheme  $S$  (e.g., on the basis of an  $S$  ple  $S = \text{Spec}(Z)$ ), the form of the Riemann-Roch formula most consistent with the writing (within the coherent framework familiar since 1957) is obtained by introducing the products

$$(4) \quad c_{hX}(x) c(X/S) = {}_{cX/S}(x)$$

(where  $x$  is in a  $K-(X, \square)$  or  $K^\bullet(X, \square)$  indifferently), which we could call the *Chern class of  $x$  relative to the basis  $S$* . When  $x$  is the unit element of  $K^\bullet(X, \square)$  i. e. the class of the constant bundle of value  $\square$  we find the image of the total relative Chern class of  $X$  with respect to  $S$ , by the canonical homomorphism of  $A(X)$  into  $A(X) \otimes_{\mathbb{Z}} K^\bullet(\square)$ . Having said this, RR's formula is equivalent to the fact that the formation of these relative Chern classes

$$(5-) \quad c_{X/S} : K-(X, \square) \rightarrow A(X) \otimes_{\mathbb{Z}} K-(\square),$$

for a regular variable scheme  $X$  over  $S$  (of finite type over  $S$ ), with  $S$  fixed, is functorial with respect to eigenmorphisms, and similarly for the variant (5 $^\bullet$ ). In null characterisation, this reduces to the functoriality (for eigenmorphisms) of the corresponding application

$$(6) \quad c_{X/S} : \text{Cons}(X) \rightarrow A(X).$$

It is in this form of the existence and uniqueness of a "Chern class" application ab- solue (6), in the case where  $S = \text{Spec}(\mathbb{C})$ , that the conjecture in Mac Pherson's work is presented, the relevant conditions (here as in the general case of zero characteristic) being

a) the functoriality of (6) for proper morphisms and b) we have  $c_{X/S}(1) = c(X/S)$  (in this case, the "absolute" total Chern class). Compared with my initial conjecture, however, the form presented and proved by Mac Pherson differs in two ways. One is a "minus", in that it is placed not in the Chow ring, but in the whole cohomology ring, or more precisely the whole homology group, defined by transcendental means. The other is a "plus" - and it is perhaps here that Deligne has made a contribution to my initial conjecture (unless this contribution is due to Mac Pherson himself (\*)). It is that for the existence and uniqueness of an application (6), we do not need to restrict ourselves to regular schemes  $X$ , provided that we replace  $A(X)$  by the entire homology group. The same is probably true in the general case, where we denote by  $A(X)$  (or better by  $A-(X)$ ) the *Chow group* (which is no longer a ring in general) of the Noetherian scheme  $X$ . Or to put it another way: while the heuristic definition of the invariants  $c_{hX}(x)$  (for  $x$  in  $K-(X, \square)$  or  $K^\bullet(X, \square)$ ) makes essential use of the assumption that the ambient scheme is regular, as soon as we multiply it by the "multiplier"  $c(X/S)$  (when the

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(\*) (March 1985) This is indeed the case, cf. note no.° 164 cited in the previous footnote.

scheme  $X$  is of finite type on a fixed regular scheme  $S$ ), the product obtained (4) seems to make sense without any regularity assumption on  $X$ , as an element of a tensor product

$$A(X) \otimes K(\square) \text{ or } A(X) \otimes K^*(\square) ,$$

where  $A(X)$  denotes the Chow group of  $X$ . The spirit of Mac Pherson's proof (which does not use singularity resolution) would suggest the possibility of an explicit "computational" construction of the homomorphism (5-), by "making do" with the singularities of  $X$  as they are, as well as with the singularities of the bundle of coefficients  $F$  (whose class is  $x$ ), to "collect" a cycle on  $X$  with coefficients in  $K(\square)$ . This would also be in the spirit of the ideas I had introduced in 1957 with the coherent Riemann-Roch theorem, where I was doing self-intersection calculations in particular, taking care not to "move" the cycle under consideration. A first obvious reduction (obtained by immersing  $X$  in a smooth  $S$ -scheme) would be to the case where  $X$  is a firm subscheme of the regular  $S$ -scheme... .

The idea that it should be possible to develop a *singular* Riemann-Roch (cohomology) theorem was, moreover, familiar to me, although I can't say how long ago it was, and I never tried to test it seriously. It was more or less this idea (apart from the analogy with the 'cohomology, homology, cap-product' formalism) that led me in SGA 6 (in 1966/67) to systematically introduce the  $K(X)$  and  $K^*(X)$  and the  $A(X)$ ,  $A^*(X)$ , instead of simply - t work with  $K^*(X)$ . I can't remember if I've also thought about something like this.

... like in the SGA 5 seminar in 1966, and if I even hinted at it in my oral presentation. As my handwritten notes have disappeared (in a removal perhaps?) I'll probably never know... .

(7 June) Looking through Mac Pherson's article, I was struck by the fact that the word 'Riemann-Roch' is not mentioned - which is why I did not immediately recognise the conjecture I had made in the SGA 5 seminar in 1966, which was for me (and still is) a theorem of the 'Riemann-Roch' type. It would seem that when Mac Pherson wrote his paper he didn't even realise this obvious fact. I presume that the reason for this is that Deligne, who after my departure put this conjecture into circulation in the form that pleased him, took care as far as possible to 'erase' the obvious kinship with the Riemann-Roch-Grothendieck theorem. I think I sense his motivation for doing this. On the one hand, it weakens the link between this conjecture and myself, and makes the name 'Deligne- conjecture' more plausible.

Grothendieck" under which it is currently circulating. (NB I don't know whether it is in circulation in the schematic case, and if so, I'd be very curious to know under what name). But the deeper reason seems to me to lie in his obsessive idea of denying and destroying, as far as possible, the fundamental unity of my work and my mathematical vision (\*). This is a striking example of how, in a mathematician of exceptional means, a fixed idea entirely unrelated to any mathematical motivation can obscure (or even completely block out) what I have called the 'healthy mathematical instinct'. This instinct cannot fail to perceive the analogy between the two 'continuous' and 'dis- cret' statements of 'the same' Riemann-Roch theorem, which I had of course pointed out in the oral presentation. As I indicated yesterday, this kinship will no doubt soon be confirmed by a statement in form (conjectured by Zoghman Mebkhout), at least in the complex analytic case, making it possible to deduce one and the other from a common statement. Clearly, given Deligne's "fossilised" attitude towards the Riemann-Roch theorem(\*\*), he was not likely to discover the unique statement that links them in the analytic framework, and even less likely to ask himself the question of an analogous statement in the general schematic framework. Nor was he able, in such circumstances, to identify the fruitful point of view of  $\mathbb{Q}$ -modules in the cohomological theory of algebraic varieties, arising all too naturally from ideas that it was a matter of burying - nor even to recognise, for years, the fruitful work of Mebkhout, succeeding where he himself had failed.

(<sup>87</sup> 2) (31 May) That was the year of my Bourbaki lecture on the rationality of  $L$ -functions, in which I used Verdier's result (???) heuristically (and above all the expected form of the local terms in the case in point), without waiting for Illusie to demonstrate it thirteen years later, at Deligne's invitation. Moreover, it seemed to me, when Verdier showed me his ultra-general formula, which came as a surprise, that he was demonstrating it with his 'six operations' formulae in a few lines - that's the kind of formula where you (almost) have to write it down,

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(\*) Compare with the comment in the note 'La dépouille' (n° 88) on the profound meaning of the operation SGA 4 $1/2$ , similarly aimed at shattering the profound unity of my work around staggered cohomology into an amorphous set of 'technical digressions', by the 'violent insertion' of the foreign text SGA 4 $1/2$  between the two indissoluble parts SGA 4 and SGA 5 which develop this work.

(\*\*) These provisions, with regard to the Riemann-Roch-Grothendieck theorem, are manifested in the following ways particularly clearly in the "Funeral Eulogy"; see the note "The Funeral Eulogy (1) - or the compli- ments", n°

104.

is to demonstrate it! If there was any 'difficulty', it could only be at the level of verifying one or two compatibilities (\*). Moreover, both Illusie and Deligne know perfectly well that the demonstrations I gave in the seminar for various explicit trace formulae were *complete*; they did not depend in any way on Verdier's general formula, which had simply acted as a "trigger" to encourage people to explain and prove trace formulae in as general cases as possible. The bad faith of both is obvious here. As far as Deligne is concerned, it was already clear to me when I wrote the note 'La table rase' (n° 67) - but it was probably not clear to an uninformed reader, nor of course to an informed reader who renounces the use of his healthy faculties.

(6 June) As for Illusie, he played right into his friend's hands, trying to muddy the waters to give the appearance of an ultra-technical oral seminar which did not even give complete demonstrations of all the results, and in particular the trace formulae. However, these were indeed demonstrated (and for the first time) in 65/66, and it was there that both he and Deligne had the privilege of learning them, and all the delicate technique that goes with them(\*\*).

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(\*) (6 June) It would also appear that, via the biduality theorem (now known as Deligne's theorem), the initial proof of the Lefschetz-Verdier formula depended on a hypothesis for the resolution of singularities, which Deligne manages to dispense with in the case of schemes of finite type over a body. This is a good opportunity to fish in troubled waters and to give the impression that SGA 5 is subordinate to the "seminar" SGA 4 1/2 which "precedes" it (and which was indeed published before it!).

(\*\*) In the second paragraph of the Introduction to the volume published as APG 5, Illusie presents as "the heart of the seminar" the three lectures III, III B, XII on the Lefschetz formula in staggered cohomology, whereas we have seen that in the introduction to lecture III B, he takes great care to specify (contrary to reality) that "this lecture does not correspond to any oral lecture of the seminar" and that in the introductions to lectures III and III B, he does his utmost to give the impression that these are subordinate to SGA 4 1/2 and that lecture III is presented as "conjectural"! In fact, the entire SGA 5 seminar was technically independent of Lecture III (Lefschetz-Verdier formula), which acted as a heuristic motivator, and Lecture III B is nothing more than the 'hole' (Lecture XI) created by the move to Bucur, which was the welcome pretext for this additional dismemberment.

To lend credence to the version of a seminar of 'technical digressions' (suggested by his friend Deligne), Illusie was careful to omit the introductory presentation, in which I had drawn up a preliminary table of the main themes that were to be developed in this seminar, a table in which the trace formulae form only a small part (taking on particular importance because of their arithmetical implications, in the direction of Weil's conjectures). For an overview of these "major themes", see sub-note n°<sup>87</sup> 5 below.

This reminds me that I had, of course, taken the trouble to demonstrate the Lefschetz-Verdier formula in the seminar - it was the least I could do, and a particularly striking application of the formalism of local and global duality that I had set out to develop. The question came to me these days why on earth, when there were a dozen or so papers still being written by my dear students, so that Deligne and Illusie were really spoilt for choice when it came to naming their technical 'obstacle' to the publication of SGA 5, They chose between all of them the theorem of their good friend Verdier, who at the time was taking credit for it as his own, just like the theorem of the derived and triangulated categories that he had never bothered to write up either (or, at least, to make available to the public). There's a kind of *defiance* in the absurdity (or in a kind of collective cynicism in the group of my former cohomology students, whom I consider to be united in this operation-massacre), which reminds me of the 'weight-complexes' brilliantly invented by Verdier the previous year (see the note of that name, no.<sup>o</sup> 83), or (in the iniquitous register) with the 'perverse' name given by Deligne to bundles which should be called 'Mebkhout bundles' (see the note 'Perversity', no.<sup>o</sup> 76). I sense in such inventions as many acts of domination and contempt towards the entire mathematical community - and at the same time a *gamble*, which was obviously won right up to the moment of the unexpected appearance of the deceased, who appears almost as the only one awake before a community of sleepyheads...

(<sup>87</sup> 3) (5 June) After this assessment of a massacre, we can appreciate the value of Illusie's statement in line 2 of his introduction to the volume known as SGA 5:

"Compared with the original version, the only significant changes concern Lecture II [generic Künneth formulae], which has not been reproduced, and Lecture III [Lefschetz-Verdier formula], which has been entirely rewritten and expanded by an appendix numbered III B (\*). Apart from a few changes of detail and additions of footnotes, the other papers have been left *unchanged*" (emphasis added).

Here again, Illusie complacently echoes another well-sent joke from his inimitable friend, namely that the existence of SGA 4 1/2 "will soon make it possible to publish

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(\*) Which is presented as part of the "heart of the seminar"! (See previous footnote).

SGA 5 *rel quel*" (see the note "Table rase" n° 67) - and Illusie does his utmost in the course of his presentations and introductions to substantiate this imposture (that SGA 5, where he and his friend learned their trade, depends on the pirate volume SGA 4 1/2 , made up of odds and ends gleaned or plundered over the twelve years that followed), with a luxury of references to SGA 4 1/2 at every turn of the page...

The final word goes (as it should) to Deligne, who wrote to me a month ago (3 May), in response to a laconic request for information (see the beginning of the note "Les Obsèques", n° 70):

"To sum up, if it was seven years since you were doing maths [?!] when this SGA 4 1/2 text appeared, that simply corresponds [?] to the long delay in editing SGA 5, *which was too incomplete to be published in its original form.*

I hope these explanations please you."

If they haven't 'approved' me, at least they will have edified me. . .

(<sup>87</sup> 4) (6 June) It might be time to indicate the main themes developed in the oral seminar, and whose published text only gives an idea by cross-checking.

I) Local aspects of duality theory, whose essential technical ingredient is (as in the coherent case) the biduality theorem (completed by a "cohomological purity" theorem). I have the impression that the geometrical meaning of this last theorem, as a local Poincaré duality theorem, which I had explained so well in the oral seminar, has since been completely forgotten by those who were my students (\*).

II) Trace formulae, including more subtle "non-commutative" trace formulae  
tiles that the usual trace formula (where the two members are integers, or more generally elements of the ring of coefficients, such as  $Z/nZ$  or an A-adic ring  $Z_A$ , or even  $Q_A$ ), placing ourselves in the algebra of a finite group operating on the scheme under consideration, with coefficients in a suitable ring (such as those considered in the previous parenthesis). This generalisation came about quite naturally, because even in the case of Lef- schetz formulae of the usual type, but for bundles of "twisted" coefficients, we were led to

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(\*) This geometric interpretation was at least preserved in Illusie's writing.

replace the initial scheme with a Galois covering (usually branched) used to "untwist" the coefficients, with the Galois group operating on it. This is how Nielsen-Wecken-type formulae are naturally introduced into the schematic context.

III) Euler-Poincaré formulae. On the one hand, there was a detailed study of an 'absolute' formula for algebraic curves, using Serre-Swan modules (generalising the case of moderately branched coefficients, giving rise to the more naive Ogg-Chafarévitch-Grothendieck formula). On the other hand, there were new and profound conjectures of the "discrete" Riemann-Roch type, one of which reappeared seven years later, in a hybrid version, under the name of the "Deligne-Grothendieck conjecture", proved by Mac Pherson by transcendental means (see note n° 87 ).<sup>1</sup>

The comments I couldn't fail to make on the profound relations between these two themes (Lefschetz formulae, Euler-Poincaré formulae) have also been lost without trace. (As was my habit, I left all my handwritten notes to the volunteer-writers, and I have no written trace of the oral seminar, of which I did of course have a complete set of handwritten notes, even if some of them were succinct).

IV) Detailed formalism of the homology and cohomology classes associated with a cycle, arising naturally from the general duality formalism and the key idea of working with the cohomology "with supports" in the cycle under consideration, using cohomological purity theorems.

V) Finiteness theorems (including generic finiteness theorems) and generic Künneth theorems for cohomology with any support.

The seminar also developed a technique for passing from torsion coefficients to A-adic coefficients (lectures V and VI). This was the most technical part of the seminar, which as a general rule worked with torsion coefficients, even if it meant "going to the limit" to deduce the corresponding A-adic results. This point of view was a provisional pis-aller, pending Jouanolou's thesis (still unpublished) giving the formalism needed directly in the A-adic framework.

I do not include among the main 'themes' the calculations of some classical schemes and the cohomological theory of Chern classes, which Illusie highlights in his introduction as 'one of the most interesting' of the seminar. As the programme was full, I had not thought it necessary to dwell on these calculations in the oral seminar.

culs and on this construction, since it was enough to repeat, practically verbatim, the reasoning I had given ten years earlier in the context of Chow rings, on the occasion of the Riemann-Roch theorem. It was also obvious that it had to be included in the written seminar, in order to provide a useful reference for users of stale cohomology. Jouanolou took on this task (Lecture VIII), which he had to regard not as a service to the mathematical community while learning basic techniques essential for his own use, but as a chore, since it took years to write (\*). It was no different, it seems, for his thesis, which is still a ghost reference, just like Verdier's... The section on 'crossing the limit' should not be counted as one of the 'main themes' of the seminar either, in the sense that it is not associated with any particular geometrical idea. Rather, it reflects a technical complication peculiar to the context of stale cohomology (distinguishing it from transcendental contexts), namely that the main theorems on stale cohomology concern in the first place *r torsion coefficients* (prime to residual characteristics), and that in order to have a theory that corresponds to rings of coefficients of zero characteristic (as is necessary for Weil's conjectures), it is necessary to pass to the limit over rings of coefficients of zero characteristic.

of coefficients  $Z/A^n Z$  to obtain "A-adic" results.

All that said, the only one of the five main themes of the oral seminar that seems to appear in complete form in the published text is theme I. Themes IV and V have simply disappeared, absorbed by SGA 4 1/. Themes IV and V have disappeared purely and simply, absorbed by SGA 4 1/2, with the advantage of being able to refer to them extensively and give the impression that SGA 5 depends on a text by Deligne that appears to be earlier. Themes II and III appear in the published volume in a simplified form, still maintaining the same deception of dependence on the text SGA 4 1/2 (which in reality came entirely from the mother seminar SGA 4, SGA 5).

(<sup>88</sup>) (16 May) The two consecutive seminars SGA 4 and SGA 5 (which for me are like a single 'seminar') develop out of nothing, both the powerful instrument of synthesis and discovery that the *language* of topos represents, and the perfectly perfected and perfectly effective *tool* that is étale cohomology - better understood in its essential formal properties, from that moment on, than even cohomological theory was.

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(\*) (12 June) Going through the presentation in question, I was able to convince myself of Jouanolou's perfect complicity with my other cohomology students.

ordinary spaces (\*). This work represents the most profound and innovative contribution I have made to mathematics, at the level of a fully completed project. At the same time, and without wanting to be, while at every moment everything unfolds with the naturalness of the obvious, this work represents the most far-reaching technical 'tour de force' that I have accomplished in my work as a mathematician(\*\*). For me, these two seminars are indissolubly linked. They represent, in their unity, both the *vision*, and the *ouril* - the topos, and a complete formalism of stale cohomology.

While vision is still rejected today, for almost twenty years the tool has profoundly renewed algebraic geometry in what I consider to be its most fascinating aspect - the 'arithmetical' aspect, apprehended by intuition, and by conceptual and technical baggage of a 'geometrical' nature.

It was certainly not only the intention of suggesting an *anteriority* in his cohomological 'digest' of the SGA 5 part that motivated Deligne to give it the misleading name SGA 4 1/2 - after all, there was nothing to stop him calling it SGA 3 1/2 ! In the 'SGA 4 1/2 operation' I sense the intention to present the work from which all his work stems (this work from which he cannot detach himself!) - a work of an obvious and profound unity that is quite apparent in the two seminars SGA 4 and (the real) SGA 5, as a *divided* thing (as he himself is divided. . .), cut in two by this work of his. ), *cut in two* by this violent insertion of a foreign and disdainful text; a text that would like to present itself as the living heart, the quintessence of a thought, of a vision in which he had no part (\*), and the two 'quarters' that surround it as a sort of vaguely grotesque appendix, like a collection of 'digressions' and 'technical complements' to the work that is presented as central and essential, from the pen of Deligne and in which my humble person is graciously admitted (before burial).

(\*) Even if we restrict ourselves to the spaces closest to the "varieties", such as triangulable spaces.

(\*\*) Some difficult or unexpected results were obtained by others (Artin, Verdier, Giraud, Deligne), and some parts of the work were done in collaboration with others. This in no way detracts (in my mind at least) from the strength of my appreciation of the place of this work in my body of work. I intend to come back to this point in more detail, in an appendix to the Thematic Outline, and to dot the *i's* and cross the *t's* where it has obviously become necessary.

(\*) This thinking had reached full maturity, both in terms of its key ideas and its essential results, before the young man Deligne appeared on the scene, to learn algebraic geometry and cohomological techniques from me, between 1965 and 1969.

(30 May) On this subject, see the note "L'être à part", no.° 67<sup>¶</sup>.

total) to the number of "collaborators"(\*\*).

'Chance' had done things well. This 'corpse left at mercy' - this 'unfortunate seminar' which was always left behind by the 'editors' and which, when I left, remained in the hands and at the discretion of my cohomology students - this was not *just any* part of the master's work! It wasn't SGA 1 and SGA 2 (where I was developing, in my corner and without even realising it, the tools that were to be the two essential technical aids for the 'take-off' of the main work to come), nor SGA 3 (where my contribution consisted mainly of incessant scales and arpeggios - sometimes arduous - to perfect the 'all-out' technique of the diagrams), nor SGA 6 (systematically developing my ten-year-old ideas about the Riemann-Roch theorem and the formalism of intersections), or even SGA 7 (which, through the inner logic of reflection, stems from the possession of the central tool, mastery of cohomology). It is indeed the *master part* of my work, the writing of which was left unfinished (and by them . . . ), that I have left, at least in part, in the hands of my cohomology students. It is this master part of a work that they chose to massacre and whose pieces they appropriated, forgetting the unity that is their meaning and beauty, and their creative virtue ( ).<sup>90</sup>

Nor was it by chance that, equipped with heterogeneous tools and denying the spirit and vision that had brought them into being from nothing, none of them was able to discern the innovative work where it was being reborn, against their indifference and disdain. Nor that after six years, when at the end of the day the new *ouril* was finally apprehended by Deligne, they unanimously buried the man who had created it in solitude - Zoghman Mebkhout, the posthumous pupil of the disowned master! And it is no coincidence either that after the collapse of Deligne's initial impetus (which in the space of a few years had led him to launch a new theory of Hodge in force, and to demonstrate Weil's conjectures), and despite his prodigious resources and the brilliant resources of my cohomology students, I am now witnessing this 'morose stagnation' in a field of prodigious richness where everything still seems to remain to be done. This should come as no surprise, when for nearly fifteen years the main source of inspiration and some of the 'big problems'(\*), even though they are present and confronting us at every step, have remained carefully circumvented and concealed, like the messengers of the one who is the most important.

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(\*\*) See notes "Le feu vert", "Le renversement", n° s 68, 68<sup>✉</sup>.

(\*) This "main source of inspiration" is of course the "yoga of motifs". It has been active in Deligne alone, who has kept it to himself for his own 'benefit', and in a narrow form deprived of a 'meaning'.

which, for fifteen years, we have been constantly trying to bury.

(<sup>89</sup>) (17 May) The thought, the vision of things that lived in me and that I had thought I was sharing, I see as a living body, healthy and harmonious, animated by the power of renewal of living things, the power to conceive and engender. And now this living body has become a *corpse*, shared between one person and another - one person's limb or quarter, duly stuffed, serving as a trophy; another person's limb or quarter, butchered, as a puzzle or a boomerang; and yet another, who knows, just as it is, for the family kitchen (we're not quite there yet!) - and all the rest is good for rotting in the dump...

This is the picture that finally emerged for me, in terms that are certainly colourful but that seem to me to express a certain reality of things. The puzzle may well fracture a skull here and there(\*\*) - but never will these scattered pieces, trophy, puzzle or family soup, have the power that is so simple and so obvious in the living body: the power of the loving embrace that creates a new being. ...

(18 May) This image of the living body, and of the 'corpse' with its pieces scattered to the four winds, must have been forming in my mind throughout the past week. The comical way in which it has presented itself to my pen-writing machine in no way means that this image is in the least an *invenzion*, a tad macabre, a burlesque improvisation on the spur of the moment. The image expresses a *reality*, deeply felt at the moment when it took material form through a written formulation. I must already have become aware of this reality in bits and pieces, here and there, over the fourteen years since my 'de- parting', and perhaps even before. Snippets of information recorded at first on a superficial level by distracted attention, absorbed elsewhere - but which all pointed in the same direction, and which had to come together, on a deeper level, into a certain image - an unformulated image that I didn't bother to learn about, when I had other things to worry about. This image was considerably enriched and clarified over the course of my life.

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This is the reason why I have chosen to ignore much of its strength, rejecting some of the essential aspects of this yoga. Among the "great problems" inspired by it, which have been ignored or discreetly discredited, I can already see (outsider though I am) the standard conjectures, and the development of the formalism of the "six operations" for all the usual types of coefficients, more or less close to the "motifs" themselves (which play in their respect the role of "universal" coefficients - those which give rise to all the others). Compare with the comments on this subject in the note "My orphans", n° 46.

(\*\*) (31 May) And it will even be used to prove a theorem of "proverbial difficulty"!

of the reflection that has been going on since the end of March, for six or seven weeks in other words. More precisely, scattered pieces of information, finally examined by the care of a fully present conscious attention, have gradually been assembled into *another* image, at the more superficial level of the thought that examines and probes, through work that might seem independent of the presence, in deeper layers, of the first. This con-scient work culminated six days ago in the sudden vision of the 'massacre' that had taken place - when I felt the 'breath', the 'smell' of *violence*, for the first time I think in all my thinking (\*). It was also the moment when, in the layers already close to the surface, the feeling of a living, harmonious body that had indeed been 'massacred' must have appeared - and also the moment when the deeper, diffuse image must have begun to surface, perhaps to give the image in formation a carnal dimension, a 'smell' that thought alone is powerless to give.

This 'carnal' aspect came to the fore again in a dream last night - it's because of this dream that I'm now returning to the lines I wrote yesterday. In this dream, I was cut quite deeply in several places on my body. First there were cuts on my lips and in my mouth itself, bleeding profusely as I rinsed out my mouth with copious amounts of water (heavily reddened by blood) in front of a mirror. Then there were wounds on my stomach, also bleeding profusely, especially one where the blood was coming out in spurts, as if it were an artery (the Dreamer wasn't concerned with anatomical realism). The thought even occurred to me that I might be left out in the cold if it continued to bleed like that, so I pressed my hand in front of the wound and curled up to stop the blood - it did indeed stop flowing, and ended up forming a clot and a very large crust. Later, when I carefully lifted the scab, delicate healing had already begun. I also had a cut on my finger, surrounded by an impressive bandage doll...

I don't intend to launch into a more delicate and detailed description of this dream, or to explore it in depth here (or elsewhere). What this dream 'as is' already reveals to me with startling force is that this 'body' of which I spoke yesterday, and which as I was writing I saw as detached from me, like a child perhaps that I had conceived and procreated and who had then gone away

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(\*) (12 June) In recent years I have sometimes sensed a violent intention on the part of some of my former students towards some of my 'co-interested' people, but never a violence that was felt to come from a *collective* will (grouping five people here) and directed against my person, through my work.

It's *my* body, made up of flesh and blood and a life force that enables it to survive deep wounds and regenerate itself. And my body is also, without doubt, the thing in the world to which I am most deeply, most indissolubly linked. ...

The Dreamer did not follow me in the image of the 'massacre' and the sharing of the remains. This image was meant to convey the reality of intentions, of *aurrui* dispositions that I had strongly perceived, and not the way in which I myself experienced this aggression, this mutilation of which I was the object through something to which I remain closely linked. The Dreamer has just given me a glimpse of the extent to which I remain linked to it. This ties in with what I perceived (albeit less forcefully) in the reflection in the note "Le retour des choses - ou un pied dans le plat" (n° 73), where I try to pin down to some extent the feeling of this "deep link between the person who conceived a thing, and that thing", which emerged in the course of the reflection that day. Before that reflection on 30 April (barely three weeks ago) and for the rest of my life, I pretended to ignore this link, or at least to play it down, following in the footsteps of the prevailing clichés. To be concerned about the fate of a work that has left our hands, and above all of course to be concerned about whether our name remains attached to it in any way, is felt to be petty, small-minded - whereas it seems natural to us all that we should be deeply touched when a child of the flesh that we have raised (and that we believe we have loved) chooses to repudiate the name he was given at birth.

(<sup>90</sup>) (18 May) I don't know whether, during the sixties, any of my students (apart from Deligne) felt this essential unity, beyond the limited work they were doing with me. Perhaps some of them sensed it in a confused way, and that perception was lost without return in the years following my departure. What is certain, however, is that from our first contact in 1965, Deligne sensed this living unity. It was this fine perception of a unity of purpose in a vast design that was surely the main stimulus for his intense interest in everything I had to communicate and pass on. This interest manifested itself, without ever waning, throughout the four years of constant mathematical contact between 1965 and 1969 (\*). He gave the mathematical communication between us that exceptional quality that I have already mentioned, and which I only experienced with other mathematical friends.

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(\*) This period comprises five years, of which my friend spent one (1966) in Belgium doing his

It was this perception of the essential, and the passionate interest that it stimulated in him, that enabled him to learn, as if by playing, all that I could teach him. It was this perception of the essential, and the passionate interest it stimulated in him, that enabled him to learn as if by playing everything I could teach him: Both the technical *means* (the zinc wire diagram technique, Riemann-Roch yoga and intersections, cohomological formalism, étale cohomology, topos language) and the overall *vision* that unites them, and finally the *yoga of motifs*, which was then the main fruit of this vision, and the most powerful source of inspiration I had yet been given to discover.

What is clear is that Deligne has been the only one of my students up to the present day who at a certain point (as early as 1968, I think) had fully assimilated and made his own the totality of what I had to pass on, both in its essential unity and in the diversity of its means(\*\*). It was this circumstance, of course, which I think was felt by everyone, that made him seem the obvious 'legitimate heir' to my work. Clearly this heritage neither encumbered him nor limited him - it was not a burden, but gave him wings; I mean: it nourished with its vigour these 'wings' that he was born with, just as other visions and other heritages (less personal of course. . . ) would nourish it...

The heritage he had nurtured in those crucial years of growth and development, and the unity that makes up its beauty and creative virtue, which he had sensed so well and which had become like a part of himself - my friend subsequently (\*) disowned them, striving relentlessly to hide the heritage and to deny and destroy the creative unity that was its soul. He was the first of my students to set an example by appropriating tools, 'pieces', while striving to dislocate the unity, the living body from which they came. His own impetus

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military service.

(\*\*) When I say 'totality', I mean everything that was essential, both in vision and in means. This does not mean, of course, that there were no unpublished ideas and results that I never thought of telling him about. On the other hand, I don't think there was any mathematical reflection from 1965-69 that I didn't talk about 'on the spot' with my friend, always with pleasure and profit.

(\*) Strangely enough, this division must have been present from the very first year we met (expressing himself

This was already the case through an ambiguous attitude towards the SGA 5 seminar, which was his first contact with schemes, Grothendieck-style cohomological techniques, and stale cohomology), and at the latest and in an unequivocal form as early as 1968 (see note "L'éviction", n° 63) - at a time, therefore, when mathematical communication was perfect, and when the development of his mathematical thought does not seem to me to have been marked yet by conflict. At the time, he made many interesting contributions (which I take great pleasure in highlighting in the Introduction to SGA 4) on topics that he did his best, as soon as I left,

to bury.

The creator found himself slowed down, absorbed and finally dislocated by this deep division within himself, pushing him to deny and destroy the very thing that made him strong, that nourished his impetus.

I see this division expressed in three interdependent and indissolubly linked effects. One is the *dispersal of energy*, scattered in the effort to deny, dislocate, supplant and hide. The other is the *rejection* of certain ideas and means, essential for the 'natural' development of the subject he has chosen as his central theme(\*\*). The third is the *wrenching away from* this theme of all themes, where the aim is to supplant, to oust a master who is present at every step and who must be constantly erased - precisely the theme that is most intensely invested with the fundamental contradiction that has dominated his life as a mathematician.

What I know at first hand, and an instinct or elementary flair that has never deceived me, make it quite clear to me that if Deligne had not been torn apart by this profound contradiction in his very work, mathematics today would not look like what it does (\*) - that it would have undergone, in several of its essential parts, far-reaching revivals like the one I myself had been the main instrument of - that one.

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(\*\*) This refusal was manifested in particular by the burial of derived and triangulated categories (until 1981), of the formalism of the six variances (until today), of the language of topos (also), and by a sort of 'blocking by disdain' of the vast programme of foundations of homological and homotopic algebra, of which I am now trying (twenty years later) to give an outline with the *Poursuite des Champs*, and of which he had of course also felt the need. Finally, even though he was inspired by the yoga of motives (buried until 1982), this yoga remained mutilated of part of its force, being detached from the formalism of the six variances which constitutes an essential formal aspect of it. It seems to me that this aspect has also been rigorously banished from Hodge-Deligne's theory.

(\*) When I wrote these lines on the subject of 'mathematics today', I wasn't thinking solely of the the more or less profound knowledge we have of mathematics today. There was also, in the background, the thought of a certain *esprit* in the world of mathematicians, and more particularly in what might be called (without sarcastic or mocking intonation) 'the great mathematical world': the one that 'sets the tone' for deciding what is 'important', or even 'licit', and what is not, and also the one that controls the means of information and, to a large extent, careers. Perhaps I'm exaggerating the importance that a single person, in the position of figurehead, can have on the 'zeitgeist' in a given milieu at a given time. Deligne's career seems to me to be comparable (for better or for worse) to that which Weil seemed to have in the milieu that had welcomed me twenty years earlier, and with which I had identified myself for twenty years.

(31 May) Compare with the (additional) reflections in the note "The Gravedigger - or the whole Congregation", n° 97.

which the same Deligne was determined to counter and divert! (\*\*)

There was also no doubt that he was ideally suited to be the driving force behind a powerful school of geometry, a continuation of the one that had grown up around me - a school nourished by the vigour of the one from which it had emerged, and by the creative power of the one who was taking over from me. But this school that had formed around me, this nurturing matrix that had surrounded intense years of training - it broke up the very day after I left. If this was the case, it was precisely because I couldn't find, in the person who was obviously taking over from me(\*\*\*), the person who would be the soul of a group united by a common adventure, for a task whose dimensions exceed the means of each individual.

I have the impression that after I left, each of my students found themselves in their own corner, with a lot of work to do - there's certainly no shortage of it in maths - but without this 'corner' being part of a whole and without this 'work' being supported by a current, by a wider purpose. No doubt, as soon as I left, if not even before, most of my students or ex-students were looking to the designated 'successor', the most brilliant among them and also the closest to me. At this sensitive moment, my friend must have felt, perhaps for the first time in his life, the power over others that was suddenly in his hands, the power of life or death that he had over the fate of a certain school, from which he had come, and whose friends he had worked with for four years were no doubt expecting him to ensure its continuity. The situation was entirely in his hands, and it was he who was going to set the tone... He did indeed set the tone, by destroying the legacy, and first and foremost the confidence and expectation (\*) that those who had been students with him could not fail to bring him.

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(\*\*) (16 June) I am convinced that simply because the key ideas I introduced into mathematics are developing normally, building on the momentum gained in the sixties (cut short by the 'chainsaw effect' discussed in the next two notes), mathematics today, fifteen years after I left, would have been different from what it is, in some of its essential parts....

(\*\*\*) This *succession of heirs* was expressed by unequivocal concrete signs: he took over from me at the IHES (from which I left the year after he joined - see note "L'éviction", n° 63), and he took up, with the resources I had developed for this purpose over a period of fifteen years (from 1955 to 1970), the central theme of the cohomology of algebraic varieties.

(\*) (26 May) In the course of my reflections, I detected a completely different 'expectation' regarding my tacit heir, this time coming not from my pupils alone, but from "the entire Congregation" - see on this subject the end of the note "The Gravedigger - or the entire Congregation" (n° 97). I have little doubt that these two expectations in opposite directions, one linked to a very particular moment, and the other continuing

throughout the fourteen years of the Burial, are both real. What is more, I would be inclined to think that in

from the same master...

Many people are undoubtedly impressed by Deligne's work, and not without reason. But I am also well aware that this work, beyond its impressive initial impetus (which ends with the demonstration of Weil's conjectures), is a long way from living up to its full potential. It certainly shows uncommon technical mastery and ease, placing him among the 'best'. But it lacks the humble virtue that I perceived in him in his younger years - the virtue of renewal. This virtue that he carried within him, this freshness or innocence of the little child, has long since been deeply buried, denied. I was going to write that because of this 'virtue' and because of his unusual gifts, as well as the exceptional circumstances from which he benefited to deploy his gifts, Deligne was destined to 'dominate' the mathematics of our time, just as a Riemann or a Hilbert had each 'dominated' the mathematics of their time. Inveterate habits of thought, ingrained in everyday language, have led me to use this image of 'domination', which gives a distorted view of reality. These great men undoubtedly fully 'grasped', 'assimilated' and 'made their own' the mathematics known at the time, which undoubtedly also gave them an exceptional mastery of technical means. But if they rightly seem 'great' to us, it is not because of their technical prowess, 'wresting' difficult demonstrations from a surly substance. It is by the renewal that each of them brought to several important parts of mathematics, by their simple and fertile 'ideas', that is to say: by having brought their gaze to simple and essential things, to which no one before them had deigned to pay attention. This childlike ability to *see* simple, essential things, however humble and disdained by all, is the power of renewal, the creative power in everyone. This power was present to a rare degree in the young man I knew, unknown to all, a modest and passionate lover of mathematics. Over the years, this humble 'power' has seemed to disappear from the person of the admired and feared mathematician, enjoying his prestige without hindrance, and the (sometimes discretionary) power it gives him over others.

This *eruption* in my friend of something very delicate and very lively, neglected by all and which

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For more than one of my former students, the two expectations must have been present at the same time: that of finding in the most brilliant among them the person who would ensure the continuity of a School and a body of work in which they had their place and their part to play - and that of seeing erased (if that were possible) all trace of the person whose departure suddenly called out to them with such force, in the tranquillity of the well-trodden paths.... .

t's a creative power I've felt many times since I left, and more and more in recent years. But it's taken the discoveries of the last few weeks, and the reflection I've been pursuing since the end of March (in the wake of Harvest and Sowing), to begin to feel the full extent of the devastating effect of this suffocation in the life of my friend, and among many others I've known closely. Not only on some of my 'later' (and assimilated) students, who were subjected to his malevolence (perhaps unconscious in some cases), which was exercised against each of them and weighed heavily on three of them; but also, it seems to me now, among my 'earlier' students, through the destruction of a sense of *continuity* in the subject matter, and of a feeling of a whole, of unity, giving a deeper and wider meaning to their work than that of an accumulation of separate prints bearing their name <sup>(91)</sup> (\*).

More than once in the last seven years, and more than once again in the last few weeks and days, I have felt saddened by what feels, on some level, like an immense *waste* - when what is most precious in oneself and in others is squandered or smothered as if for pleasure. However, I have also come to learn that such 'waste' is a basic feature of the human condition, which in one form or another can be found everywhere, in the lives of individuals, from the humblest to the most illustrious, as well as in the lives of peoples and nations. This very 'waste', which is nothing other than the action of conflict and division in the life of each individual, is a substance of a richness and depth that I have barely begun to fathom - a nourishment that it is up to me to 'eat' and assimilate. So this mess, and all the other messes I encounter every step of the way, and all the things that happen to me along the way that are so often unwelcome - these messes and other unwelcome things carry within them a *benefit*. If meditation has a meaning, if it has the power of renewal, it is insofar as it allows me to receive the benefit of what (through my inveterate reflexes) presents itself as 'evil', where it allows me to *nourish* myself from what seems designed to destroy.

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(\*) (16 June) This second aspect only came to my attention during the reflection on L'Enterrement. If I have ever seen a prestigious mathematician make use of the 'power to discourage', it was the very man who once seemed to me to be my heir apparent. When I wrote the section 'The power to discourage', I thought a lot about him (before the thought came back to me), but without yet having the slightest inkling (at least not on a conscious level) of the extent to which this power had found occasion to be exercised among the very people for whom he must have been (as he was for me) the model of the perfect mathematician. ...

Nourishing yourself with your experience, letting it renew you instead of constantly avoiding it - that's what it means to take full responsibility for your life. I have this power within me, and it's up to me at any given moment to use it or put it aside. It's the same for my friend Pierre, and for each of my students - free like me to feed off the 'mess' that I'm just finishing reviewing in these last days of a long meditation. And the same goes for the reader who reads these lines, intended for him.

(<sup>91</sup>) (19 May) The feedback I have received here and there about my former students has been more than sparse. Hardly any of them gave me any sign of life after my departure, even if it was only to send me some prints (\*). However, by putting together the few that I did receive, I can form an idea, admittedly a very rough one. Perhaps it will become clearer in the months to come, if this reflection prompts some of them to come forward.

I have already had occasion to note the profound break in Deligne's work after I left, even though in some respects he appears, unwillingly, as a successor, and therefore as part of a certain continuity. And I had the feeling that this break must have had a profound effect on the work of all my other students. It's this impression that I'd like to explore a little more closely.

The only one of these students whose work seems to be an obvious extension (at first sight at least) of the work he had done with me seems to be Berthelot(\*\*). He is also the only one who for a long time sent me numerous separate prints - perhaps even all his separate prints. They are all on the difficult subject of crystal cohomology, the systematic start-up of which is the subject of his thesis. It seems to me, however, that, as with my other (commutative) 'cohomology' students, his work is marked by a disaffection with some of the main ideas I had introduced: derived categories (and triangulated categories, identified by Verdier), the formalism of the six operations, topos (<sup>91</sup> 1). As Zoghman Mebkhout himself says, his own work, so close in theme to that of Berthelot (<sup>91</sup> 2), is in line with these ideas, together with the ideas of the school of

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(\*) (31 May) On this subject, see note no. <sup>◦</sup> 84 1, following the note on "Silence" (no. <sup>◦</sup> 84).

(\*\*) According to the theme of duality that Verdier pursued for a few years after I left, in the context of analytical spaces close to the one in which I had developed it, there is an impression of continuity as in the case of Berthelot. But it seems to me that this was a bit of a 'routine continuity', whereas the continuity whose signs (or lack of signs) I'm mainly looking for is a creative continuity, continuing an initial momentum into the unknown...

Sato. If they had not been repudiated by my cohomology students, led by Deligne and Verdier, there is a good chance that from the very beginning of the 1970s, Mebkhout's crystalline theory (which he only began to develop from 1975, against the disinterest of these same students) would already have reached the full maturity of a formalism of the six operations, which it has still not achieved today (\*).

I remember talking to Verdier about the question, which intrigued me, of the link between constructible discrete coefficients and continuous coefficients, but it didn't seem to catch his eye. It must have caught Deligne's eye, since he devoted a year's seminar (in 1969) to compiling a dictionary, which must not have satisfied him, since he subsequently abandoned it to write off. (See note "L'inconnu de service et le théorème du bon Dieu", n° 48<sup>¶</sup>.) Moreover, he was so 'blocked' by his burial syndrome that he did not perceive the importance of Mebkhout's work until October 1980 - and when he did finally realise it, it was in the grave-digging mood that we know (see notes n° s 75 to 76).

As far as I know, Verdier's work since he defended his thesis has essentially been limited to redoing in the analytical context (which sometimes presents additional technical difficulties) what I had done in the coherent schematic framework, without introducing any new ideas. It's even rather extraordinary, with the reflexes he was supposed to have developed and well-informed as he was, that he didn't come across Mebkhout's theory himself, by dint of turning his crank - and that he didn't at least recognise that his 'pupil' was doing some interesting things, which had escaped him (as they had escaped Deligne).

To tell the truth, although I was intrigued by the question of the relationship between discrete and continuous coefficients, I hadn't really had any inkling of Mebkhout's crystalline theory, which was to blossom in the decade following my departure. On the other hand, there was

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(\*) (7 June) I hesitated to venture this assessment, which could be interpreted as undermining the originality of Mebkhout's theory. This would not at all be in line with my thinking, and all the less so as I have an excellent opinion of the abilities of each of my cohomology students (when they are not blocked by prejudices alien to good mathematical sense). My friend Zoghman himself has dispelled any misgivings I might have had, saying himself that he was convinced that 'normally' it was my students who should have been developing his theory from the very beginning in the 1970s. At a certain level, they are surely the first to be convinced: it is they, or Deligne, who *should have developed* it - and with the general decline in morals, that's all it takes to behave as if they really were (or as if Deligne really was)! On this subject, see the notes "Le Colloque" and "La mystification", n° s 75<sup>¶</sup> and 85<sup>¶</sup>.

a vast theme, stemming from my reflections on both commutative and non-commutative cohomology in the fifties (1955-1960), and which had only just begun (in the "commutative" context, i.e. in terms of additive categories) in the work of Verdier, started in the early sixties and left to one side after his defence (see note n° 81). The non-commutative aspect was initiated later in Giraud's thesis, which develops a geometric language, in terms of 1-fields over a topos, for non-commutative cohomology in dimension  $\leq 2$ . By the second half of the sixties, the inadequacy of these two beginnings was quite obvious: both in terms of the inadequacy of the notion of "triangulated category" (developed by Verdier) to account for the richness of structure associated with a derived category (a notion that was to be replaced by the considerably richer notion of *derivareur*), and in terms of the need to develop a geometric language for non-commutative cohomology in any dimension, in terms of *n-fields* and  $\infty$ -*fields* over a topos. We felt (or I felt) the need for a synthesis of these two approaches, which would serve as a common conceptual foundation for homological algebra and homotopic algebra. Such a work was also in direct continuity with Illusie's thesis work, in which both aspects are represented.

Bousfield-Kan's fundamental work on homotopic limits (Lecture Notes n° 304), published in 1972, was also in line with this diffuse programme, which since at least 1967 had only been asking for arms to be developed, via the notion of the derivator (valid in a non-commutative as well as a commutative framework). In January last year, without yet suspecting that I was going to launch into La Poursuite des Champs a month later, I submitted to Illusie some thoughts on the 'integration' of homotopy types (familiar to homotopists as 'homotopic (inductive) limits'), at a time when I was still completely unaware of the existence of Bousfield and Kan's work, and when this type of operation had already been examined by others. It turned out that Illusie was just as unaware of it, even though he was supposed to have remained in homologous-homotopic waters all the time since my 'death' in 1970! This just goes to show the extent to which he seems to have lost touch with certain realities that are part and parcel of the fundamental thinking he himself pursued in the 1960s (\*). He must have made his own little hole, from which he hardly ever emerges...

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(\*) This notion of "integration" of homotopy types came to me again in the context of the unscrewing of stratified structures, which I took up again at the end of 1981.

With the disdain that has hit the very notion of *topos* and all the 'categorical nonsense', it is not surprising that Giraud now has a total disaffection for what had been his first major theme of work. It is true that Deligne, with the exhumation of motives two years ago, pretended to have suddenly discovered the interest of the arsenal of non-com-mutative cohomology, sheaves, links and the like, as if he had just introduced them himself, at the same time as motives and motivic Galois groups (\*). It is doubtful that this kind of circus will rekindle a flame that he himself has worked so hard to extinguish. ... In February last year, I sent Giraud a copy of the twenty-page letter that became chapter 1 of the opening chapter of the *Poursuite des Champs*. It was a non-technical reflection, in the course of which I managed to 'jump with both feet' over the 'purgatory' that had at one time stopped Giraud (and many others) from handling the notion of 'non-strict' *n-category* (which I now call '*n-field*'), which remained heuristic and yet was visibly fundamental. This was the start of the *Poursuite des Champs*. When we met (on friendly terms) last December for Contou-Carrere's thesis defence, I learned from Giraud that he hadn't even been curious enough to read the letter! I got the impression that he had written off this sort of thing. The idea that there might be some rich substance, in a direction he had long since abandoned, didn't even seem to cross his mind. I tried, unsuccessfully I'm afraid, to get him to understand that there was a juicy and far-reaching job there that had been waiting to be done for nearly twenty years, and to which I finally got down to work in my old age, in order at least to give an outline, under the dictation of the things themselves, of a rich substance that the 'deceased' that I am continues to feel strongly, whereas my pupils have long since forgotten it.

Jouanolou also abandoned a line of research he had just begun with his thesis. This direction had become the object of the disdain of a fashion established by the very person who had provided him with a master technical idea for the theme he had chosen. With the 'rush' on the triangulated categories with the Colloque Pervers three years ago, this same Deligne suddenly pretended (without laughing) to discover the great work of foundations in perspective, the lack of which was suddenly felt at all ends, and which he had been the first to discourage for ten years. The need for such work was quite obvious to me as early as 1963/64 with the beginnings of étale cohomology; and to Deligne just as much,

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(\*) See "Souvenir d'un rêve... - ou la naissance des motifs", note n° 51.

from the moment he started hearing about A-adic cohomology and triangulated categories, in other words when he arrived at my seminar the following year. At the time, it was a question of

beyond the construction of "constructible triangulated categories" on the  $Z_{\text{ring}_A}$  (above of a basic schema, let's say), and the development of the 'six operations' formalism within this framework (something accomplished, it seems to me, in Jouanolou's thesis), to do an ana-

logue by replacing the base ring  $Z_A$  by a  $Z_A$ -noetherian algebra (more or less?)

arbitrary, for example  $Q_A$  or an (algebraic?) extension of  $Q_A$ . This is one of the things for which the time was ripe some twenty years ago, and which are still waiting to be done, when the wind of contempt that has blown over them has died down... .

The natural continuation of Mme Raynaud's work (weak Lefschetz theorems in staggered cohomology, in terms of 1-fields) would have been placed in a context of strictly taboo  $\infty$ -fields, never mind! The same goes for Ms Sinh's work, begun in 1968 and completed only in 1975 - a natural continuation would have been the notion of Picard's enveloping  $\infty$ -category of a so-called "monomial" category, or tri-angulated variants of such a category (\*) - let's not think about it! Another was to transpose her work in terms of fields on a topos - what a horror! As for Monique Hakim, she also had the misfortune to write her thesis on a subject which, these days since my untimely departure, looks a bit ridiculous around the edges - relative diagrams on a locally ringed topos, I ask you! His little book on the subject, published in the Grundlehren (by Springer) must sell three or four copies a year - it's not surprising that I've got bad press there, and that they're no longer keen to accept a text that I might recommend. For me, it was a first test step towards a 'relativisation' of all the 'absolute' notions of 'varieties' (algebraic, analytic, etc. . . ) on general 'bases', the need for which is obvious to me (<sup>91</sup> 3). It will be said that we have done very well without it until now. But it's also true that we've done very well without maths for the two million years we've been around. In any case, Monique Hakim, who did not have the same motivations for doing her thesis as I did for proposing it to her, certainly had no desire to maintain any contact with a theme which (detached from the context of a favourable consensus, or of an obstinate thought pursuing a tenacious and sure vision against all odds) can no longer have the slightest meaning for her. For Neantro Saavedra Rivano, it seems to have disappeared entirely from circulation - I'm sure of it.

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(\*) As an approach to the  $K^i$  invariants of these categories, which I had imagined around 1967...

I can't even find his name in the official world directory of mathematicians. What is certain is that the subject of his rather categorical thesis could hardly have been in good press with the gentlemen who decide what is serious and what is not. The most natural continuation of this thesis, in my opinion, would have been no more and no less than this 'vast table of motives', a theme that was decidedly a little broad for the more modest aims of this student. Yet he ended up having the unexpected honour of having his thesis redone ab ovo et in toto by one of these great gentlemen himself, barely two years ago (see on this subject the notes 'L'Enterrement - ou le Nouveau Père' and 'La table rase', n° s 52 and 67.)

Finally, the only ones among my twelve 'pre-1970' students for whom it is not too clear to me whether or not there was a more or less drastic or profound break in their work compared to that which they had pursued in contact with me, are Michel Demazure and Michel Raynaud (<sup>91</sup> 4). All I know is that they have continued to do mathematics, and that they are part (as was to be expected, given their brilliant means) of what I called earlier 'the great mathematical world'.

The foregoing brief reflection, based on data that is sometimes very meagre, is of course largely hypothetical and very approximate. I hope that those mentioned in it will forgive me any errors of assessment that may be gross, and that I will be happy to rectify if they will let me know. Here again, I realise that each person's case is certainly different from that of all the others, and represents a much more complex reality than someone as distant as myself can reasonably apprehend, let alone express in a few lines. All these reservations aside, I nevertheless have the impression that this reflection has not been in vain, for me at least, to pin down with a few concrete facts a still diffuse impression which emerged yesterday (and which had no doubt been present at an informal level for many years): that of a *break-up* that took place among many of my students in the aftermath of my departure, and which reflected on a personal level the sudden disappearance, overnight, of a 'school' of which they must have felt a part during crucial years of training in their profession as mathematicians.

(<sup>91</sup> 1) (22 May) I have just read an article-survey from the "Analyse p-adic and its applications" at CIRM, Luminy (6-10 September 1982), by P. Berthelot,

entitled "Geométrie rigide et cohomologie des variétés algébriques de car.  $p$ " (24 pages), which outlines the main ideas for a synthesis of Dwork-Monsky-Washnitzer cohomology and crystalline cohomology. The initial ideas (and the name itself) of crystalline cohomology (inspired by Monsky-Washnitzer cohomology), and the idea of supplementing these by the introduction of sites formed by rigid-analytic spaces, ideas that I introduced in the 1960s, have become the daily bread for all those working in the field, starting with Berthelot, whose thesis consisted of developing and fleshing out some of these initial ideas.

Nevertheless, my name is rigorously omitted from both the text itself and the bibliography. Here we have a fourth clearly identified student-croquemort. Who's next?

(7 June) It is a remarkable thing that more than fifteen years after I introduced the starting ideas of crystal cohomology, and more than ten years after Berthelot's thesis which established that the theory was indeed 'the right one' for clean and smooth schemes, we have still not reached what I call a situation of 'mastery' of crystal cohomology, comparable to that developed for stellar cohomology in the SGA 4 and 5 seminar. By 'mastery' (to the first degree) of a cohomological formalism including duality phenomena, I mean no more and no less than full possession of a formalism of the six operations. While I am not sufficiently "in the know" to be able to appreciate the difficulties specific to the crystalline context, I would not be surprised if the main reason for this relative stagnation lies in the disaffection of Berthelot and others for the very idea of this formalism, which makes them neglect (just as Deligne does for his Hodge theory, which remains in its infancy) the first essential "stage" to be reached in order to have a fully "adult" cohomological formalism. It was the same kind of attitude that led him to ignore the interest of Mebkhout's point of view for his own research.

NB When I speak here of "crystal cohomology" in a context where one is abandoning cleanliness assumptions (as is necessary for a "fully grown-up" formalism), it is understood that one is working with a crystal site whose objects are (power-divided) "thickenings" that are not purely infinitesimal, but are "proper" (power-divided) topological algebras. The need for such an extension of the primitive crystalline site (which for me was only a first approximation for the "right" crystal theory) was clear to me from the start, and Berthelot learned it (with the ideas of

departure) by none other than myself. A written allusion to this link can be found in *Esquisse Thématische*, 5 e.

(<sup>91</sup> 2) It's quite extraordinary that nobody apart from me seems to have realised that Mebkhout's unnamed theory was an essential new part of a crystalline theory. I've been completely 'out of cohomology' for nearly fifteen years now, but I realised it as soon as Mebkhout took the trouble to explain to me what he had done last year. In any case, when I mentioned the matter (as a matter of course) to Illusie, he seemed to see in it a somewhat 'sau-grenuous around the edges' connection of things ( $\square$ -modules and crystals) that really had nothing to do with each other. Yet I know first-hand that he has a mathematician's flair, and so do my other students (cohomologists in this case, starting with Deligne) - but I can see that in certain situations, he's no longer any use to them. ... The more I think about it, the more extraordinary I find it that in such an atmosphere, Mebkhout still managed to do his job, without allowing his own mathematical flair to be defused by the total incomprehension of his elders, so far above him. . .

(<sup>91</sup> 3) It is especially since my talks at the Séminaire Cartan on the foundations of the theory of complex analytic spaces, and on the precise geometric interpretation of "level modular varieties" à la Teichmüller, towards the end of the fifties, that I have understood the importance of a double generalisation of the current notions of "variety" with which we have worked up to now (algebraic, real or complex analytic, differentiable - or subsequently, their variants in "moderate topology"). One is to extend the definition so as to admit arbitrary 'singularities', and nilpotent elements in the structural bundle of 'scalar functions' - along the lines of my seminal work with the notion of schema. The other extension is towards a 'relativisation' above suitable locally annelated topos (the 'absolute' notions being obtained by taking a punctual topos as a basis). This conceptual work, matured over more than twenty-five years and begun in Monique Hakim's thesis, is still waiting to be taken up again. A particularly interesting case is that of the notion of relative rigid-analytic space, which makes it possible to consider ordinary complex analytic spaces and rigid-analytic spaces over local bodies with variable residual characteristics, as the 'fibres' of the same relative rigid-analytic space; just like the notion of relative scheme (which has finally entered into

(e.g. morals) can be used to link together algebraic varieties defined over bodies with different characteristics.

(<sup>91</sup> 4) While Demazure's thesis work, like Raynaud's, makes essential use of a consummate schematic technique that they learned from me, the essential ideas in their respective works are not part of the 'Grothendieckian' panoply, which distinguishes their work from that of my other students of the first period. It is possible that this circumstance resulted in a continuity in their work, free from a rupture due to the effect of the 'master's burial syndrome'. This does not necessarily mean that this syndrome did not affect one or other of them in another way. Three years ago, I was struck by Raynaud's attitude towards Contou-Carrère's work on relative local Jacobians. The results announced are profound, difficult and beautiful, and go far beyond a simple generalisation of things that are 'well known'. There is an unexpected link with Cartier's theory of typical curves, some wonderful explicit formulae - all entirely within Raynaud's (and my) grasp. The freshness of his welcome must have weighed decisively in Contou-Carrère's strategic retreat, abandoning to the prof- its and doors a subject in which he had invested himself wholeheartedly and which, it might seem, would bring him nothing but trouble...(\*). My letter to him expressing my (pained) surprise at his insensitivity to the beauty of these results went unanswered.

(<sup>92</sup>) When I moved to the region nearly four years ago, there was a beautiful cherry orchard not far from my house. Often when I went for a walk, I'd go and have a look. I was delighted to see these thick cherry trees, in the prime of their lives, with their powerful trunks, which had always seemed to be at one with this piece of land, where weeds proliferate freely. They must not have known about fertilisers or pesticides, and in cherry season, that's where I went to pick the tastiest cherries. There must have been twenty or thirty trees.

One day when I went back, I saw all the trunks cut down to man-height, the crowns slumped on the ground next to the trunk, stumps in the air - a vision of carnage. With a good chainsaw, it must have been a quick job, an hour at the most. I'd never seen anything like it - when you cut down a tree, you usually take the trouble to bend down, to

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(\*) For further details, see sub-note no. <sup>95</sup> 1 to the note "Cercueil 3 - ou les jacobiniennes un peu trop relatives", no. <sup>95</sup>.

cut it down to ground level. There's a shortage of cherries, all right, and this cherry orchard wasn't going to produce a ton, that's understood - but these stumps of trunks said something other than shortages and yields...

Yesterday I had that feeling again, of a vigorous trunk, with powerful roots and generous sap, with strong, multiple branches extending its momentum - cut off cleanly, at man's height, as if for pleasure. It was taking the trouble to look at the main branches one by one, and seeing each one cut off, that finally made me see what had happened. What was made to unfold, in the continuity of an impulse, of an inner need with deep roots, was cut off cleanly, by a cut without burrs, to see itself designated in the eyes of all as an object of derision.

This reminds me of the 'misunderstanding' that Zoghman referred to, which supposedly took place between me and my students (apart from Deligne). What is clear, in fact, is that neither élan nor vision ever communicated from me to any of my students (apart from Deligne, who is definitely 'apart' indeed).

!). Everyone assimilated a technical baggage, which was useful (and even indispensable) for doing a job well done on the subject they had chosen, and which could even be of use to them later on. I can't say whether there was any hint of something else, going beyond that. If there was, it didn't stand a chance against the chainsaw, which cut it down quickly....

I'm well aware that if there are still people doing maths - and unless we completely abandon the kind of maths we've been doing for over two millennia - one day or other they won't be able to resist breathing new life into each of these branches that I see lying inert. Some of them have already been taken over by my friend the chainsaw, and it's quite possible, if God gives him life, that he'll do the same with a few others or even with all of them. Most of them, however, are no longer in his style. But perhaps he'll also eventually tire of constantly substituting himself for someone else, which is surely very tiring and not at all profitable, and just be himself (which is not bad at all).

## X. The Funeral Van

(<sup>93</sup>) (21 May) For the past two weeks, I've been thinking about my 'old' students. Every day, the reflection has come as a 'last addendum', as a matter of conscience, to a reflection that seemed (almost) finished. More than once, it was an innocuous footnote, carelessly branching off from the previous day's or the day before's reflection, which grew and grew into an autonomous 'note'. Each time, it quickly found its name, distinguishing it from all the others, and fitting into its funeral procession, in just the right place, as if it had always been there! Every other day, I was there to redo (each time with pleasure) at least the end of the table of contents, which seemed to be closed and which was then lengthened by two or three new participants in the Procession, if not a whole new procession...

This Procession ends up taking on worrying dimensions - no one will ever want to read all this! But if it grows like this, it's not, to be honest, for the dubious benefit of a hypothetical reader, but first and foremost for my own benefit - just like when I do maths. I've never had any regrets about embarking on these 'last supplements'. By dint of these final supplements, I've learnt a lot of things that I wouldn't have been able to learn otherwise, without doing some 'on the spot' thinking. And these things have come together, one by one, to form a vividly coloured picture of vast proportions and multiple facets. Even now, I can see that it's not entirely finished - there are still two places that seem to need a final brushstroke.

I think it's time, after my 'good-natured students', to talk a little about the *buried* - those who 'with me are entitled to the honours of this burial by silence and disdain'. No more than I or those who bury with gusto, these buried are not saints and have no vocation for martyrdom. I don't think there's one of them who hasn't blamed me for the trouble I was unwittingly getting him into (simply because he'd been unwise enough to bet on me, on a certain approach to mathematics and on a certain style... . ) - or that he had at least tried to distance himself from me, once he had recognised that the bet was definitely a loser (\*). I have also noticed that this is where

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(\*) (February 1985) I was aware of a total of seven or eight (short) publications, outside my Uni-

It's a wasted effort - once you've been spotted, you're finished, and to stand out is to fuel contempt, to give it tacit justification, instead of disarming it. On more than one occasion too, and in more ways than one, I've seen the roles of burier and buried rubbing shoulders and becoming confused(\*\*). These aspects of ambiguity are undoubtedly the cause of a long-standing reluctance on my part to talk about the 'buried' in any more detailed way than the allusions I have already made to them in passing. It is possible that, with the possible exception of Zoghman, none of the other three people I know are grateful to me for giving them 'publicity' here, as if I hadn't already caused them enough trouble as it is.

Like so many times during Harvesting and Sowing, I'm finally overcoming this reluctance in myself. I tell myself that even towards people who have had to suffer because of me (because of a choice they made at a given time and in which, for one reason or another, they were happy, even though they had no more idea than I did of the disadvantages attached to their choice) - even towards them my role is not to help them avoid a very real situation, in which they are involved whether they like it or not, and which surely makes sense even if it has serious disadvantages.

Before embarking on the black series of four coffins of my late co-deceased and co-buried, I should perhaps cheer up the reader with a less funereal note. First of all, in my dealings at the 'local' level of my university's Institute of Mathematics, I have by no means had the experience that the good I could say about a candidate for a post, or the fact that a candidate was one of my students (after 1970, needless to say), or that his work was influenced by mine, necessarily worked against him. Such an attitude of systematic boycott only characterises the relationship of the mathematical 'big world' to me and, by extension, to those who appear to be linked to me 'after 1970'. This boycott has been virtually unbroken in the fourteen years since I left, as far as I have been able to ascertain, albeit with two modest exceptions. One concerns a student who, after a promising start, was supposed to be working with me on a doctoral thesis on a very attractive subject, and whose application for a post as assistant professor was rejected.

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versity, presenting (in summary form) work done with me and inspired by me, since I moved to Montpellier. My name is absent from all of them.

(\*\*) (2 September) In different ways from one to the other, each of them at some point ended up internalising- (\*\*)(2 September) In different ways from one to the other, each of them at some point ended up internalising-

rise and take on board the disdain for their work, acquiescing in the consensus that dismisses this work or classifies it as "uninteresting".

at the USTL had been rejected by the Commission of Specialists of my University. He was 'rescued' at the national level, with the help of Demazure, to whom I had written about this student's work (\*). In addition, on two occasions, the journal *Topology* accepted articles by students of mine: an article "Stein factorisations and cut-outs" by Jean Malgoire and Christine Voisin, and a forthcoming article by Yves Ladegaillerie, containing the central result of his 1976 thesis (See note n° 94).

I've already had occasion to talk about Zoghman Mebkhout in particular, and I'll mention him again here 'for the record'(\*\*). Mebkhout began to draw inspiration from my work in 1974, I believe, and has continued to do so to this day. I am not aware of any of my 'official' students having produced a work of comparable scope - although Mebkhout's work is inevitably affected by the conditions of adversity in which it had to be produced. As I said in the Introduction (6), for the past thirteen years Mebkhout's ideas and results have been used by everyone, while his name has been carefully disregarded(\*\*\*). It is a mystery to me how my friend has been able to continue doing maths, while suffering disdain, and then iniquity as a kind of inescapable fate - a fate that came to him through people he must have (and still must) felt were vertiginously above him (\*), people he must have first heard talk of as a kind of 'stadium gods', at a time when he was (as he is) a student of mathematics.

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(\*) At the 'practical' level of promotion or accession to a post and status, the record of my teaching activity since 1970 can be reduced, in all, to two accessions to a post with status, once as a maître-assistant and another time as an assistant. By a strange irony, on both occasions these appointments signalled a sudden and radical halt to all research activity on the part of the person concerned.

(\*\*) Apart from the Introduction (6) (*L'Enterrement*), Mebkhout is mentioned in the notes "Mes orphelins" (My orphans), "L'inconnu de service et le théorème du bon Dieu", "L'Iniquité - ou le sens d'un retour", "La Perversité", "Rencontres d'outre-tombe", "La Victime - ou les deux silences", "Le Pavé et le beau monde", "Thèse à crédit et assurance tous risques" (notes n° s 46, 48<sup>✉</sup>, 75, 76, 78, 78<sup>✉</sup>, 80, 81).

(\*\*\*) A legion of people acted as gravediggers at this funeral, which was practically attended by-. Apart from my cohomology students (see on this subject the note "My students (2): solidarity", no.° 85), those whose professional good faith is directly and seriously in question here and of whom I am aware are J. L. Verdier, B. Teissier, P. Deligne, A. A. Beilinson and J. Bernstein.

(\*) Of course, Zoghman Mebkhout is no more of an idiot than I am, and he's well in the loop. to have a precise idea of the work of each of my cohomologist students, and to realise its scope as well as its limits, without any inclination to idealise it. This does not alter the fact that inhibitions of considerable power have held him back from even the idea of publicly calling any of them into question, even where malice is patent.

I myself was once a modest emigrant student with precarious resources. When he defended his thesis in 1979, he had an assistant post in Orléans. He then did everything he could to get into the CNRS, coming back three times - on the third occasion (in October 1982) he was finally given a post as a research fellow (equivalent to that of assistant or lecturer at the University). This gave him, if not a statutory guarantee, at least a degree of relative security.

Of the four 'co-buried' mathematicians of whom I am aware, Mebkhout is the only one who has continued to pursue his work against all odds, trusting his mathematical instincts without letting himself be stopped by considerations of prudence and expediency that might have inspired him in a merciless fashion. In him, who was not of a combative nature, there was an elementary *faith* in his own judgement, which is also a *generosity*, and which (much more than cerebral 'means') is the primary condition for doing innovative and profound work.

The idea I have of his work is certainly incomplete. From what I know of the main part of his work, it seems to me that with the brilliant means at his disposal, placed in an atmosphere of warm and active sympathy, he could have accomplished it, and brought it to greater maturity, in three or four years instead of ten, and with joy and not bitterness. But three years or ten, and "maturity" or not, the remarkable thing is that the innovative work appeared, and that it was able to appear in such conditions.

(<sup>94</sup>) Yves Ladegaillerie started working with me in 1974. It was 'by chance', at a time when he was in a slump - I gave him some naive ideas about the plunging of topological 1-complexes into surfaces, at a time when I knew nothing about surfaces (except the notion of genus), and he knew even less. It was a bit like grothendieckery (it always starts that way with me anyway...), and he was more or less hooked, until the day it finally clicked, I don't really know when or why. Perhaps it was at the moment when a visibly juicy question was emerging, a certain key conjecture on the determination of the isotopy classes of a compact 1-complex in a compact oriented-edge surface. True - false? That was the suspense, which lasted well over six months, a year, during which Yves kept abreast (and in the process kept me abreast) of the key theorems of surface theory,

while pushing on the 'foundations' parts of his work. The known results made the conjecture fairly plausible, but were obviously far from the mark - while the conjecture involved some nasty results from Baer and Epstein, and other things that looked unusual, even suspicious. He finally managed to prove the key conjecture in the summer of 1975. It is essentially equivalent to a complete algebraic description, in terms of fundamental groups, of the set of isotopy classes of plungings of a compact triangular space (say) into a surface with a compact oriented edge (\*).

From the moment Yves 'got the hang of it', he did his thesis in a year, a year and a half, results, writing, everything, and still on top form. It was a brilliant thesis, not as thick as most of those done with me, but as substantial as any of those eleven theses. It was defended in May 1976.

The thesis has still not been published. It may not have been very thick, but apparently it was still too thick to be publishable, among many other excellent reasons I was given. I mention a few of them in the note "You can't stop progress" (n° 50). The story of my efforts to 'place' this unfortunate thesis, one of the best I have ever had the pleasure of inspiring, would make a small book, which would certainly be instructive but which I have decided not to write. Among the close friends of yesteryear who had such good reasons for forgetting to take note of the results and for burying the whole thing with their eyes closed are (in order of appearance on the scene) Norbert A. Campo, Barry Mazur, Valentin Poenaru, Pierre Deligne - not to mention B. Eckmann through Springer (\*). The central result finally appeared, nine or ten years later and reduced to the bone, in a short article

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(\*) The "analogous" statement in the non-oriented case is false - decidedly this is a tricky result, carefully "un-cut" into a set of equally "plausible" but nonetheless false hypothesis-conclusions! For further comments on Ladegaillerie's work, see *Esquisse d'un Programme*, especially the beginning of par. 3.

(\*) I don't know Eckmann personally, and my correspondence to have Yves by Lecture Notes was with Dr Peters, who was in charge of the LNs at Springer. I think that through the fifteen or so volumes of the LNs that were published by me (SGA in particular) or by students (theses) in the 1960s, I was among those who contributed by their endorsement to the credit and unprecedented success of this series, which was still in its infancy. The reason given for rejecting the work I recommended (that they didn't publish theses) was a joke.

My first experience of the New Look in correspondence also dates from this episode: with a truly impressive array of letters, A. Campo, B. Mazur, V. Poenaru and Dr. Peters refrained from honouring me with a reply to a second letter, when I naively (I'm a slow learner. . . ) returned the favour,

of Topology (shhh - I have an accomplice on the Editorial Board of this esteemed journal... . ). The rest of the work, on the one hand demonstrated things that everyone has always used without demonstration (and we certainly did well without it!), and on the other hand developed typical grothendieckeries, completely contrary to usage and good morals. I'm well aware that if my friend Deligne doesn't take it upon himself to 'discover' them in the next ten years, others won't be able to resist repeating them in thirty or fifty years' time, since my healthy instinct tells me that these are fundamental things. They have been a precious thread in my Anabelian cogitations, and if God lends me life, I will have ample opportunity to refer to them in the part of the Mathematical Reflections developing the yoga of Anabelian algebraic geometry.

This adventure was a revelation for me, the first of its kind - the revelation of something that I only became fully aware of with the Reflexion l'Enterrement. I've tended to forget it since then, my mind being absorbed elsewhere. Yves Ladegaillerie, one of the most brilliant students I've ever had, realised at the time that to be accepted in today's mathematical world, it's not enough to put in a lot of effort and do work that meets all the requirements of excellence. Having more than one string to his bow, for seven years he has devoted himself to more down-to-earth tasks with less problematic returns. Before his unfortunate encounter with me, he was fortunate enough to have been appointed to the position of assistant professor, giving him a degree of security that was not jeopardised by his misadventure. Last year a mathematical spark seems to have been rekindled, on a theme very close to those I have been interested in over the last few years - hyperbolic geometry à la Thurston and its relationship to the Teichmüller group. It's even possible that we'll go a little further together, or that he'll take his own personal walk, just for the fun of it, and without expecting any return other than that which mathematics itself can give. He knows full well that if he expects any more, it's in his interest to change the person he's talking to or the person he's travelling with (and even the past. . . ).

(<sup>95</sup>) My first encounters with Carlos Contou-Carrère were in the corridors of the Institut de Math, the day after my arrival in Montpellier in 1973. He would corner me in some obscure corner and pour out a flood of mathematical explanations on me, before

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after their reticent response, which showed that they had not bothered to read the results set out in the introduction to Ladegaillerie's work.

I didn't even have time to apologise politely and get out of the way. What he was pouring out at an impressive rate was going right over my head, without him even pretending to notice, or being the least bit bothered when I timidly let him go on. He was in desperate need of someone to talk to, and I wasn't his only 'unwilling interlocutor'. This was at a time when I was not at all interested in maths. For a year or two, I would run away as soon as I saw his (easily spotted) silhouette appear at the end of a corridor. It was like that until Lyndon, who had been at Montpellier for a year as an associate professor, told me that Contou-Carrère had some unusual resources and that he was about to be shipwrecked because he didn't know how to use them. Until then, the question of whether or not what Contou-Carrère was spouting at me made sense, and whether or not he had the means, had not even occurred to me, so far removed was all this from my mind. Perhaps Lyndon's suggestion came at a time when I was beginning to take an interest in mathematical questions. In any case, I took the bit by the teeth and asked Contou-Carrère if he would explain something he had done so that I could understand him. I suspect I was the first to ask him such a thing, at least in the many years he'd already been in France. It wasn't easy to get him to explain something, but it wasn't impossible, and it was worth it. I soon realised that Lyndon hadn't been wrong - that Contou-Carrere was full of ideas that just needed to be worked out and developed with care, and that he had an immediate and very sure intuition in practically every mathematical situation that could be put before him. This rapidity and certainty of intuition, even in matters with which he was completely unfamiliar, exceeded and impressed me - the only other student in whom I experienced it to a comparable degree was Deligne (\*). On the other hand, he was almost totally opposed to writing! Incredibly, he could do maths *without writing* - God knows how he managed to do even that little, not to mention communicating with others, where he was a total 'train wreck' (see above).

If I had something urgent and useful to teach Contou-Carrere, it was the art of writing, or even more frugally, just making him understand that maths is done by *writing* it. I had to try for two years, maybe three, until 76 or 77(\*\*),

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(\*) I'm not sure I've come across it in other mathematicians, except Pierre Cartier (who impressed me greatly at a young age with this remarkable ability) and Olivier Leroy, who will be mentioned in the next note.

although I'm not entirely sure whether I've succeeded entirely. His first major work written out in black and white is his thesis on Schubert's cycles, defended only last December (1983)(\*\*\*). Between 1978 and the present day, our relations have been very episodic indeed, my role being practically limited to supporting him as best I can on the many occasions when he has found himself trapped in one way or another in his professional life, which is constantly suspended in the most precarious of assistant-delegate posts.

For two or three years, I had been trying to provide Contou-Carrère with the foundations of a precise and flexible mathematical model and a few principles of systematics. With this background, and his resources and wealth of ideas, he was really spoilt for choice about what to branch out into. Rather than start with ideas of his own, he branched off into the theory of local and global relative jacobians, which I had mentioned to him as a possible thesis topic. Once I had left him to his own devices, in the space of barely a year he produced a very fine piece of work, part of which is announced in a note to the CRAS (<sup>95</sup> 1). Going all the way down this path would have meant a few years of exciting work, which he found highly motivating, while at the same time learning all the finer points of the diagramming technique. I had no doubts at the time - it was clear to me that Cartier, Deligne and Raynaud would all warmly welcome the work that had already been done, which was profound, difficult and unexpected in many ways. Cartier was delighted to see some of his old ideas take on a new life. Raynaud, on the other hand, was indifferent, as was Deligne, who kept the complete manuscript in his drawers for six months, without deigning to give any sign of life (\*).

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(\*\*) (7 June) Checked, it was until February 1978.

(\*\*\*) It's a long piece of work (which I haven't read) in which he carefully develops ideas in which I have no part, giving, among other things, an explicit resolution of the singularities of all the "Schubert"-type cycles - something that nobody has been able to do before him. For the first time he wrote a formal essay, he was criticised for being too detailed (not to mention the fact that his statements were too general...)! For my part, if I have a criticism to make, it would be in the opposite direction: while Contou-Carrere claims that his methods should apply to all types of semisimple groups and Schubert cycles, he has only done the work in the case of the general linear group - so he has not gone as far as he should have on the precise question: description of the resolutions of equivariant singularities of universal Schubert cycles, *and* of the singular loci of the said Schubert cycles. This omission seems to me to be a legacy of this 'block' against work on parts and against writing, which for a long time had been his main handicap.

(\*) Contou-Carrère had taken the initiative, however, and did not breathe a word in his note about my person, who was provided the initial programme. It was a wasted effort - no matter how much he put into it, there's a 'style' to it.

It was two against one - enough to feel the wind. The Jacobias, which were a little too relative, were written off sine die. The chainsaw has done its job...

This did not, however, prevent the misadventures at Contou-Carrère, a detailed account of which would make for another little book, which I willingly give up writing. It was around this time, I think, that for the first and only time since I left (in 1970) the institution which for four years (1958-62) I had been the only one to represent and make credible 'on the ground', during the years when it did not yet have a home of its own - it was the only time I took it upon myself to recommend someone for an invitation (for a year in this case), at a time when Contou-Carrère risked finding himself without a post and on the street. I knew that the person I was recommending, just as unknown as Hironaka, Artin or Deligne had once been when I warmly welcomed them to the IHES, would do as much honour to the institution that was welcoming him. Of course, I made a point of saying so. Fortunately for Contou-Carrère, his position as deputy assistant (admittedly unworthy of the honour of an invitation to such a selective institution) was finally renewed (\*).

I wasn't really surprised by this episode, as I was already aware of Deligne's attitude, and as Nico Kuiper had warned me that everything depended on him in this particular case. (It didn't even occur to me to suggest to him that the same thing might perhaps apply to the other members of the Scientific Council, given the case in point...). The episode that touched me the most, however, of all the misadventures of Contou-Carrère (my 'protégé', as Verdier had taken it upon himself to call him in a letter, as a matter of course... . ), takes place in October 1981, in connection with his application for a teaching post in Perpignan. His colleagues in Perpignan (where he had his post as assistant delegate) surely appreciated the presence among them of someone who was at ease and whom they could

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which, whether you like it or not, is attached to certain themes that are best avoided if you want to make a career in maths today.

(7 June) On enquiry, I note that I am confusing here two different episodes relating to Contou-Carrère's work on Jacobians. See the following note (n °<sup>95</sup> 1) for details and precise references.

(\*) I can't complain, since five or six years later, on the occasion of the jubilee of twenty-five years of At the IHES last year, I was indeed honoured with an invitation, and was even given the choice between a formal reception with a speech by the Minister, or a week's stay at the IHES, again all expenses paid (I was assured). I told my old friend Nico Kuiper that it was very kind of him to have thought of me like that, but that I didn't travel any more at my age. ...

consult in practically all branches of mathematics. When a teaching vacancy arose, they put him forward as the sole candidate for the post - a rare occurrence, which made it clear that it was he and no one else they wanted in the post. C. C. had relatively few publications apart from his doctoral thesis in Argentina with Santalo, which were mainly notes to the CRAS, announcing results (some of them pro-funds), but without any demonstration. No one had yet suggested to him that in these times, and as long as you don't have a job, it's better to have articles with complete demonstrations as 'convic- tions' - something that I had preached to him enough, but from a less utilitarian point of view(\*\*). In any case, Contou-Carrere's application was deemed inadmissible by the Comité Consultatif des Universités and the file was sent back. The thing that struck me at the time was that neither the President of the CCU (the national body that took the decision), on behalf of the Committee, nor any of the members in a personal capacity, had the minimum respect to write, either to the principal interested party Contou-Carrere himself, or at least to the Director of the Institut de Mathématiques de Perpignan, to give a few words of explanation about the meaning of this vote, which in the absence of any explanation could only be seen as a stinging disavowal of the choice made by the Perpignan colleagues, and as a disavowal of their only candidate as being capable of honourably filling the post for which he was proposed. There were three of my former students on the Council, two of whom knew Contou-Carrère personally. Of course they knew that he had been a pupil of mine just as they did, especially as the dossier included a particularly glowing report by me on the candidate's work. None of them, nor any of the other members of the Council, thought about the affront represented by this vote-couperet without any other form of trial, and the torpedoing of a mathematician who was just as honourable as any of them.

It was this incident, for the first time in my life as a mathematician, made me feel that 'breath' I've mentioned more than once in the course of my reflections. I had already felt it four

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(\*\*) The year before, Contou-Carrère had applied for a professorship at Rennes, where he knew Berthelot and Larry Breen. His application was deemed admissible by the CCU, but the post was awarded to another candidate. No one bothered to warn him that if he wanted to have any chance of getting the job, he would have to publish detailed demonstrations of the results he was announcing. The CCU's rejection the following year came as a complete surprise to Contou-Carrere, his colleagues in Perpignan and myself. With hindsight and in the light of the present reflection, I doubt whether the situation will really change with the writing of his thesis (already declared 'unpublishable' as it stands) and its defence, and whether he will have any chance of finding a teaching post in France.

years before, with the episode of the strangers (\*), but it wasn't inside the world that had been mine, blowing on *one of their own* - on someone who unreservedly identified with that world. It made me feel sick for weeks, maybe months. To free myself from the anguish that gripped me without my even bothering to read it (\*), I became restless, writing letters left and right, and a thirty-page text entitled 'Le Cerveau et le Mépris' (The Brain and Contempt), in a darkly humorous vein, which I finally gave up trying to publish (\*\*). Looking back, I realise that it was the perfect time to *ponder* the meaning of what was happening. The funny thing is that what 'prevented' me at the time from even realising the need for in-depth meditation was a long meditation that I was engaged in at the time and about which I've had occasion to speak(\*\*\*) - and a meditation, what's more, on my relationship with mathematics (if not on my past as a mathematician)! It was disturbed by an episode in which life was challenging me forcefully - and I evaded the challenge by getting agitated, then plunging back into 'meditation'. Looking back, I realise that this 'meditation' at the time did not fully deserve the name, that it lacked an essential dimension of true meditation: attention to my own person at the *very moment*. I was 'meditating' on the meaning of certain more or less remote events, while ignoring a repressed anguish (perfectly controlled, it's true, as a result of a long habit of such control), a sign of my refusal to take note of the message that this rejected 'breath' was bringing me.

But I'm getting away from my point. The torpedoing, of course, had the effect it was bound to have. The Perpignan colleagues were called to order once, but that was enough. Apparently there isn't even a position for an assistant delegate with them any more, at least not for Contou-Carrère. He has found a replacement at short notice in Montpellier, for the current year, and the incumbent will return next year.

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(\*) On this subject, see the section "My farewells - or strangers", s. 24.

(\*) I only became aware of this anxiety during a long period of meditation the following year, when I discovered the role of anxiety in my life, the presence of which (chronic until 1976, and occasional after 1976) had been 'the best-kept secret in the world' throughout my life. There were some highly effective mechanisms that concealed all the generally recognised signs of anxiety, which remained unknown to myself and to those close to me.

(\*\*) I was discouraged from publishing it by the very people for whom I was preparing to go to war, to whom I had the good sense to show my text before any attempt was made to make it public.

(\*\*\*) On this subject, see "Le patron trouble-fête - ou la marmite à pression", s.

43.

I'm not worrying too much about his future, though. It's been a while since Contou-Carrère had the wisdom to get ahead of the curve and take up computing. With the brilliant means at his disposal, he must have been dominating the subject for a long time, while doing the maths he loves in his spare time. He's a father with two children, and maths these days, with the past hanging over his head, is decidedly risky, not to say violent. It's in his interests to have a brilliant career as a computer scientist, where no one will hold it against him that he was even remotely my pupil.

(<sup>95</sup> 1) (7 June) It was towards the end of 77 that I submitted to Contou-Carrère a circumscribed work plan for a theory of relative local and global Jacobians, including, in the local case, the suggestion of 'screwing back' the Jacobian and Cartier's ind-group, in order to find a 'complete' Jacobian with a more beautiful universal property, and which would be 'autod- ual'. I had no idea of a demonstration to propose, and did not take any more care of his work after February 78, having realised that my presence inhibited his abilities, instead of stimulating them. He managed to "get going" in the year that followed, and his first note "*The generalized Jacobian of a relative curve, construction and universal factorization property*" (concerning the global case) appeared on 16.7.1979 (CRAS t. 289, Series A - 203). The following month he found the decisive results for the local Jacobian, but did not publish anything on this subject for a year and a half, when he published "half" (universal property of the ordinary local relative Jacobian, not screwed with the Cartier group), in a note

at the CRAS on 2 March 1981, under the title (not very convincing at first sight) "*Corps de classes local géométrique relatif*" (CRAS t. 292, Série I - 481). As for the theory of the complete local Jacobian, which is even more interesting in my opinion, there is a draft note to the CRAS, which has never been published, under the title: "*Local Jacobian, universal Witt bivector group and tame symbol*". Of course, I was informed of his results as early as 1979, i.e. a complete realisation of the provisional programme that I had proposed to him, for which it had been necessary to overcome considerable technical difficulties, requiring a great deal of imagination and technical power. I was aware (unless I was mistaken) only of the first note, and was surprised that he did not publish the rest, i.e. the final part, without him ever giving a clear explanation - but he was visibly disappointed by the reception given to this first note. After his unsuccessful application to Rennes in 1980, and given that my

Although the letter of support attached to his candidature file referred to remarkable results on global and local relative Jacobians, he must still have thought it prudent (in order to prepare his candidature the following year in Perpignan) to publish at least one more note on local Jacobians, otherwise he would have emptied his entire bag. It was two months later, in May 1981, that he sent the draft of his third note to Deligne and Raynaud (no doubt Cartier had known about it for a long time), presumably to sound out the field first (I don't think he would have had the slightest difficulty in getting Cartan to present this third note, at any time since August 1979 when he had the results in hand). Neither Raynaud nor Deligne gave him any sign of life - but in March 1982 Deligne sent him the manuscript of an article "*A remark on tame symbols*", dedicated to Deligne, by Kazuya Kato, which gives Contou-Carrère's theory in the case of a basic body, and conjectures its validity on any basic ring. Contou-Carrère told me about it, saying that he was convinced that Deligne had communicated his results (without naming him, or giving any indication of a demonstration) to K. Kato. At the time the whole thing seemed so incredible that I didn't take Contou-Carrère seriously - although now I realise that it would be quite in the usual "thumbs up" style of my brilliant friend Deligne. Contou-Carrère looked genuinely outraged that anyone would "presume to conjecture" about something he seemed to regard as some kind of private property. Yet he himself got his conjectures from me, without thinking it necessary to allude to me in any of the three notes (\*)! From him to me it must have seemed self-evident, whereas the mere presumption that Deligne would do the same to him outraged him, but he didn't dare breathe a word of it to Deligne. (I had urged him to explain himself to Deligne, which he was careful not to do.... . )

In a way, I imagine that he has had to work hard all these years not to publish some very fine results, in which he has had to invest his heart and soul. If he has done so, it's out of concern for an economic climate that is clearly not conducive to this kind of grothendieckery. He was astonished to receive a letter from the same Deligne in the last few days, expressing surprise that he had not published his note on 'total' Jacobians, and asking him for all the information he had on the subject and even on others. Zoghman Mebkhout had already told me a few days before that Deligne was using these things

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(\*) On the subject of a certain role of connivance that I have often played in this kind of situation with some of my students, see the note "Ambiguity", n° 63<sup>✉</sup> .

and that he had even named Contou-Carrère in this context. It would seem that the time is ripe for Contou-Carrère to finally recognise a child of his own, whom he has had the prudence to bury for nearly five years. Perhaps, who knows, the time has even come for a reconciliation between the two 'student-enemies'; these two most brilliant of my students, one a decorated academician and the other a delegated assistant, and yet (whether they reconcile or not) they have long been *brothers*.

(<sup>96</sup>) (22 May) I'd hardly be exaggerating if I said I'd never seen Olivier Leroy. What is certain is that from the moment he heard about me, he decided to avoid me like the plague. His reasons, I confess, escape me. Perhaps an instinct told him that I was only going to get him into trouble, or perhaps Contou-Carrère (who was very friendly with him for a long time) told him so - I may never know. All the same, I had the honour and pleasure of two substantial conversations with Leroy, which I remember very well.

The first time must have been in 76, 77, when Contou-Carrère and I went to see him at his place, out of the blue, just to talk maths a bit - I don't know if we had some ulterior motive. I don't know if we had an ulterior motive, but perhaps it was understood that Olivier was thinking of embarking on a 3° cycle doctorate, and I certainly had plenty of subjects up my sleeves. Having seen him once or twice at Contou-Carrère's house, and from what Contou-Carrère himself told me, I had the impression that Olivier must have a quick grasp of things, and not just in maths. It was a memorable evening for the three of us. I soon had to talk to Olivier about a programme for a theory of the fundamental group of a topos and van Kampen theorems in the topassic framework, and he seemed interested. He must have had some topassic experience from Contou-Carrère's algebraic geometry seminar, and he seemed interested in having an opportunity to 'get to grips' with the language of topos on an example of a concrete theory. For a good two or three hours, I had to pour over him a detailed masterpiece of the theory I had in mind to develop, which grew richer as I talked about it, and as a host of concrete situations in algebraic geometry and topology came to my mind - situations that had to be expressed in the topassic framework, and that each time I first had to 'remind' someone who was hearing about it for the first time. More than once in the course of the evening, Contou-Carrère (who has read almost everything and has a strong stomach) looked vague and defeated,

Even for him it was a lot to take in - and more than once I thought it prudent to ask Olivier if it wouldn't be better to stop for today and start again another day. I could have saved myself the trouble - Olivier was visibly fresh, bright-eyed and perfectly at ease, and I was even laughing, because I couldn't believe he wasn't cracking up, but he wasn't! He was a young guy, maybe twenty years old, who must have had just a smattering of diagrams, a bit of topology and topos, and I think he'd done a fair bit of work with infinite discrete groups... . It was three times nothing, to tell the truth, and with that he still managed to fill in all the blanks and to 'feel' effortlessly what I, an old veteran, was telling him at breakneck speed in two or three hours on the basis of a fifteen-year familiarity with the subject. I had never come across anything like it, at most in Deligne's work, and perhaps in Cartier's, who had also been quite extraordinary in this respect in his younger days.

The fact remains that it was clearly a done deal, and Olivier was going to do his 3° cycle thesis on the subject in question. He couldn't have known what was waiting for him at the end. In any case, I never saw him again during the two years he was doing the work and even after that. His official boss was Contou-Carrère, but it would have been nice to have a chat with such a hip guy. In fact, I wasn't even informed of the defence, and I don't think I ever received a copy of the thesis - but I do remember holding a copy in my hands, from someone who was entitled to it (\*). I can't say whether the defence took place before or after the note was 'cast' at the CRAS.

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(\*) All this secrecy is all the more unusual in that I was surely, along with Contou-Carrère, the only person in the whole of Languedoc who could understand anything about Olivier Leroy's work. Needless to say, I never got my hands on Leroy's draft note to the CRAS either. Maybe I'm deluding myself, but it seems to me that if I hadn't been so draconianly sidelined that it was practically impossible for me to intervene, I would have found a way to get that unfortunate note published, through Cartan or Serre if necessary, who aren't in the know, but who would have trusted me if I had guaranteed the seriousness of the work.

(7 June) I must have found out a long time later that Leroy had passed his thesis, and was too busy on my side to think of asking myself how it was that I hadn't even been informed. It only 'clicked' after Contou-Carrère himself had defended his thesis, for which I am supposed to have been the thesis supervisor(x). He found a way of ensuring that, as the only member of the jury, I was not entitled to the final and official copy of his thesis! I finally received a copy today - he had thought (he wrote) that I 'wasn't interested' in having one...

(x) More precisely, for a year or two C. C. had cautiously played on two "directors" at the same time (you never knew... ), each of them unaware of the existence of a 'parallel' director. I was informed of the role

where Olivier summarised his work. I talk about this casting, in some detail but without naming anyone, in the section 'The note - or the new ethic (1)' (s. 33). The two mathematicians who took care of this casting were Pierre Cartier (the same one whose incredible speed of intuition came back to me when talking about that of his young non-colleague, whom Cartier was casting so kindly and with all the regret in the world), and the other was Pierre Dèlige, with his historic remark that this mathematics 'did not amuse him'. (They did, however, 'amuse' him when he was young. . . ) I should add Contou-Carrère himself, who did not lift a finger to defend his pupil - that exposed him to the risk of upsetting powerful men. He must have suggested to Olivier Leroy that it would be better to forget the episode of his unfortunate thesis. What is clear in any case is that Leroy has well and truly drawn a line under this episode - even if the opportunity arose to publish not only a note to the CRAS, but even his entire work, I doubt very much that he would make use of it (\*). Once again, the chainsaw has done its job(\*\*).

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as Verdier's director at the last minute, when C. C. finally fell back on me in the spring of 1983, when it became clear that Verdier was determined to kill him anyway!

(\*) An eloquent sign of this "thick line": in Olivier Leroy's application for an assistant post in Montpellier, presented during a vacancy two years ago, Leroy mentions neither the title of his post-graduate thesis nor the name of Contou-Carrère, who had been his boss. Nor did he mention any personal work whatsoever. Clearly, he was undecided at the time whether he wanted the job or not - which is why, despite his impressive gifts, the post was awarded to another candidate who had a solid record and for whom there was no doubt about his intentions.

(\*\*) By an interesting coincidence, I recently heard that Cartier had been kind enough to dedicate the following to me  
one of those Bourbaki lectures (I think it's the first time such a thing has happened to me), and what's more, this lecture was devoted precisely to the theory of topoi - these same topoi, judged by this same Cartier to be unworthy of appearing in a note to the CRAS. Is this a sign of a change in fashion in recent years? Certainly not, and it all ties together: the paper in question concerned the use of topoi in logic!

My friend Cartier's touching dedication seems to me to be in the same vein as the Funeral Eulogy delivered last year on a special occasion (see the note 'The Funeral Eulogy - or the compliments', n° 104), in which the word 'topos' is pronounced (among other well-sent compliments), only to hasten to add (as a unique and eloquent comment) that they are 'used today in logic' - and nowhere else, need I say, at least as long as my friends who are lavish with compliments can prevent it, by the power that is in their hands... (Reference to Cartier's paper: *Catégories, logiques et faisceaux, modèles de la théorie des ensembles*, Séminaire Bourbaki n° 513, Feb. 1978).

(23 June) I sense a phenomenal degree of condescension (and boycott...) in the attitude of some people (such as Deligne, Cartier, Quillen, among those who set the tone...) towards innovative and profound concepts such as topoi in geometry. Even supposing that just one of them had the stuff (or

Despite this misadventure, I still had the pleasure of seeing Leroy regularly for several months in early 1981. It was at a micro-seminar I was giving at the time on the algebraic-arithmetical theory of Teichmüller's tower (which is discussed a little in *Esquisse d'un Programme*). The only listeners in the true sense of the word were Contou-Carrère and Leroy. Even for an ultra-selective Parisian audience (and I know what I'm talking about), there wouldn't have been three or four of them in a whole room so as not to be left out. To tell the truth, the reason I was doing this seminar, at a time when Contou-Carrère was entirely taken up with putting the finishing touches to his ideas on Schubert's cycles, was for Leroy, thinking that perhaps he would take to such a splendid subject. He obviously 'sensed' what I was doing, but he had decided in advance (I think) that he wouldn't 'catch on'. It's strange that he even bothered to come - something must have fascinated him, just as it did me, and he wasn't too clear himself about what he really wanted. When I realised he wasn't going to go for it, I stopped. I wasn't interested in continuing a monologue in front of two spectators, no matter how brilliant they were. It was at this point that I had my second and last conversation with Leroy. I don't even think I've seen him since.

There was no real mathematical discussion between Leroy and myself, apart from the one seven years ago - which explains why I know practically nothing about the work he did, apart from his unfortunate topological work. His misadventure must not have increased his confidence in people like me, or even Contou-Carrère, or other people from the fine world of mathematics. I heard that he was giving a seminar at the Faculté des Lettres, where there is a group of sympathetic mathematicians who get on well together. He was going to talk about combinatorial topology - a subject that's been right up my street for nearly ten years. As I'm by nature a discreet person (yes, I am!), I haven't asked any questions about what he's talking about, and I don't know whether he intends to publish it. As far as his situation is concerned, he leads a most illegal existence (although he is neither a foreigner nor in an irregular situation), doing tutorials here and there, paid for (shhh...) by I don't know who.

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innocence...) to draw out of nothing, as I did with the introduction of the étale and crystalline topos, a new topological vision of algebraic varieties (and from there, the means for a profound renewal of algebraic geometry and arithmetic, while waiting for topology) - there is no doubt that this very attitude of contempt that he likes to cultivate in himself and to arouse in others, defuses this power of vision and renewal, for the sole benefit of a fatuity.

I don't think he's made up his mind, especially whether or not he's going to pursue a career in mathematics. I don't think he's made up his mind whether or not he's finally going to pursue a career in mathematics, and that must be an uncomfortable situation in the long run, Court of Auditors or not. I'd be happy if my edifying painting of a funeral, in which he appears as the fourth assistant coffin, could help him to dispel his perplexities, this time with full knowledge of the facts.

(<sup>97</sup>) (24 May) It was against a certain reluctance on my part that I finally decided to mention by name some of my close friends and colleagues of yesteryear, in the mathematical world, whom I have seen act as 'gravediggers' (or 'chainsaws'), cutting short from the outset the attempts made by certain mathematicians of modest or precarious status to take up some of my ideas and develop them according to their own logic, or only (as in the case of Yves Ladegaillerie) to follow an approach and a style that bear the mark of my influence. As I've said over and over again, such reluctance to involve others, or only to name them (\*) without consulting them, was not uncommon in Harvest and Sowing. In each case, I ended up examining the reticence and realising that it was unfounded, that its source was not delicacy but con-fusion, not to say pusillanimity. In all the cases (it seems to me) where I have mentioned the acts or attitudes of others by name, they were in no way of a 'confidential' nature. They concerned the professional life of the person concerned, with all the repercussions that implies in the professional life (and by extension, in the lives of other colleagues).

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(\*) I was reluctant, for example, to include a note (note n° 19) in which mention would be made by name of all the students who had prepared a doctoral thesis with me and completed it. This hesitation on my part must have stemmed from the reluctance of many of my students to be associated with me, a reluctance that I must have perceived at an informal level for some years already. The only ones among my former students (with or without inverted commas) where I had clearly perceived the desire to distance myself from myself were Contou-Carrère (with whom I had only just discovered it), and Deligne (where it had already been quite clear since 1968, although I had no idea how far this desire would take him). In the case of Deligne, I was particularly reluctant to name him as having been 'more or less' a pupil, as I didn't want to appear to be taking advantage of such a brilliant 'pupil', when he himself didn't want anything to show about the link that bound him to me and my work. My reflection made me realise that this link had taken on an infinitely greater significance in the life and work of my young friend than I had ever suspected.

(1 June) On the subject of these deliberate remarks in me, see the note of 27 March (three days later) "L'être à part" (n° 67).<sup>98</sup>

lègues, including myself. Each of those I involve is just as responsible for their actions and attitudes, and for the full range of their implications (whether or not they like to ignore them), as I am for mine. He has no right to take offence if some of the consequences of his actions come back to him in one form or another, for example that of being publicly 'called to account', in this case through me. If at times my language is colourful and harsh, my intention is in no way to be polemical, or to offend or outrage anyone, but rather to describe the facts and the way I feel about them, as an incentive for everyone (and first and foremost for everyone I involve) to examine them for themselves, rather than dismissing them one way or another (as I often did myself before the Harvest and Sow reflections). If the person being questioned in this way chooses to take offence, that's a choice for him or her. This choice may pain me, coming from people I hold in esteem or even affection, but it does not weigh on me. The reticence I mentioned, a sign of a certain confusion in my vision of things, vanished without a trace as soon as it was understood and thus overcome.

At no time during the reflection on L'Enterrement did I have the feeling that some vast 'plot' was being hatched against my work and against those who had the temerity to draw inspiration from it (rather than simply borrowing tools and keeping quiet about the name of the worker who had fashioned them and placed them in their hands). There is no conspiracy, but there is a *consensus* which, in what I have called 'the great mathematical world', has so far appeared to me to be without fault. This consensus, except in the rarest of exceptions, is in no way fuelled by any conscious 'malice' towards me or my work. Only in a few exceptional cases has it been expressed in unequivocal malevolence towards one or other of the four 'co-interreds' referred to in the preceding notes (\*). But surely such malevolence could not have proliferated in any of my former pupils, and it could only have been expressed unhindered by the encouragement of the general consensus.

This consensus manifests itself, in most if not all of my former friends or former students, not through attitudes of 'malice', but through mechanisms that are (I believe) entirely unconscious, disconcertingly uniform and unfailingly effective, sweeping away common sense and the healthy instincts of mathematicians, to make way for *rejectionist tendencies*.

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(\*) I was only aware of what I consider to be unequivocal acts of malice in the cases of Deligne and Verdier.

purely automatic(\*\*). Such automatic attitudes, I suspect, are not only evoked by myself and by those whose mathematical "smell" recalls it in some way - but also by any mathematician who does not present himself as already part of the "establishment"; either because he himself is already part of it, or because he appears to be the "protégé" (to use an expression from Verdier's pen) of one of them. It seems to me that in almost all mathematicians, a minimum of 'mathematical openness' (necessary for this 'common sense' and this 'healthy mathematical instinct' to come into play) *is only triggered in relation to someone already invested with a real passion.*

This kind of mechanism must be practically universal, not only in the mathematical world, but in all sectors of society without exception. It goes far beyond any specific case. If (as it seems to me) there is an exceptional situation in the case of my person, and of those who in the eyes of the establishment are 'my protégés', it is because in the past I was invested with the status of 'one of theirs', with the usual effect of 'a minimum of openness' towards me and 'my people'. This status was taken away from me when I left in 1970. Or more precisely, by my own choice, clearly expressed on more than one occasion in the years following my departure and by my way of life to this very day, I have indeed ceased to be one of 'them'. In fact, I myself no longer felt 'one of them', and I left a world that was common to us with no spirit of return.

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(\*\*) These attitudes of rejection, of course, never present themselves as such, even in extreme cases like those of my friend Deligne, or Verdier. They are almost invisible at the level of conscious attitudes towards me, which (as I have already had occasion to say) are almost always (perhaps even always), in the case of my friends and pupils of yesteryear, attitudes of sympathy (from which some of them sometimes try as best they can to defend themselves) and of respect. Such dispositions of sympathy and respect are present, not only at the superficial level of conscious 'opinions', but even at the deeper level of real attraction (or repulsion), and of the real knowledge that we have of others (independently of the images in which we try to enclose them).

We are here in a typical situation of *ambivalence* (collective, I would almost be tempted to say) where, as far as the eye can see, we 'see' nothing! (Compare with the reflection in 'The Enemy Father (1), (2)' (sections 29, 30), where for the first time in Harvest and Sowing I address this ambivalent aspect that has marked many relationships in my life, and not only in the mathematical milieu). However, at the level of concrete manifestations (examined at length in Burial), the 'resultant' of these ambivalent forces no longer has anything ambivalent about it, it seemed to me, but it does present itself, with 'disconcerting uniformity and unfailing effectiveness', as the 'attitude of automatic rejection' that I am about to examine more closely.

Even today, my 'return to maths' is by no means a return 'among them', to the establishment, but a return to mathematics itself; more precisely, a 'return' to a continuous mathematical investment, and to an activity of publishing my mathematical reflections.

I'm only just beginning to realise the extent to which my departure was felt as a kind of 'desertion', even as an 'outrage' by my former friends and students (\*). This must have been the easiest way to evacuate the meaning of my departure, the questioning it might have raised in them, by such a diffuse feeling of a *rrorr received*, and the automatic reaction of a grudge, expressed by an act of *retaliation* (which rarely had to be perceived as such, or even as an act, on a conscious level): since he has cut himself off from us, we cut ourselves off from him - we stop giving him and 'his kind' the benefit of the 'automatic attention' reserved for 'our kind' - he and his kind will be entitled, like the first people who come along, to the rigours of automatic rejection!

The situation is further complicated (for my former friends and students) by the fact that not only was I part of the establishment, but it is also impossible for any of them to do their job as a mathematician without using at every step notions, ideas, tools and results of which I am the author. I don't know if there has ever been, in the history of our science or any other science, an example of such an embarrassing paradox! Seen in this light, the jiggery-pokery (by no means limited to my friend Deligne) of cutting off any hint of development for ideas that bear my imprint (when such development could only increase this perplexity) now appear to me as driven by an implacable inner logic, as a *necessity* based on a certain choice already made - the choice of rejection. And the same is true of the efforts I see being made just about everywhere to sweep under the carpet the origins of these notions, ideas, tools and results that have become part of our common heritage and which we can no longer do without, whether we like it or not. This 'in- difference' that I have noticed, in the face of the 'operations', however large, of a Deligne who pretends to arrogate to himself, one by one, the paternity of a certain number of my principal contributions to mathematics (or, for the crumbs, generously attributing them to such-and-such a person), is a kind of 'in- difference'.

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(\*) Such a way of seeing and feeling things was expressed particularly eloquently by my friend Zoghman Mebkhout. It is through this desertion that I am responsible for his setbacks with the great mathematical world, since he alone found himself deprived of the 'protection' and support that those who now like to treat him as a laggard had once found with me.

inseparable buddy) - this is by no means indifference, but an *approbarion racire*. Deligne is simply doing what the collective unconscious of the establishment expects him to do: *erasing* the name of the man who has cut himself off from everyone, and thus resolving the intolerable paradox, *by replacing a real but unacceptable parernity with a roleable facrince parernity*.

Seen in this light, the main Deligne officiant appears no longer as the man who shaped a fashion in the image of the profound forces that determine his own life and actions, but rather as the designated *insrrrumenr* (by virtue of his role as 'legitimate heir') of an unfailingly coherent *volonré collecrite*, committed to the impossible task of erasing both my name and my personal style from contemporary mathematics.

I have little doubt that this view of things essentially expresses the reality of things - at least on a collective level. Surely my 'return', which brings an unexpected end to a funeral that was proceeding so satisfactorily for everyone, or (if it doesn't bring it to an end) at the very least disrupts in an unseemly and inadmissible way the proceedings of a ceremony that seemed to have been arranged in advance - this return will inconvenience and displease not only one or other of the principal officiants, but the entire congregation assembled for the funeral! And I have no idea, of course, what 'parade' this famous collective unconscious will come up with to clear up the mess created by the untimely return of the deceased, suddenly (and unacceptably scandalously) stepping out of the cosy coffin provided for him, and pretending to officiate at his own funeral in his own way. I have every confidence, however, that the congregation will find a way to get rid of this little additional contradiction in the mathematical edifice.

I seem to see quite clearly now, at the level of everyone's images and attitudes in particular, the reflection and the general form taken by the collective consensus, and the collective will to erase, to bury. This is the universally used system of the 'two mutually contradictory tables' on which we operate simultaneously, and which I had the opportunity to discuss for the first time in Harvest and Sowing in the case of my own person. (See the section 'Merit and contempt', s. 12.) I doubt there is anyone who would say flatly and clearly: 'Grothendieck has done nothing but bogus mathematics, let's not talk about it any more and get down to business'. As it stands, this would be too explicitly contrary to the axioms of the establishment, for the moment at least. As things are set to evolve, in twenty or thirty years' time the question will no longer even arise, since there will be no question of even uttering the name, long since forgotten.

The common tactic, both individually and collectively, is that of silence: we do not think of the deceased, not as a mathematician at least, we do not talk about him, and we do not mention him (except, when we cannot do otherwise, by the providential acronym SGA or EGA, until these references are replaced by others from which all trace of the deceased is absent).

However, there are occasions, exceptional no doubt, when complete silence becomes impracticable. One of these occasions, I imagine, will have been my application for admission to the CNRS, which must have embarrassed many (\*). Another will be the preliminary distribution of *Récoltes et Semailles* (\*), pending its publication in volume 1 of *Réflexions Mathématiques* (if my publisher doesn't crack and refuse to blame the entire scientific establishment). These are opportunities created by the inadmissible deviations of the deceased himself, unhappily stepping out of the role assigned to him. Another occasion (perhaps more instructive for an understanding of the Funeral, before it was disrupted by an unruly deceased) is the twenty-fifth anniversary jubilee of the IHES, which was celebrated last year 'with great pomp'. As 'the first of the four Fields medals at the IHES', it would have been difficult to ignore me entirely on this solemn occasion - even if the role I played in giving the IHES a real existence in the four heroic years of its existence was overlooked. The eulogy that has been concocted in my honour, in the brochure published on the occasion of this jubilee (a brochure to which I have already had occasion to refer twice), seems to me to be a model of its kind - as an elegant and discreet way of resolving, to everyone's satisfaction, this 'little contradiction' in contemporary mathematics....

And suddenly I'm all revived - like the horse that's starting to smell the stable ! Almost a fortnight ago I began to reflect on this instructive episode, in a note that immediately took the name 'The Eulogy - or the compliments'. After

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(\*) (26 May) I have just learnt today, from a phone call from Zoghman Mebkhout, that my colleagues on the National Committee at the CNRS have made an effort on my behalf, by offering me a two-year 'post d'accueil'. I don't know whether they did so enthusiastically - the fact remains that none of my friends on the Committee went out of their way to give me a phone call or drop me a note to tell me the good news (which dates from 15 May).

(September) I was finally informed by a letter from the CNRS dated 16 August - it was an appointment for one year (not two) to a research associate post.

(\*) This is a limited edition (150 copies) produced by my university, for distribution to for distribution among my colleagues and closest friends.

After some hesitation as to where to place this note (taken from a late footnote to the first of the notes written for the Funeral), it became clear that the most natural place to insert it was (not the 'chronological' place, but) in the 'Funeral Ceremony' which is to complete the Funeral. And now, without having looked for it, the 'thread' that I have been following for the last three weeks, through the last three processions - 'The Colloquium', 'The Pupil' and finally 'The Funeral Van', which has only just joined the convoy - connects with the last part of the Funeral, namely the Funeral Ceremony; this ceremony marked above all by the masterpiece of the Funeral Eulogy that I began to examine on 12 May, and which now constitutes the note that naturally follows this one (\*).

I'm finally (again?) on target! And at the same time this beginning of reflection on a Funeral Eulogy suddenly takes on a new dimension. It's no longer just the clever invention of a powerful brain at the service of a fixed idea, expending itself in the face of the indifference or commanding attention of the distinguished guests at an official 'grand occasion' - but above all it's the perfect and deftly served response, made on this delicate occasion of all, to a collective *expecrative* about the attitude that should be taken towards my person. If there is anyone of his generation who has earned the unreserved gratitude of the entire congregation, it is my friend Pierre Deligne, who fulfilled the role expected of him with his characteristic flawless perfection.

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(\*) (November 1984) Following an unforeseen episode of illness, the note in question (n° 104) is separated from "this one" by a new procession - "The deceased - still not dead" (n° s 98-103).

# HARVESTING AND SOWING

Reflections and testimony  
on a mathematician's past

by

Alexandre GROTHENDIECK

Part Three:

**BURIAL (II)**  
or The Key to Yin and Yang

Université des Sciences et Techniques du Languedoc, Montpellier  
and Centre National de la Recherche Scientifique (French National  
Centre for Scientific Research)

In memory  
by Claude Chevalley



## HARVESTING AND SOWING (III)

### THE FUNERAL (2)

or

### The Key to Yin and Yang

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## XI. The deceased (still not deceased. . . )

(<sup>98</sup>) (22 September) The last of the notes for l'Enterrement (apart from a few footnotes) was dated 24 May - that's four months ago. The two weeks that followed, until 10 June, were mainly spent re-reading and completing or reworking the notes already written, not to mention a visit of a day or two from Zoghman Mebkhout, who came to read all the notes for L'Enterrement before I sent them off to be typed, and to give me his comments. I was confident that the final manuscript would be ready by early June, and that it would be typeset and printed (that was optimistic, after all...) before the university holidays. I really wanted to send out my 'five hundred page letter' to everyone before the holiday rush!

In fact, the text of L'Enterrement is still not finished as I write: as it was four months ago, it still lacks the final two or three notes - plus one(\*) that has been added in the meantime: the one I have just started with the lines I am writing, as a quick account of what has happened in the meantime.

On 10 June, the writing of Récoltes et Semailles, which is full of unexpected events, was interrupted by another unforeseen event: I fell ill! A stitch in my side, which appeared suddenly (even though the minute before I'd suspected nothing), pushed me onto my bed with peremptory force, without reply. Suddenly I found standing or even sitting very difficult, and only lying down seemed to do the trick. It was really silly, especially at a time when I was just about to finish a very urgent job, and I didn't want to hear any more about it! Typing while lying down was out of the question, and even writing by hand in this position is no picnic...

It took me almost two more weeks, during which I tried as best I could to continue my work against all odds, to realise the obvious: my body was exhausted and was insisting, without me even pretending to hear, on complete rest.

I had found it so hard to hear, because my mind had remained fresh and alert, wriggling to keep up the momentum, as if it had an autonomous life, totally separate from that of the body. In fact, it was so fresh and wriggly that it had the greatest difficulty in taking into account the body's need for sleep, as it stubbornly refused to give up on the tasks it had to perform.

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(\*) (23 September) In fact, it appears that this planned "note" was split into three separate notes (n° s 99 - 101)

he was harnessed, and constantly pushing back the deadline for sleep to the limits of exhaustion, this obstacle to going round in circles!

Throughout my life, and up until three or four years ago, my unlimited capacity to recuperate through deep and prolonged sleep had been the solid and salutary counterpart to my sometimes inordinate investments of energy: when sleep is secure, you no longer fear anything, and you can afford (without it being madness) to throw yourself headlong and to exhaustion into orgies of work - even if it means making up for it with orgies of restorative sleep! This ability, which all my life had seemed to go without saying just as much as the ability to work, the ability to discover (and surely the two are intimately linked. . . ), has in recent years ended up being eliminated, and sometimes disappearing, for reasons that I can't really discern at the moment, and that I haven't really tried to fathom yet. More and more, when, after a long day spent at my typewriter (or working on handwritten notes) and obeying the injunctions of my body, which refuses to go on, I finally resolve to go to bed, the reclining position (and the partial relief it provides from the tension of sitting) immediately rekindles my thinking. It starts all over again, for hours or even for the whole night (or rather what's left of it. . . ). However much I realise that the system is not profitable (even supposing that it is *sustainable* in the long term), given that (for me at least) prolonged reflection without the support of writing ends up going round in circles, often becoming a kind of rehashing - the bad habit is well established, and tends to get worse. It seems to me that this has become *the* major source of energy dispersion in my life in recent years, while other dispersion mechanisms have been gradually eliminated over the years.

If this mechanism has taken root in my life with such tenacity, if I've been prepared all these years to pay such a price, it's surely because something in me has found its reward in it, and would find its reward when the time came. It would not be a luxury for me to examine the situation closely - and more than once in the last four months I have been on the point of doing so.

This was undoubtedly an urgent task. But I eventually realised that there was something even more urgent. First I had to deal with the most pressing problem: reconnecting with my body, helping it to recover from the state of exhaustion I had come to feel and admit, and to regain the vigour it had lost. I realised that to do this, I would have to give up any intellectual activity for an indefinite period - even meditating on the

sense of what was happening to me. Today's notes bring to an end this long and salutary 'interlude' in my major investments, which for a time (since February of this year) had come together in the writing of '*Récolres er Semailles*'. This note is an initial reflection, or at least a kind of summary account of this four-month 'interlude'.

By the time I understood the need for complete rest, a great fatigue had become a profound exhaustion. Because I failed to listen to the peremptory language of my body, the paltry few pages of comments and retouching in *l'Enterrement*, which I was able to extract from my physically exhausted state in those first two weeks, were done at the cost of an expenditure of energy which, with hindsight, seems insane! The fact remains that after these feats, I had to lie in bed for long weeks, only getting up a few hours a day for the essential practical tasks.

Remarkably, once I finally *understood* the need for complete rest, I had no difficulty whatsoever in completely abandoning all intellectual activity, without any desire to 'cheat'. I didn't even have to make a decision in the strict sense of the word - by the mere fact that I'd understood, I'd already given up. The tasks that only the day before had kept me on my toes suddenly seemed very distant, as if they belonged to a very distant past... .

This did not mean that the present was empty. While for weeks and months sleep remained reluctant to come, and I lay for long hours, seemingly in total inaction, I don't remember for a single moment finding time long. I re-acquainted myself with my body, and also with my most immediate surroundings - my bedroom, or sometimes the patch of grass or dry grass bathed in sunlight right in front of my eyes, wherever I happened to lie down, near the house or during a short (and prud- ent...) walk. I spent long moments following the dance of a fly in a ray of sunlight, or the peregrinations of an ant or tiny green or pinkish translucent bugs along endless blades of grass, in inextricable forests of such blades tangling before my eyes. These are also the moments when, in a state of great fatigue, you follow with solicitude the hesitant wanderings of the slightest wind through your guts - the moments when you regain contact with the elementary and essential things; the moments when you know how to fully appreciate all the benefits of a good holiday.

restful sleep, and even the wonder of simply taking a leak! The humble workings of the body are an extraordinary marvel, and we only become aware of them (sometimes unwillingly) when they are disrupted in one way or another.

It was quite clear that, 'technically', the root of my 'health problem' was sleep disturbance. The underlying reasons for this disturbance eluded me and still do. It was by trial and error that I tried above all to get back to sleep, the good old sleep I'd known, which mysteriously slipped away just when I needed it most! I've only recently found it again. Needless to say, the idea would never have occurred to me to rely on pills, and if I tried herbal teas or orange blossom water (which I got to know on this occasion), I knew deep down that they were at best expedient. On a more serious note, I took the opportunity to make some major changes to my diet: a reduction in starchy foods in favour of green vegetables and fruit (both raw and cooked), the (moderate) reintroduction of meat as a regular ingredient in my diet, and above all, a drastic reduction in the consumption of fats and sugars, where there had been a systematic imbalance in my diet (as in many others in affluent countries) since at least the end of the war. My son-in-law Ahmed, who practises Chinese medicine and has a very good 'feel' for these things, was a great help to me in realising the importance of such a change of diet in restoring a disturbed balance in my life. He was also the one who insisted, without tiring, on the importance of significant physical activity, on the order of a few hours a day, to keep up with intense intellectual activity. Intellectual activity otherwise tends to exhaust the body, drawing available vital energy towards the head and creating a strong yang imbalance.

Ahmed didn't content himself with lavishing me with good advice, accompanied by a yin-yang dialectic to which I'm quite sensitive, in the four or five years since I've had ample opportunity to familiarise myself with this delicate dynamic of things. As soon as I was well enough to start gardening, and seeing that I was doing my bit to get a mini-garden back on its feet, Ahmed took the initiative and started work on a larger scale: clearing new strips of land, bringing in soil, transplanting and sowing, making terraces and retaining walls, rearranging the compost heap... As the days and weeks went by, I saw, under the impetus of

of my tireless friend, enough landscaping tasks to keep me busy for years, if not for the rest of my life!

This was exactly what I needed, and what I also need in the long term to counterbalance my overly spirited intellectual activity. In this respect, daily walks, which I could impose on myself, as has been suggested to me for a long time, would not be of much help: my head continues to grind during walks as it does in bed, without being disturbed by the beauty of the landscape, which I pass through without seeing much of anything! On the other hand, when I'm watering the garden - it's up to me to make sure it's doing well - and even better, when I'm hoeing a bed of vegetables, I can't help but pay attention and get a little bit involved - to see the texture of the soil and how it's affected by the hoeing, by the vegetable plants and by the 'weeds' that grow in it, by the compost and by the mulching - and also, over time, to become aware of the condition of the plants I'm supposed to be caring for, a condition that reflects to a large extent the greater or lesser attention I've paid to them. This activity of gardening, and all that revolves around it, responds to two strong aspirations or dispositions in me: the one that pushes me towards an action where I see *something come out of my hands* every day (which is by no means the case for walking, and even less so for the weights suggested to me by a colleague and friend...); and the one also pushing me towards an action where, at every moment, I have the opportunity to *learn* from contact with things. It seems that I'm most likely to learn in situations where I'm actually 'doing' something - 'something' that takes shape and is transformed by my hands...

Once I'd got over the state of exhaustion proper, my convalescence was, it seems to me, aided by two types of activity, or rather, two types of important and beneficial factors in my day-to-day activities, both in the house and in the garden. On the one hand - there was the *physical effort*: even though I often felt tired and lackadaisical before setting to work - the 'harder' the work was, the more I felt fit and tired afterwards. And then there was the contact with *living things*: the plants that had to be cared for; the soil that had to be prepared for them, then mulched or hoed; the food that had to be prepared and that I ate with as much pleasure as I had had in preparing the meal; the cat demanding its pittance, and its share of affection; the various utensils and tools too, and even the rough and often unpolished stones that had to be turned and turned in every direction,

to assemble them into walls that can stand upright...

Physical effort and contact with living things - these are precisely the two aspects that are lacking in Intellectual work, and which mean that such work is by nature incomplete, fragmented, and ultimately, if it is not supplemented and compensated for by something else, dangerous or even nefarious. This is the third time in just over three years that I've had the opportunity to realise this. It's even become quite clear now that I'm facing a dramatic deadline: to change a certain way of life, to find a balance where the yin pole of my being, my body, is not constantly neglected in favour of the yang pole, the mind or (to put it better) the head - or else lose my skin in the next few years. That's what my body has been telling me, as clearly as it can be told! I've now reached a point in my life where the need for a certain basic 'wisdom' has become a matter of *survival*, in the literal sense of the word. That's surely a good thing - otherwise that 'wisdom' would be perpetually put on hold, in favour of the kind of bulimic intellectual activity that has been one of the dominant forces throughout my adult life.

Faced with such a clear deadline: "change or die! - I didn't have to test myself to know what my choice was. That's why, for nearly four months, I was able to abstain from any intellectual activity, maths or no maths, without ever having the impression that I was doing myself any violence. I knew, without having to tell myself, that at the end of the day, a living gardener is better than a dead mathematician (or a dead 'philosopher' or 'writer', never mind!). With a little mischief, we could add: and even better than a living mathematician! (But that's another story... )

Moreover, I don't think I'll ever find myself in such a 'borderline' situation, where I'll have to give up all intellectual activity, whether mathematical or meditative, in the long term. Rather, the most immediate practical task, the most urgent in the years to come, seems to me to be precisely that of achieving a balance in my life where the two types of activity coexist on a day-to-day basis, that of the body and that of the mind, without either becoming all-consuming and crowding out the other. I make no secret of the fact that it is in the 'spirit' direction that my most powerful investments have been made since childhood, and that it is also where the two main passions that have continued to dominate my life in recent years still lead me today. Of these two passions, the passion for mathematics and

the passion for meditation, it seems to me that it is the first named above all, if not exclusively, that acts as a factor of imbalance in my life - as something that still retains an unfortunate tendency to 'devour' everything else for its own sake. It's no coincidence, surely, that the three 'episodes of illness' in my life that have marked a situation of imbalance, since June 1981, have occurred precisely at times when it's the mathematical passion that has taken centre stage.

It could be said that this is not quite the case for this latest episode, which occurred during the writing of *Récoltes et Semailles*, which was a period of reflection on myself, not to say a period of meditation in the strict sense of the word. But it is also true that this reflection on my past as a mathematician was constantly fuelled by my passion for mathematics. This was especially true in the second part, *l'Enterrement*, it seems to me, where the egotic component of this passion was involved in a particularly strong and constant way. And yet, even in retrospect, I don't get the impression that at any point this reflection took on an all-consuming, even demented, rhythm or diapason, as on the two previous occasions when my body was finally forced to let out an unanswerable "fed up!" Seen separately from the context of an entire life, my intellectual activity over the last year and a half (since 'resuming' with the writing of *La Poursuite des Champs*, followed by *Récoltes et Semailles*) seems to have continued at a very reasonable pace, without forgetting to eat or drink (but sometimes, a little, to sleep...). If it eventually led to a third 'health episode' (to put it euphemistically), it was undoubtedly the result of a whole life marked by the eternal imbalance of a head that was too strong, imposing its rhythm and its law on a robust body that had long endured without flinching (\*).

Over the past two months, I've had ample opportunity to realise the irreplaceable benefits of working with my body, in intimate contact with humble living things, silently speaking to me about the simple, essential things that books or reflection alone are powerless to teach. Thanks to this work, I found sleep again, a companion even more precious than food and drink - and with it, a renewed vigour, a robustness that had suddenly seemed to have vanished. And I was able to see that in my season of life, if

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(\*) I should make an exception here for the five years from 1974 to 1978, which were not dominated by any major task, and where manual occupations absorbed a not inconsiderable proportion of my time and energy.

I want to continue this new mathematical adventure, which began last year, for a few more years, but I can't do it without endangering my health and my life, except with my two feet firmly planted in the soil of my garden.

The coming months will be those in which a new way of life will have to be put in place, in which the work of the body and that of the mind find their place and are reconciled on a daily basis. There's a lot of work to do!

(<sup>99</sup>) (23 September) Last night I had to cut my work short to avoid going on until two or three in the morning and being caught up in a situation I know only too well. I was feeling refreshed and ready to go, and if I'd followed my natural inclination, I'd even have carried on into the early hours of the morning! The trap of intellectual work

- at least the one you pursue with passion, in a subject where you end up feeling like a fish in water, following a long familiarity - it's that it's so incredibly *easy*. All you have to do is pull, pull, and it always comes; it's barely that sometimes you have the feeling of an effort, of friction, a sign that it's resisting just a little...

However, in my early years as a mathematician, I remember a persistent feeling of heaviness, of heaviness that had to be overcome by stubborn effort, leaving a feeling of tiredness in its wake. This corresponded above all to a period in my life when I was working with insufficient or even inadequate tools; or to a later period, when I had to acquire tools more or less painfully, under the pressure of an environment (essentially, that of the Bourbaki group) which used them routinely, without their *raison d'être* becoming apparent to me as I went along, or even sometimes for years. I had the opportunity to talk about these years, which were sometimes a bit painful (see "L'étranger bienvenu" s.9, and "cent fers dans le feu, ou : rien ne sert de sécher !", note n° 10), in the first part of *Récoltes et Semailles*. It was mainly the period from 1945 to 1955, which coincides with my period of functional analysis. (It seems to me that in the students I had later, between 1960 and 1970, this resistance to learning without sufficient motivation, where concepts and techniques are swallowed up on the faith of the authority of elders, was much less strong than it was in me - to tell the truth, I didn't perceive it at all).

To come back to my point, it was mainly from 1955 onwards that I often had the impression of 'stealing' - of doing maths by playing with myself, without any feeling for it

effort - just like some of my elders whom I had once so envied for such an almost miraculous facility, which had seemed well beyond the reach of my modest and ponderous person! Today, it seems to me that such 'facility' is not the privilege of some exceptional gift (as I have encountered in some people, at a time when such a 'gift' seemed entirely absent in me), but that it appears of itself as the fruit of the union of a passionate interest in a given subject (like mathematics, say), and a more or less long familiarity with it. If 'gift' does indeed play a part in the emergence of such ease, it is undoubtedly through the time factor, which varies from one person to another (and sometimes from one occasion to another in the same person, it's true.... ), to arrive at a perfect ease in working on this or that subject(\*).

The fact remains that the more things go - as the years go by - the more I get this impression of 'ease' when I do maths - that things are just waiting to reveal themselves to us, if only we take the trouble to look at them, to scrutinise them just a little. It's not a question of technical virtuosity - it's quite clear that from this point of view, I'm in much worse shape than I was in 1970, when I 'gave up maths': since then I've had the opportunity mainly to unlearn what I'd learnt, 'doing maths' only sporadically, in my own corner, and in a spirit and on themes quite different (at first sight at least) from those of yesteryear. Nor do I mean that it would be enough for me to get to grips with some famous problem (Fermat's, Riemann's, or Poincaré's, say), to make my way straight to its solution, in a year or two or even three! The ease I'm talking about is not the ease that enables you to achieve a given *goal*, fixed in advance: proving a given conjecture or giving a counter-example... It is rather the kind that allows us to set off into the unknown, in a direction that some obscure instinct tells us is fruitful, with the intimate assurance, which will never be denied, that every day and every hour of our journey cannot fail to bring us its harvest of new knowledge. We can sense exactly what knowledge the next day, and even the hour after that on this very day, holds in store for us.

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(\*) However, I know several mathematicians, each of whom has produced a profound work, and who have never seemed to me to give this impression of ease, of 'facility' that is referred to here - they seem to struggle with an omnipresent heaviness, which they have to overcome with effort, at every step. For some reason, the 'natural fruit' just mentioned did not 'appear of its own accord' in these eminent men, as it was supposed to. Which just goes to show that not all unions bear the fruit you might expect...

and it is this 'presentiment', constantly caught unawares, and this suspense with which it is at one with, that constantly launches us forward, while the very things we are investigating seem to draw us into them. What becomes known always surpasses what was presaged, in precision, flavour and richness - and what is known in turn immediately becomes the starting point and material for a renewed presaging, dashing off in pursuit of a new unknown eager to be known. In this game of discovering things, the *direction* we are taking at any given moment is known to us, while the *bur* is forgotten, assuming that we started out with a goal that we set out to achieve. This 'goal' was in fact a *point of departure*, reproduced from an ambition, or from ignorance; it played its part in motivating 'the boss', setting an initial direction, and triggering this game, in which the goal has no real part. Provided that the journey undertaken does not last a day or two, but is a long one, what it will reveal to us as the days and months go by, and where it will lead us at the end of a long cascade of unknown adventures, is for the traveller a total mystery; a mystery so remote, so out of reach, in fact, that he hardly cares! If he sometimes scans the horizon, it is not for the impossible task of predicting a point of arrival, and even less to decide as he pleases, but to take stock of where he is at the moment, and from among the directions open to him for continuing his journey, to choose the one that from then on he feels is the hottest...

Such is the 'incredible facility' I spoke of earlier, in relation to the work of discovery in an entirely intellectual direction, such as mathematics. It is *slowed down* neither by inner *resistance*(\*) (as is so often the case in the work of meditation as I practise it), nor by a *physical effort* to be made, generating a fatigue that ends up giving an unequivocal signal to stop. As for *unremitting* effort (assuming we can even talk about 'effort', having reached a point where the only 'resistance' left is the time factor...), it doesn't seem to generate either intellectual or physical fatigue. More precisely, if there is any physical 'fatigue', it is not really felt as such, a p a r t from occasional aches and pains from sitting in a fixed position for too long, and other incidental problems of the same kind. These are easily eliminated by

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(\*) I know a remarkably gifted mathematician, however, whose relationship to mathematics is typically conflictual, hindered at every step by powerful resistances, such as the fear that a given expectation (in the form of a conjecture, let's say) might turn out to be false. Such resistance can sometimes lead to a state of real Intellectual paralysis. Compare this with the previous footnote.

a simple change of position. Lying down has the unfortunate virtue of making them faint, and so encourages a resumption of intellectual work, instead of the much-needed sleep!

However, I've come to realise that there is a physical 'fatigue' that is more subtle and insidious than muscular or nervous fatigue, which manifests itself as an unquestionable need for rest and sleep. The term 'exhaustion' here (rather than 'tired') would capture the matter better, on the understanding that this state is not perceived as such, in the usual sense of this term, which designates extreme fatigue, manifested in particular by the great effort required just to get up, walk a few steps, etc. It is rather a state of 'tiredness', which is more subtle and more insidious than muscular or nervous fatigue, manifested as such by an unquestionable need for rest and sleep. Rather, it is a 'depletion' of the body's energy for the benefit of the brain, manifested by a gradual lowering of the body's general 'tone', its level of vital energy. It seems that this exhaustion, caused by excessive intellectual activity (by which I mean activity that is not compensated for by sufficient physical activity, leading to physical fatigue and the need for rest), is gradual and *cumulative*. These effects depend on both the level of *intensity* and the *duration* of intellectual activity over a given period. At the level of intensity at which I pursue intellectual work, and with my age and constitution, it would seem that the cumulative exhaustion in question reaches a critical, dangerous threshold after a year or two of uninterrupted activity, without compensation by regular physical activity.

In a sense, this 'ease' of which I speak is only apparent. Intellectual activity in- tense clearly involves a considerable amount of energy: energy is taken from somewhere and 'spent' on work. It would seem that the 'somewhere' is in the body, which 'absorbs' (or rather *disburses*) as best it can the (sometimes dizzying) expenses that the head spends without counting the cost. The normal way of recovering the energy provided by the body is through sleep. It's when the head becomes bulimic that it ends up encroaching on sleep, which amounts to eating up energy capital without renewing it. The trap and the danger of the 'ease' of intellectual work is that it constantly encourages us to cross this threshold, or to remain beyond it as soon as it is crossed, and that moreover this crossing does not signal to our attention the usual, unmistakable signs of fatigue, or even exhaustion. It takes a great deal of vigilance, I realise, to detect the approach and crossing of the threshold in question, when you are fully engaged in the pursuit of a passionate adventure. To perceive this emptiness of energy at the level of the body requires a state of listening towards

of the body, which I have often lacked and which few people have. Moreover, I doubt that such a state of communion of conscious attention with the body could blossom in anyone at a time of life dominated by purely intellectual activity, to the exclusion of all physical activity.

Many intellectual workers instinctively feel the need for such physical activity, and organise their lives accordingly: gardening, DIY, mountains, boating, sport... Those who, like me, have neglected this healthy instinct in favour of too much passion (or too much lethargy), sooner or later pay the price. Three times in three years I've paid the bill, and I've done so without complaint, or rather, with gratitude, realising with each new episode of illness that I was merely reaping the rewards of my own negligence, and moreover, that it also taught me a lesson that no doubt only he could give me. Perhaps the main lesson I learned from the last of these episodes, which has just come to an end, is that it's high time I took the initiative and made such reminders unnecessary - or, more concretely, that it's high time I cultivated my garden!

(<sup>100</sup>) In my reflections yesterday and today, I have deliberately left out an event that took place right in the middle of the illness episode, in the first days of July, at a time when I was still bedridden. This was the death of Claude Chevalley.

I found out about it from a vague article in Libération, more or less devoted to the event, which a friend had passed on to me at random, thinking it might interest me. There was almost nothing about Chevalley, but a bit about Bourbaki, of which he was a founding member. I felt quite stupid when I heard the news. I'd been thinking for months that I was going to finish Récoltes et Semailles, mint and all.

- and to rush off to Paris to bring him a copy while it was still hot! If there was one person in the world whom I was sure would read my book with real interest, and often with pleasure, it was him - and I wasn't at all sure whether there would be anyone other than him! Right from the start of my reflection, I realised that Chevalley had brought me something, at a crucial moment in my itinerary, something sown in effer- vescence, and which had germinated in silence. What I felt connecting me to him wasn't so much a *feeling of* gratitude, let's say, or sympathy or affection. These feelings were certainly present, as they are also present towards one or other of the 'elders' who

had welcomed me as one of their own, more than twenty years earlier. What made my relationship with Chevalley different from my relationship with any of them and with most of my friends, if not all of them, was something else. It's the feeling, I think, or to put it better, the perception, of an essential *commonality*, beyond the differences in culture, the conditioning of all kinds that marked us from our earliest years. I can't say whether anything of this 'kinship' shines through in the lines of my reflection where he is mentioned(\*). In the period of my life to which these lines refer, Chevalley appears perhaps more as an 'elder', this time at the level of an understanding of certain elementary things in life, than as a 'parent'. This is a distance, however, that my subsequent maturation must have reduced and perhaps abolished, as had been the case for a long time at the mathematical level, in my relationship with him as with my other elders. If I now try to put into words the meaning of this kinship, or at least one of its signs, what comes to mind is this: we are both 'cavaliers seuls' - travellers each on his own 'solitary adventure'. I speak about mine in the last 'chapter' (of the same name) of 'Fatuity and Renewal' (\*\*). Perhaps, for those who knew Chevalley well (and even for others), this part of the reflection is more apt to suggest what I would like to express than the part that concerns him by name.

Meeting him and talking with him would surely have given me a better understanding of this friend than I had in the past; and a better grasp of both this essential kinship and our differences. If there was one person, apart from Pierre Deligne, for whom I was anxious to be able to hand him the text of *Récoltes et Semailles*, it was Claude Chevalley. If there was one person whose comments, whether mischievous or sarcastic, would carry particular weight with me, it was him again. On that day in the first week of July, I knew I wouldn't have the pleasure of bringing him the best I had to offer, nor the pleasure of hearing the sound of his voice again.

The strange thing - and what no doubt contributed to making me feel so *srupid* on hearing this news - was that on more than one occasion over the past few months, when talking about a forthcoming meeting with Chevalley, I remembered that he was struggling with health problems - and there was in me a kind of worry, constantly dismissed, that this meeting

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(\*) See "Meeting with Claude Chevalley - or: freedom and good feelings" (section 11), and the last paragraph of the following section, "Merit and contempt".

(\*\*) See especially, in this sense, the two sections "The forbidden fruit" and "The solitary adventure", n° s 46, 47.

that my friend might disappear before I came to see him. The idea of course occurred to me to write or telephone him, if only to ask how he was and how he was doing, and to say a few words about the work I was engaged in, and my intention of going to see him about it. The fact that I dismissed this idea as silly and unwelcome (that there was really no reason why... etc), as people so often do in situations like this, is a good illustration of the extent to which I, like many others, continue to live 'below my means' - pushing aside the obscure foreknowledge of things that I'm too busy and too lazy to hear...

(<sup>101</sup>) (24 September) After the digression of the previous two days around the 'illness episode' of the past few months, it was time to pick up where I left off in June. I foresaw that there would still be two final notes to write: a 'Funeral Eulogy (2)' (which would follow on from and complete the note 'The Funeral Eulogy') and an 'Eulogy (3)' (which would follow on from and complete the note 'The Funeral Eulogy').

(1) - or the compliments' of 12 May), and a final 'De Profundis', in which I intended to sketch out my overall thoughts on the Burial.

The substance of these two notes was still warm when I fell ill - I was about to throw it all away, just long enough to finish putting the finishing touches to all the previous notes, so that I could feel that I was working on a solid and tidy 'backlog'... During the three full months (since 23 June to be exact) that I've practically stopped all work on Burial, apart from the occasional typing correction, it has, alas, slipped my mind a little. I even feel a bit foolish, embarrassed in any case, to start wisely filling in the blank pages behind the titles, on the pretext that they appear in a provisional table of contents, and that I was unwise enough to allude to them here and there in a certain text intended for publication. This is especially the case for 'L'Éloge Funèbre (2)', and even rereading the first juice of 'L'Éloge Funèbre (1)' (aka 'les compliments') wasn't enough to warm up for me a substance that for months had had time to cool in its corner!

However, from the day after 12 May when I wrote this note, and throughout the month that followed, my hands were tingling with the desire to delve deeper into this new mine that I had just got my hands on, without even suspecting it. When Nico Kuiper had been kind enough to send me the jubilee brochure celebrating the twenty-fifth anniversary of the IHES, a year earlier, I'd had no idea what I'd found.

I must have spent half an hour going through it (including the two half-page topos on Deligne and me), without finding anything in particular. The only thing that struck me was the absence of any reference to the difficult early years of the IHES, when its reputation was established in makeshift premises, myself (with the first Algebraic Geometry Seminars) being the only one to represent it 'in the field'. I thought about it again months later, when writing the note "L'arrachement salutaire" (n° 14), in March 84. Not being sure of my memory, I conscientiously asked Nico to send me another copy of the booklet (as I couldn't find the first one). This was a second opportunity to go through the two topo's again, perhaps with a slightly less hasty eye. However, this time I'm definitely not into it. I note in passing, with some surprise, that it says in the Deligne topo that "The main thrust of his work is to 'understand the cohomology of algebraic varieties'" - who would have thought! So I forgot about it for a month or two (until I remembered by writing the note "Refus d'un héritage - ou le prix d'une contradiction", n° 47). On the other hand, I don't notice that the word 'cohomology' isn't mentioned in the topo on me, any more than the word 'schema'. In my inattentive state at the time, there is still nothing to make me suspect that this anodyne text, a little overloaded with hyperbolic epithets, functions as a Funeral Eulogy, 'served' (moreover) 'with perfect fingering'! Such perfect fingering, in fact, that I wonder if any of the readers of this booklet (which is a little boring around the edges, due to its deliberate use of all-out pomposity, as the occasion demanded, it would seem. . ) noticed it more than I did on my first and second readings.

This immediately brings me back to an observation that I make constantly, every time that for one reason or another, I am led to look with somewhat intense and sustained attention at something that I had previously been content to look at 'in passing', with the 'usual', routine attention that I give to the small and large things and events that pass in my life from day to day. Such a situation frequently arises during meditation, which often leads me (more often than not, moreover, 'one thing leading to another' and without any deliberate intention) to subject to closer scrutiny certain events of the day or night (including dreams), which had passed more or less unnoticed in my customary state of attention, or whose meaning (often clear and obvious) had entirely escaped my conscious attention at first.

When I talk here of "somewhat intense and sustained attention", what I mean is

Basically, it's a *new way of looking at things*, a fresh way of looking at things, a way of looking that is not weighed down by habitual ways of thinking, or by the 'knowledge' that serves as a façade for them. If, for one reason or another, we are led to cast an alert, attentive eye on things, they seem to transform before our very eyes. Behind the apparent flatness of the dull, smooth surface of things presented to us by our everyday 'attention', we suddenly see an unsuspected *depth* opening up and coming to life. This profound life of things has not waited for us to take the trouble to become aware of them - it has always been there, it is part of their intimate nature, whether we are talking about mathematical objects, a garden lawn, or all the psychic forces acting in a particular person at a particular moment.

*Thought* is one instrument among others for revealing and enabling us to fathom this depth behind the surface, this secret life of things, which is 'secret' only because we are too lazy to look, too inhibited to see. It's an instrument that has its advantages, just as it has its disadvantages and limitations. But in any case, thought is rarely used as an instrument of discovery. Its most common function is not to discover the secret life in us and in things, but rather to mask and freeze it. It is a multi-purpose tool available to both the child worker and the boss. In the hands of the former, it becomes a veil, capable of capturing the forces of our desire and carrying us far into the unknown. In the hands of the other, it becomes an immovable anchor, unshakable by storm or tempest...

My thoughts were drifting a bit, and now they're coming back to a starting point - which is the same observation I made yesterday: the extent to which, because of inveterate habits and conditioning, I'm living below my means! (In which, moreover, I find myself in very good company...). It was thanks to a gradual discovery of L'Enterrement, based on facts as large as volume LN 900 (\*), that my lazy attention was finally awakened. A reading of the note 'Refus d'un héritage - ou le prix d'une contradiction" (n° 47) led me on 12 May to reread the two famous "topos" for a third time (!). This time, however, I noticed something rather unusual: at no point was there any mention of 'cohomology' (or algebraic varieties or diagrams) in the small, laudatory text devoted to me in the jubilee booklet! Visit

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(\*) See the note "Souvenir d'un rêve - ou la naissance des motifs", n° 51, and the following note "L'Enterrement - ou les Nouveaux Pères".

something seemed funny enough to merit a footnote, which I set about writing as quickly as possible. Along the way, I noticed one or two other 'funny' details that hadn't caught my attention before: even though it was a third reading, it had remained superficial and mechanical - I'd pretty much just *repeated* and *reproduced* the previous readings. It was only when I wrote what was supposed to be a footnote, and which became the note 'L'Éloge Funèbre (1)', that I gradually became hooked on the game, that a *curiosity* was awakened that made me return to these texts once again, this time looking at them a little more closely. It was only then that the transformation I mentioned earlier took place - that a 'depth' opened up, an intense life behind the flat façade of a dithyrambic discourse, served up in the glitter of a grand occasion! It was this curiosity that transformed a mechanical, repetitive, distracted gaze into an 'awake' gaze. . .

"The 'awakening' in question wasn't instantaneous, moreover; it happened gradually, with the progress of the reflection pursued in this footnote. To tell the truth, it wasn't complete until the final point of this note, when the hour was late (I seem to remember) and prompted me to 'get it over with' (\*\*). But I hadn't even got to that point, or at least not until the following day, when I realised that I was far from having exhausted the subject of L'Éloge Funèbre. It was only then that I fully realised the extent to which these two texts, so short and innocuous in appearance, are rich in meaning, veritable mines in fact! And that I was far from having exhausted what they had to say, if only I would listen hard enough. . .

(25 September) Last night I had to cut short my reflection, even though it had only just started, it seemed to me. I'd been sitting at my typewriter for three and a half hours straight, and little signs were beginning to show me that it was time to get up and get moving.

I well remember the first time I had to devote 'intense and sustained attention' to written texts, and I experienced day after day, for months on end, the astonishing metamorphosis of a dull, flat 'surface' coming to life and revealing meaning

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(\*\*) All the more so, I'm sure, because that very day I had already gone through the long and substantial reflection on 'The Massacre' (n° 87), to which, incidentally, I refer towards the end of the note on 'The Funeral Eulogy - or the compliments' which followed on from it.

It was also, at the same time, my first long-term meditation, in the spirit of a journey into the unknown, which would last as long as it lasted... The starting material was the voluminous 1933/34 correspondence between my father (who had emigrated to Paris) and my mother (who was still in Berlin at the time, with me when I was five). My aim was to 'get to know' my parents. I'd discovered the previous year that the admiration I'd devoted to them all my life, which had eventually congealed into a kind of filial piety, covered up and maintained a very great ignorance about them. This phenomenal ignorance, in which I had been happy to maintain myself all my life, only became apparent to me in its full dimension during the long-term meditation of the following year, from August 1979 to March 1980.

I had begun to 'prepare the ground' throughout the month of July 1979, in particular by doing an initial reading of the whole of this correspondence, alongside work on a 'poetic work of my own composition'(\*) which I was then putting the finishing touches to. Every evening I spent a few hours reading three or four letters and replies, certainly with interest and, I would have said without hesitation, attentively. However, I was obscurely aware that I remained a stranger, an outsider to what I was reading - that the true meaning escaped me. What I was reading was often quite crazy, as if the men and women I saw living and parading before my eyes had nothing in common with those I had thought I knew - those whose memory gave me a clear, intangible image. In the absence of patient, meticulous, demanding work on what I was reading, which I would have pursued as I went along, I was simply stunned, without more, by the (relatively) little in these letters that was 'big' enough to catch my superficial attention. What was recorded in this way was superimposed on the 'well known', which had been the invisible and unchanging foundation of my life, of my sense of identity, since my early childhood and up to the present day (without my ever realising it, of course). Assuming that I had stuck to this first reading, surely the thin layer of new and undigested 'facts' that had thus been superimposed on the master layers would quickly have been eroded and swept away without leaving much trace in the months and years that followed.

At the time of this preliminary work, my main investment was elsewhere, in writing a book that was absorbing most of my energy at the time. I was well aware

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(\*) Allusion is made to this book and to the episode in my life which it represents, at the end of the section "Le Guru- pas-Guru, ou le cheval à trois pattes", n° 45, and in the note on p° 43 to which it refers.

I was aware of the limits of a work done in parallel with another, and that I would have to come back to it from beginning to end, through a piecemeal process in which I would invest myself fully. I anticipated that it would take a few weeks - in fact I spent seven months in a row, devoted to a meticulous examination of the letters and writings left by my parents, the most 'burning' part of which is surely the 1933/34 correspondence. Seven months, moreover, at the end of which I ended up cutting it short, realising that the subject ('getting to know my parents') was as inexhaustible as ever. It had become more urgent now to *get to know myself*, with the help of all the things I'd just learned about my parents and, indirectly at least, about my own forgotten childhood...

I've just spent nearly two hours going through the early notes of this meditation on my parents, begun on 3 August 1979. Contrary to what I thought I was hastily remembering, I didn't yet realise, except perhaps in a very confused way, that I needed to go through all the letters and other written records of my parents that I had read over the past month, 'from beginning to end' (as I wrote earlier). At least I don't suggest anything to that effect in my notes. After a day or two of recapitulatory reflection, taking stock of my multiple, slightly confused impressions of this reading, I make no pretense of going back over it in meticulous detail. Instead, I followed it up (as if it were a matter of course) with an equally rapid reading of *other* letters (in particular a voluminous correspondence from my parents in 1937/39), and with a parallel reflection fuelled by the Impressions de lecture. One thing leading to another, over the course of August and the following month, I began to learn what it means to *work* on a letter (or any other written record of a life) in such a way as to be able to grasp its true meaning, which is sometimes striking - a meaning, however, that the person writing often likes to ignore, to conceal from themselves and from others, unseen and unknown! while still managing to display it 'between the lines' in a way that is sometimes ostentatious and incisive. And it must be rare for an insinuation or provocation (sometimes ferocious...) not to reach the addressee, for it not to be perceived and 'taken in' by him at a certain level, when he too is careful not to let this perception, this knowledge penetrate the field of his gaze, and when he too enters with all sails unfurled into this same game of 'neither seen nor known'. It is unfailingly the most obscure passages, those that seem to border on debility (or insanity...) and defy all rational interpretation, that reveal themselves to the curious eye to be the richest in meaning.

meaning: veritable mines, providing irreplaceable keys to penetrate further into the simple and obvious meaning behind the accumulation of apparent nonsense. Passages like these, frequent in the correspondence between my parents, and especially in the letters from my mother, who led the way, of course completely 'went over my head' when I first read them in July. I began to pick up on them, here and there, over the following month. It was only in September that various cross-checks made me realise that I'd perhaps missed something essential in what I had to learn from the 1933/34 letters, and brought me back to them, prompting me to do a first 'in-depth' reading of some of them. Reading them immediately turned my childhood image of my parents and their relationship with me and my sister upside down.

(<sup>102</sup>) (26 September) It's been two days now since I got into the swing of 'autobiographical reminiscences', as I set off to write ('coldly') the sequel to a certain note on a certain Funeral Eulogy. I don't know whether this digression warmed my ardour a little! It's about time I at least got to the point I had in mind when I launched into it the day before yesterday, in the direction of : "On the art of reading a message that pretends not to say what it has to say". This kind of text-message is much more frequent than I would have thought...

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It goes without saying that the question of the 'how' of this 'art' does not arise, as long as you are prepared (as I was for most of my life) to take at face value and to the letter everything you are told or written, and not to look for or see, in anything or anyone, any intentions other than those expressly stated by the person concerned. On the other hand, it arises when you are confronted with that indefinable expression, that in a given statement, tirade or narration, something is 'wrong', that there is something fishy about it, that something has 'passed', somewhere, that is not supposed to have been said (what would you imagine there!). Sometimes it's the perception, elementary and disconcerting, of an incoherence, of an absurdity, so enormous at times and at the same time seemingly elusive, that it seems to defy all formulation, to the point of appearing to be debilitating or delirious. These situations are often overloaded with anguish - and it is indeed by an instantaneous influx of anguish, never recognised as such but blurred and immediately concealed under a wave of violent, distraught anger, that I invariably react to such situations, where

absurdity suddenly burst into my life: unacceptable, incomprehensible, threatening absurdity, shaking my serene vision of the world and of myself to its very foundations! At least that's how it was until I discovered 'meditation', when an intrepid and enterprising curiosity defused and took over from these waves of anger and anguish...

It was curiosity, in other words the desire to know, that led me to spontaneously find, under pressure of need, this 'art' of deciphering a muddled text-testimony - or, more modestly speaking, a method that suited my limited means and cumbersome nature. No matter how hard I tried, no matter how curious I was, on first reading (or even on second reading) of these letters full of meaning, the whole point went right over my head - 'I couldn't see a thing'. Sometimes, commenting on a few often confused Impressions, perhaps about this or that particularly obscure and confusing passage, I managed to penetrate further into the meaning of a text that had seemed hermetic. Along the way, I sometimes found myself copying, for quotation purposes, passages of varying length, which stood out either because they were obscure or because they seemed to me to be 'important', for one reason or another. As the days and weeks went by, I realised that the simple fact of *copying* a passage in extenso from the text I was examining changed my relationship with it in a surprising way, opening me up to an understanding of its true meaning.

This was completely unexpected, whereas my initial motivation (at least on a conscious level) had been a matter of pure convenience. I even remember that for a long time there was a certain restrained impatience in me, to devote precious time to acting as a copyist, nothing more and nothing less, and I was gnawing at the bit to get to the end and writing as fast as I could... But there's no comparison between the speed of the eye as it scans written lines and the speed of the hand as it transcribes them word for word. No matter how fast you write, the 'time factor' is absolutely not the same. And I suspect that this 'time factor' does not act in a purely mechanical, quantitative way - or to put it better, that it is only one aspect of a more delicate and richer reality. Nor, for me at least, is there any common measure between the action of the eye that runs over lines that someone else has thought and written, and the act of the hand that letter after letter, word after word, rewrites those same lines. Surely there is a profound symbiosis between the hand and the mind or thought; and at the very rhythm of the hand that writes, and without any intention of

deliberately, the mind cannot help but reform and rethink the same words, assembling them into sentences charged with meaning, and these into discourse. Provided that a desire to know animates this hand that reproduces letters, words and sentences, and that it animates this mind which, in unison, also 'reproduces' them, at another level, - surely this double action then creates a more intimate contact between myself and this message of which I make myself the scribe-writer, than the act, above all passive and without support or tangible trace, of the eye that is content to read.

This groping intuition is in line with a long-held observation - that for me the rhythm of working thought (whether mathematical work or any other, including the work I call 'meditation') is most often (if not always) that of the hand that writes, and by no means that of the eye that reads(\*). And the *trace écrire* left by my hand (or sometimes by the typewriter operated by my hands...), to the rhythm of the thought that progresses without haste and without ever dawdling, is the indispensable material support of this thought - both its 'voice' and its 'memory'. I suspect, moreover, that it must be more or less the same (though perhaps to a lesser degree) for most if not all 'intellectual workers'.

(<sup>103</sup>) (27 September) In any case, the fact is there: just as I can only 'enter' a mathematical theory by writing, I can only begin to enter a text-message, the 'between the lines' of a message, by *rewriting* it. My first work of meditation 'on texts' was transformed, an apparent platitude began to open up into a living depth, and the absurd *began* to find meaning, *from the moment* I began to rewrite the message in extenso, or (in the case of a message of prohibitive dimensions) the passages that a sense of intuition made me feel were crucial.

You might say that, in the absence of reliable 'objective' criteria to guarantee the validity of an 'interpretation', presented as the result or outcome of (so-called?) 'work' on a text, let's say, you can make any text say exactly what you want or what you want.

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(\*) This circumstance, which seems to affect me to a greater extent than most of my mathematical colleagues, once made it difficult for me to join in the group work sessions of the Bour- baki group, finding myself unable to keep up with the readings as they went along. I've never really enjoyed *reading* mathematical texts, even beautiful ones. My spontaneous way of understanding maths has always been to *do* it, or to *redo* it (with the help, where necessary, of ideas and indications provided by colleagues or, for want of a better word, books. . . ).

It's all very well - and I'm sure your examples abound! Nothing could be further from the truth - and your examples certainly abound! I doubt (except perhaps in a limited discipline like history - and even then...) that it would be possible to identify such criteria. It wouldn't do much good anyway: it wouldn't stop anyone inventing fanciful interpretations, nor would it enable anyone to fathom and discover the true meaning of a message, a situation or an event. Rules and criteria are ingredients of a *method*, which has its usefulness and importance (often overestimated, moreover, to the detriment of other factors and forces of a completely different nature), as a tool for discovery and consolidation in the development of scientific or technical knowledge, and also in the development of any kind of know-how: driving or repairing a car, etc. On the other hand, at the level of knowledge and discovery of oneself and of others, the role of the method becomes entirely incidental: it's the 'stewardship' that follows, when the essential is there. And being inspired by a method, or even clinging to it, does nothing to encourage the emergence of that more essential thing - quite the contrary!

To put it another way: the person who sets out to find something decided in advance (which he will call 'true', or 'truth') will have no trouble finding it, and even proving it to his entire satisfaction - and he will surely find along the way some other person, if not a whole crowd, all too happy to make an alliance with him and share his convictions and satisfaction. He's like the butterfly hunter who sets off with a beautiful butterfly in his net (a stuffed one, if that's possible), and who takes it out all happy (and to his own satisfaction) when he returns from his 'hunt'.

And there is also the person who finds himself in front of an unknown, like a naked child in front of the sea. When the child wants to get to know it, he goes in and gets to know it - whether it's warm or cool, calm or rough. Anyone who is attracted by an unknown thing and sets out to discover it will surely know it to a greater or lesser degree. With or without a net, he will find the truth, or at least *some* truth. His mistakes and his discoveries are all stages in his journey, or to put it better, in *his love affair* with what he wants to know.

I know what I'm talking about, because in my life I've been both this butterfly hunter and this naked child. There's no difficulty in distinguishing one from the other. I doubt that 'objective criteria' will be of much help here, it's much simpler than that! All you have to do is use your eyes...

And there's no difficulty either in distinguishing the successive stages, the decan-

It is not essentially different, whether we are talking about the discovery of mathematical things, or the discovery of oneself and others, from the discovery of mathematical things to the discovery of others. The nature of the journey of discovery of mathematical things is not essentially different from that of the discovery of oneself and others. The feeling of progress in *knowledge*, which deepens little by little (even through an accumulation of errors, patiently and tirelessly corrected) - this feeling is just as indisputable in the latter case as in the former.

This *assurance* is one side of an inner disposition, the other side of which is an *openness to doubt*: an attitude of curiosity, excluding all fear, towards one's own errors, which enables us to detect and correct them constantly. The essential condition for this double foundation, for this *faith that* is indispensable for welcoming doubt as well as for discovery, is the absence of any fear (whether apparent or hidden) about what will "come out" of the research we are undertaking - in particular, any fear that the reality we are about to discover will upset our certainties or convictions, that it will disenchant our hopes. Such fear acts as a profound paralysis of our creative faculties, of our power of renewal. We can discover and renew ourselves in sorrow and pain, but not in fear of what is about to be known, what is about to be born (any more than a man can know a woman and have her conceived, at a time when he is afraid of her, or of the act that brings him into her). Such fear is undoubtedly relatively rare in the context of scientific research, or any other research whose subject does not involve our own person in any profound way. On the other hand, it is a major stumbling block when it comes to self-discovery or the discovery of others.

However, the feeling that accompanies a discovery, large or small, is just as irrevocable in the case of self-discovery or the discovery of others, as it is in the context of impersonal research, such as mathematics. I've already alluded to this feeling. It is the emotional reflection of a perception of something that has just happened - the appearance of something *new* - and this 'something' appears to be as tangible, as irrefutable (I apologise for the repetition!) as the appearance of a mathematical statement, let's say, or a notion or a demonstration, that we had never thought of before. It seems difficult to distinguish or separate the feeling that

accompanies a particular discovery, the feeling of progression I mentioned earlier, which accompanies the whole search. Discoveries 'big and small' are like the successive *stages* that materialise a progression, like successive *thresholds* that we have to cross. Progression is nothing other than the series of thresholds we cross, of accesses from each of these levels to the next.

The 'feeling' or, better still, the perception that reflects and restores this process, is a sure and unmistakable 'criterion' - I don't remember it ever misleading me, either in maths or in meditation: I don't remember having to realise, with hindsight, that this feeling would have been illusory. Often it allows us, without any residual doubt, to distinguish truth from falsehood, or to discern truth from falsehood, and falsehood from what is supposed to be true. But above all, it is an irreplaceable *guide* in any true search - a guide ready to inform us at any moment (provided we take the trouble to consult it) whether we are on the wrong track or on the right one.

The willingness to listen to this sure guide is, it seems to me, nothing other than what I have called 'rigour' elsewhere in my reflections(\*). This rigour is no different in essence, it seems to me, from the demands of mathematical research or of self-knowledge, without which there can be no such knowledge. But it goes without saying that this in no way means that the presence of this rigour, at the level of such intellectual work, is a guarantee or sign of its presence for the knowledge of oneself and of others. In fact, the opposite is true, as I have observed on countless occasions, starting with myself. In this area, the 'rigour' I'm talking about here appeared in my life at the same time as meditation. Or to put it another way, I can't really distinguish between one and the other. The moments of meditation in my life are none other than those when I examine myself (most often through my relationship with others) in such a state of extreme exigency with myself.

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(\*) In the section "Rigour and rigour", n° 26, I refer to "rigour" as "delicate attention to the *quality of understanding* present at every moment" in a research project.

## XII. The Funeral Ceremony

(<sup>104</sup>) (12 May)(\*) Remarkably, in the short 'overview' of my work in this same brochure (\*\*), the word 'cohomology' or 'homology' is not mentioned.

! Nor is the word 'scheme'. It certainly mentions (as circumstances demanded, when I was acting as the 'first Fields Medal brought to the IHES') the 'titanic aspect' of my work, the number of volumes published, identifying essential problems, with the greatest natural generality (funny French, that), very careful terminology, allusion to 'Grothendieck's groups' (another one of those great natural generalities, I bet!), and even topos and their usefulness in logic (but especially not elsewhere!)... . But no allusion to a *resulrar*, or to a *rheory* that I'd developed and which might perhaps have been useful - it must be that these twenty titanic volumes were rigorously empty, or just collections of problems (never solved) and notions, with the greatest natural generality - it's a given: Grothendieck's group is awarded (since my name is already stuck to it afterwards), presented as the 'ancestor' of algebraic K-theory (!) (which has nothing to do, of course, with topological K-theory, about which not a word is said)(\*\*\*). As for the Riemann-Roch theorem, it must have been the descendants of the "ancestor" who took care of it.

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(\*) (18 May) The following note is "taken from a footnote (to note no.<sup>o</sup> 47) that has grown prohibitively large". I have inserted it here, thinking that this time the order is more natural than the chronological order.

From the very moment this note was written, I felt the need to develop it a little further

- This will be done in a follow-up note to this one, which has not yet been written at the time of writing. These two notes have now been given the name they deserve: 'L'Éloge Funèbre'!

(\*\*) (18 May) This is the brochure published in 1983 by the IHES (Institut des Hautes Études Scientifiques in Paris).

on the occasion of the jubilee celebration of its twenty-five years of existence. Reference is already made to it in a footnote to the note "L'arrachement saluaire" (n° 42), and again at the beginning of the note "Refus d'un héritage - ou le prix d'une contradiction" (n° 47), to which the present note (L'Éloge Funèbre (1)) refers (see previous footnote).

(\*\*\*) My work on the Riemann-Roch theorem is the first strong start for K-theory. and by no means an 'ancestor'. K-theory was born the same year (1957) that I proved the Riemann-Roch-Grothendieck theorem, following my paper at the Hirzebruch seminar. "The 'ancestor' of this 'descendant' that has been passed over in silence was not yet a year old! Algebraic K-theory (with the introduction by Bass of the *K-functor*<sup>1</sup> in addition to the *K-functor*<sup>0</sup> that I had introduced) developed in the years that followed, under the dual influence of the "ancestor" and its first "descendant".

In fact, in the second half of the 1960s, I was already moving towards a description of  $K^i$  (for a "monomial" category, e.g. additive), in line with Ms Sinh's thesis. She

- those who do the real theorems, the serious stuff!

At a time when it is fashionable to disregard generalities (persifuted by the vaguely ridiculous phrase "the greatest natural generality". . ), the anonymous writer who has taken care of my eulogy here has gratified me abundantly with what today is given over to disdain(\*). I also fully appreciated (perhaps I am the first to do so...) the humour of the same anonymous pen in this passage of the eulogy:

"He created a school of algebraic geometry at the IHES, built around the seminar he ran and *nourished by the generosity with which he communicated his ideas*" (my emphasis). Unfortunately, just like my 'titanic work', this 'school of algebraic geometry' that I nurtured so well is rigorously empty - not a single name is mentioned, and no one has come to complain that it has been forgotten, at least not to me.

However, I seem to remember seeing the young Deligne faithfully haunting this (presumably empty) seminar between 1965 (when he must have been nineteen) and 1969, and learning in this seminar and in our tête-à-tête not only the technique of diagrams, but also cohomological techniques and staggered cohomology - in other words, the very tools used on every page of his work (among those I have seen, at least). In the 'topo' devoted to Deligne in the same brochure, there is no hint either that the reader might have learned something from me. And yet, remarkably, my name is mentioned three times in this eulogy (by no means funereal) of Deligne ("third Fields medal of the IHES"). And even in a periphrase there is a reference, with the vague rigour that must surround every appearance of my modest person, to the fact that I "constructed the theory of cohomology in geometry over any field" - and surely "with the greatest natural generality", that smacks of grothendieckery(\*)).

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remained heuristic, being based on the intuition of *Picard's enveloping  $\infty$ -category*, whereas nobody at that time (or since) had taken the trouble to develop the notion of (non-strict)  $\infty$ -category, i. e. The notion I now call  $\infty$ -field (on the punctual topos). With the sketch of foundations for a cohomologico-homotopic formalism of fields that I am about to develop in The Pursuit of Fields (in line with the ideas I developed between 1955 and 1965), this "geometrical" approach towards a theory of higher K-invariants would finally be available.

(\*) (18 May) And I've gone on and on! For a complete quotation from my Eloge Funèbre, see the note 'L'Éloge Funèbre (2)".

The full context quote is worth giving, it's a little masterpiece of the genre:

"Starting from there [classical Hodge theory] and from A-adic analogies suggested by Grothendieck [one wonders where Gr. found the time to learn such serious things, while writing his twenty volumes of greater natural generalities], he [Deligne] derived the notion of mixed Hodge structure and equipped the cohomology of any complex algebraic variety with it. In A- adic cohomology, therefore [?] for varieties over a finite field, he proved Weil's proverbially difficult conjectures. This result seemed all the more surprising [!!] since Grothendieck, after having constructed the theory of cohomology in geometry over any field [one wonders what else he went looking for there], had reduced the remaining conjecture [???] to a series of conjectures which are as unapproachable today as they were then."

To put it plainly, far from having contributed in any way to proving this astonishing result of such proverbial difficulty, these grothendieckeries (with a name that would scare off the most hardened generalist-naturalist) have done no more than encumber us with yet more *conjectures*, as is only right (he never makes any others!) and unaffordable what's more (one would have guessed), just as much today as when He had the crazy idea of making them.

However, I think I remember tackling these unapproachable conjectures, but that was probably because I was ill-informed. It was around the time that I left, I mean died, and my posterity, better informed than I am, has been careful never to stick its nose into that stuff, given that Deligne was formal: it was unapproachable!

I recognise the style: we've done our homework, quoted Grothendieck extensively

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(\*) (18 May) In the Eloge Funèbre, reference is made to the "great attention" I paid to terminology. In the use of silly expressions like "the greatest natural generality" or "the theory of coho- mology in geometry on any body", I clearly perceive the intention to mock this attention.

The extreme care I take with the names given to things naturally stems from the respect I have for these things, whose name is supposed to express their essence, or at least some essential aspect of them. I have been shocked on more than one occasion by the disdain with which this attitude of respect seems to be treated today, a disdain which is sometimes expressed by the use of abracadabra names for important concepts. On this subject, see also the note "Perversity" (n° 76).

(neither he nor anyone else will be able to claim that we are burying him on this solemn day), and even an allusion was made to "A-adic analogies" which had played a role in the start-up of the mixed Hodge theory. This must be the second time since the famous lapidary half-line thirteen years before(\*); both allusions bear an uncanny resemblance to the "weighty considerations" of a certain 1968 article (\*\*): one is "thumbed", and one has led the reader by the nose at the same time! Here, the solemn occasion helping, the thumb-reference does more than drown the fish - the impression that this text wants to suggest about this famous Grothendieck is precisely that carried by this 'wind' of fashion that I have been feeling for some years - the one that I have already had the opportunity to feel today (\*\*\*)�, no longer in the tones of a funeral eulogy and grand occasions in front of a large audience, but in those of a massacre...

I'll continue the quote, it's worth it:

"This theorem (ex-Weil's conjecture) has helped to make A- adic cohomology a powerful tool... It is unnecessary to name the brilliant and modest inventor of this powerful tool... which can be applied to questions that are apparently far removed from algebraic geometry, such as Ramanujam's conjecture.

More recently, he has studied Hodge cycles on abelian varieties, taking the first step towards a 'motivic' theory such as Grothendieck had dreamed of. He also proved the algebraic mechanism of 'intersection cohomology', the topological theory of Mac Pherson and Goresky. This made it possible to transpose it to A-adic theory, where it proved surprisingly useful."

And so, one year after the publication of the 'memorable volume' (\*\*\*\*), an anonymous writer (I'm guessing the same one) finally made good a small 'oversight' in the said volume. Someone has

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(\*) This "lapidary half-line" can be found in Deligne's report "Hodge Theory I" to the Nice International Congress in 1970. See comments in note n° 78<sub>2</sub>.

(\*\*) On this subject, see the beginning of the note "Canned weights and twelve years of secrecy" (n° 49), and the more detailed examination of this subject.  
detailed in the note "Eviction" (n° 63).

(\*\*\*) See the note of the same day "The massacre", n° 87.

(\*\*\*\*) The volume in question is Lecture Notes n° 900, published in 1982, and referred to in the notes "Souvenir d'un rêve - ou la naissance des motifs" and especially "L'Enterrement - ou le Nouveau Père" (n° 51, 52). This is the volume in which the motifs are 'exhumed' (after a deathly silence on the subject for twelve

years), under an (implicit) alternative authorship.

should perhaps have asked a question anyway, and here Deligne sets about repairing the omission in his own way (it's nice, after all, to quote that dreamer Grothendieck, when it comes to serious mathematics at last!) And always deceiving the reader, given that the 'first step' was taken as early as 1968 with Deligne's launch of the Hodge-Deligne theory, rooted in the yoga of motifs that he had indeed 'nourished' through my contact over the four years that preceded it. This yoga, from which his work stems, from which he has never known how to detach himself while denying it, is in fact dispatched in the periphrase of the first quotation under the name of 'A-adic analogies'. A reader who was not both very informed and very attentive would certainly not suspect a link between these 'A-adic analogies', which would have played a role as a starting point (but certainly not beyond... ) for the theory of Hodge-Deligne(\*), and a 'motivic theory' of which I had indeed dreamt (and a devilishly precise dream at that).

- except for this link, that it's this same dreamer Grothendieck who manages (by dint of greater natural generalities) to suggest analogies to real mathematicians, on the condition that they do some real work.

As for the famous "algebraic mechanism of intersection cohomology", here we are in the middle of the Colloque Pervers(\*\*) (although the word "perverse" is not used). Given the solemnity of the occasion, we're certainly taking it easy on one of the 'four Fields medals of the IHES' - but we don't have to take it easy on Grothendieck's posthumous pupil. My own burial on this exceptional occasion in the limelight, ministerial speech and all, is not burial by silence, but by *compliment*, skilfully measured and administered. But where Mac Pherson and Goresky are named, it goes without saying that for the posthumous pupil Zoghman Mebkhout silence is de rigueur, as it had been two years earlier at the Colloque Pervers, and as it still is today.

(<sup>105</sup>) (29 September) The "previous" note, "L'Éloge Funèbre (1) - ou les compliments".

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(\*) This theory of Hodge-Deligne is still in its infancy, as the notion of a "Hodge-Deligne complex" on any finite type scheme over  $\mathbb{C}$  and the formalism of the six operations for these "coefficients" have not yet been developed. The need for such a theory was obvious to Deligne as much as it was to me, even before his first work on mixed Hodge structures, and it followed obviously from the yoga of patterns. But as soon as I left the mathematical scene, Deligne developed a 'block' against the key ideas I had introduced into homological algebra (derived category, six operations, not counting topos), which prevented the natural development of a theory that had got off to a spectacular start.

(\*\*) On the subject of this Cortège VII Colloquium, see "Le Colloque - ou faisceaux de Mebkhout et

Perversité".

(n° 104), is dated 12 May - more than four months old. It began as a footnote to 'Refus d'un héritage, ou le prix d'une contradiction' (note no.° 47, from the end of March), just to mention in passing a little 'funny' fact that I had only just realised. But as I was writing it, I realised as the lines and pages went by that these two seemingly innocuous short texts on which I was commenting, without really having planned or sought it out, were a real 'mine' (\*). It was also the day on which I had just painted the picture of a massacre (note n° 87), a picture that had gradually emerged from the mists over the past few weeks. Now it had suddenly materialised, had taken shape simply by virtue of an enumerative description, and it was calling out to me forcefully. The massacre and the 'compliments' - the eulogy to the deceased - were like two complementary parts of the same striking picture, both appearing on the same day!

It was certainly enough to satisfy me! The very next day, my hands were tingling with the desire to carry on and, in particular, to delve deeper into this little jewel of a mine that I had just unexpectedly got my hands on. It had become clear that the first thing to do was to quote in extenso the two passages in question from the jubilee booklet - at the same time, this would be the best way to get to know these texts better and to better immerse myself in their *real* message, the message 'between the lines' . . . (\*\*). Without even having had time to copy out the two texts, the previous day's contact had already been enough to arouse or awaken in me several associations of ideas, which I felt were juicy. I was eager to pursue them, without really knowing where they would lead me...

In the end, I didn't continue in that vein in the days and weeks that followed, although I promised myself that I'd come back to it in the next few days. An unforeseen 'health incident' put an end to all work on Recoltes et Semailles for more than three months, and even to any intellectual work whatsoever(\*). The 'warm moment' favourable to pursuing this direction of reflection, which had just opened up in those days, has now passed. It's not certain that it will return, or that we'll ever see it again.

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(\*) For some retrospective comments on this subject, see the beginning of the note of 24 September "Surface and depth" (n° 101).

(\*\*) On this subject, see the note "On the art of deciphering a message - or in praise of writing" (n° 102), which follows the note cited in previous footnote

(\*) On this subject, see the notes "The incident - or body and mind" and "The trap - or ease and exhaustion", n° s 98, 99.

even if I want to make the effort to 'blow' (the heat!) to bring him back at all costs. To tell the truth, my real desire now is to come to the ultimate note, drawing a provisional *balance sheet* of the whole reflection called the Burial - and to draw a *final rrair!* As far as this note is concerned, I'm at least going to give the full quotation I promised myself (and already promised the reader, moreover); and perhaps at least a few summary Indications too, about certain associations of ideas that these two texts (and perhaps also the fact of rewriting them in black and white) will have aroused in me.

The two texts in question (pp. 13 and 15 respectively, from the 1983 jubilee brochure entitled "Institut des Hautes Études Scientifiques") are part of a series of "minute portraits" of the "permanent staff" and "long-term guests" who have passed through the IHES since it was founded in 1958, arranged in chronological order of entry. These are fairly brief texts, each about half a page long, and each includes the dates on which the person joined IHES and the position (professor or long-term visitor), the main honours, the main areas of interest and the most important contributions, with (where appropriate) the names of certain collaborators. As far as I am concerned, however, there is a noticeable gap in these last three 'objective' aspects of a work and a personality - areas of interest, main contributions, main collaborators or pupils - which is filled by these 'compliments' in dithyrambic style, some of which have already been noted and quoted in the previous note...

The series in question, which I have the honour of opening, is made up of the following mathematicians and physicists: A. Grothendieck, L. Michel, R. Thom, D. Ruelle, P. Deligne, N. H. Kuiper, D. Sullivan, P. Cartier, H. Epstein, J. Fröhlich, A. Connes, K. Gawedzki, M. Gromov, O. Lanford.

I thought I remembered that Dieudonné had been a professor at the IHES at the same time as me, and I see from the list that this is not the case - he had therefore been content to edit the Mathematical Publications. However, I now realise, on page 3 of the brochure, in the IHES 'Curriculum Vitae', that this is not the case, and that Dieudonné was indeed, like me, a 'permanent professor' from 1958 (and until 1964), at least theoretically. A rather strange contradiction! I'm copying here the beginning of the 'Curriculum Vitae', at the first two 'dates', 1958 and 1961:

1958 Creation of the Institut des Hautes Études Scientifiques association in Paris, by Léon

Motchane, assisted by world-renowned scientific advisors and a group of European industrialists.

The scientific activity was launched by two mathematicians:

Jean Dieudonné (-→ 1964) and Alexandre Grothendieck (-→ 1970)  
appointed permanent professors. Publication of issue 1 of  
"Publications Mathématiques de l'IHES".

1961 Recognition of public interest.

.....

I note in passing that it seemed useful, in this brief Curriculum Vitae, to mention the (somewhat symbolic) publication of number 1 of Publications Mathématiques (consisting of a 24-page article by G. E. Wall, whose author had no particular connection with the association that had just been born), but not the algebraic geometry seminars (well known under the familiar acronyms SGA 1 and SGA 2). Wall, the author of which had no particular connection with the association that had just come into being), but not the algebraic geometry seminars (well known under the familiar acronyms SGA 1 and SGA 2) through which I began to single-handedly ensure the scientific reputation of an institution, during years when it barely existed "on paper". Moreover, until about volume 24 of the Publications Mathématiques, the bulk of these publications consisted of the successive volumes (1 to 4) of the "Éléments de Géométrie Algébrique" (\*), all the other volumes being about fifty pages each (of a high scientific level, it goes without saying). On page 19 (after the series of 'minute portraits' from which Dieudonné was absent, God knows why(\*)), we see Ut, in a very 'advertising placard' layout (with a tempting photo of the impressive stack of volumes in their entirety from the prestigious Publications);

Mathematics publications

It was Jean Dieudonné alone [!] who, from 1959 onwards, took Publications Mathématiques to the pinnacle of world excellence.

Since 1979, they have appeared as a regular 400-page annual publication, under the direction of an editorial board headed by Jacques Tits.

Distribution is handled by... . (etc)

If Publications Mathématiques is singled out in *this way*, in this jubilee presentation of a prestigious institution whose main vocation has never been that of publishing a periodical, there is no doubt that it is to make people forget a certain fact.

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(\*) Of which I am the author, in collaboration with J. Dieudonné.

unpleasant to some (\*\*): that the said institution would no doubt have been written off and forgotten a long time ago, had it not been for the fact that, for three or four critical years, a certain quidam, stubbornly pursuing his own ideas (which had the good fortune to catch on with some people, including in the 'big world'), had given it, against all the odds (\*\*), an endorsement and a credibility that the finest statutes of association in the world, and even the finest 'world-renowned scientific advisors' (sic), are powerless to give.

(30 September) The style of this jubilee booklet (which I'm going to get to know very well!) is certainly not that of my friend Pierre, nor that of Nico - they surely have other things to worry about than composing this kind of occasional text. On the other hand, it's obvious that the two minute portraits I'm interested in, one of me and the other of Deligne, weren't written without Deligne at least providing the key words - if only because he's the only one at the IHES in a position to do so; and it's just as clear to me that these two texts, at least, weren't delivered to a printer without Deligne having first read them and given the go-ahead. So it seems clear to me from the outset that the two texts in question reflect in any case

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(\*) (30 September) It occurred to me that the reason might well be this: so as not to have to say that during the years in question (1958-1964), Dieudonné's time was essentially divided between writing Elements of Algebraic Geometry (in which I unfortunately appear as the main author) and Bourbaki essays - apart from the piano and cooking (Dieudonné was both a fine musician and a fine cook), which, alas, could not be mentioned in this brochure, which is too selective for a passing smile to find its way in. . .

(\*\*) With all due respect to my friend Nico (who at the time had been director for twelve years of the aforementioned institution celebrating its jubilee), who surely (on this occasion as on others) saw nothing but fire. . .

(\*\*\*) Against all the odds: without letting myself be impressed throughout those four years by the warnings and persistent rumours of the imminent bankruptcy of an 'adventure' (as some well-informed friends suggested...) that was entirely unrealistic, not to say a bit of a smoke screen! The fact is that the IHES did not have the slightest financial or land base at the time, and its life was constantly suspended by short-term donations from a few industrialists who were more or less well disposed. I didn't worry much about this, confining myself to trusting the founder-director Léon Motchane, who managed year after year to 'save the day' by performing miracles of financial prestidigitation and 'public relations'. After all, in those clement times, if things fell apart, I had a good chance of quickly finding a less 'problematic' alternative! On the other hand, if I won the bet I'd made on the IHES (with the encouragement of Dieudonné, who knew Motchane and in whom I had every confidence), my position at the IHES suited me better than any other I knew of.

and first and foremost the dispositions and intentions of my friend - the image he strives to give of me and of himself, both to himself and to the mathematical public. It is in this respect, of course, that these two passages interest me. This interest does not depend on whether or not Deligne is the author of these revealing lines, or whether the author is someone else (no doubt the one who 'thought up' the brochure as a whole), who for one reason or another would have espoused this 'message' that my friend wanted to get across.

At the end of these pages, you will find two minute portraits, taken from the portrait gallery (pp. 13-19) entitled "Activities of permanent and long-term visiting professors".

Alexandre GROTHENDIECK, mathematician, professor at the IHES from 1958 to 1970, Fields Medal.

During the 12 years he spent at the Institute, A. Grothendieck renewed the foundations and methods of algebraic geometry, and opened up new applications for it, particularly in arithmetic. He created a school of algebraic geometry at the IHES, built around the seminar he ran and nourished by the generosity with which he communicated his ideas. The titanic aspect of his work is reflected in his publications, including the treatise "*Éléments de géométrie algébrique*", in collaboration with Jean Dieudonné (8 volumes) and the 12 volumes of the "*Séminaires de géométrie algébrique du Bois-Marie*", in collaboration with numerous students.

In algebraic geometry, he identified the essential problems and gave each concept its greatest natural generality. The concepts introduced have proved essential well beyond algebraic geometry. They often seem so natural that it's hard to imagine the effort it took. If they are self-evident today, this was undoubtedly facilitated by the great attention he paid to terminology.

Remember also that the 'Grothendieck groups', linked in algebraic geometry to the theory of intersections and used in topology, are the ancestors of algebraic K-theory. The topos introduced in algebraic geometry over a general base field to transpose results previously proved over C by topological means are now used in logic.

He left the IHES in 1970, at a time when his passion for mathematics was waning. Are we to believe that the problems he was working on had become too difficult?

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Pierre DELIGNE, mathematician, professor at the IHES since 1970, Fields Medal, Henri Poincaré Gold Medal, Foreign Associate of the Académie des Sciences.

The main thrust of his work is to "understand the cohomology of algebraic varieties". If the complex algebraic variety  $X$  is non-singular projective, the theory of harmonic integrals provides a Hodge structure on  $H^*(X)$ . From this and from  $A$ -adic analogies suggested by Grothendieck, he derived the notion of a mixed Hodge structure and used it in the cohomology of any complex algebraic variety. In  $A$ -adic cohomology, i.e. for varieties over a finite field, he proved Weil's proverbially difficult conjectures. This result seemed all the more surprising given that Grothendieck, after having constructed the theory of cohomology over any field, had reduced the remaining conjecture to a series of conjectures that are still as unapproachable today as they were then.

This theorem has helped to make  $A$ -adic cohomology a powerful tool, applicable to questions seemingly far removed from algebraic geometry, such as Ramanujam's conjecture.

More recently, he studied Hodge cycles on abelian varieties, taking the first step towards a "motivic theory", such as Grothendieck had dreamed of. He also demonstrated the algebraic mechanism of "intersection cohomology", the topological theory of Mac Pherson and Goresky. This made it possible to transpose it into  $A$ -adic theory, where it proved surprisingly useful.

He is currently interested in non-commutative harmonic analysis (theory of functions on real or  $p$ -adic - or finite classical - Lie groups and certain homogeneous spaces), following on from his work on automorphic forms (Ramanujam conjecture) and, with G. Lusztig, on representations of finite groups.

He is quick to assimilate and penetrate all mathematical concepts and, as a result, has enlightening and constructive reactions to every question put to him.

These two texts need to be supplemented by a third, in which Deligne and I appear in one breath. I found it in a loose leaf inserted in the booklet, under the same title "Orientation of research at the IHES" as the chapter in which the "portrait gallery" is inserted, with the subtitle "Summary note on the 'prospects for scientific activities'".

It is essentially a draconian 'shortening' of the portrait gallery, reduced this time to just the 'permanent professors' (present or past) (\*), with two or three lines devoted to each. They are (in the order in which they are mentioned) myself, Deligne, Michel, Thom, Ruelle, Sullivan, Connes, Lanford III, Gromov. This is the order of the more detailed portrait gallery, except that Deligne has 'moved up', for the benefit of being quoted in one breath with me. An amusing detail is that in this text the proper names of the eminences reviewed all appear underlined, with the sole exception of my modest self (\*\*)! Here is the passage about my friend and me:

The theories of legendary depth of Alexandre Grothendieck and the brilliant découvertes of Pierre Deligne (both Fields Medal winners) have linked topology, algebraic geometry and number theory by 'interdisciplinary' means (cohomology). More recently, this has enabled G. Faltings from Federal Germany (who had already worked at the IHES) to prove an arduous theorem that is a landmark in number theory and sheds light on the famous "Fermat theorem".

I note in passing that in this mini-gallery the 'Fields medals' have been given a capital M - and that 'interdisciplinarity' has been a favourite theme of its founder-director since the early days of the IHES. It is perhaps thanks to this circumstance, moreover, that this digest finally seems to imply that my person might have something to do with a certain 'interdisciplinary means' called 'cohomology' (which also happens to be the 'guiding axis' of Deligne's work, by who knows what coincidence).

But here I am, taking this text by the scruff of the neck! The occasional reference to Faltings, who had risen to the top of the news overnight

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(\*) (1 October) To keep things in perspective, we've also included Connes (although he's only a "visitor"), so that's one more "Fields Medal" for the collector. On the other hand, my friend Nico Kuiper has been left out. He's not the one who would have gone out of his way to be there for the occasion...

(\*\*) (1 October) The typographic effect obtained by this brilliant process (the intention of which is perhaps not conscious), is that the passage I'm about to quote appears to be dedicated to Pierre Deligne (whose name appears typographically at the head of the list of 'permanent staff', to the exclusion of my own), and that I'm a bit of a '*collaborator*', a stranger to the establishment! The chronological order is certainly respected, there's nothing to say for sure - and yet the effect produced (and surely intended) is that of a role *reversal*, arousing familiar associations in me (evoked in notes such as "Le renversement", "L'éviction", "Pouce", n° s 68<sup>✉</sup>, 63, 77). As a result, I've also rediscovered a certain appropriation *style* - the "Pouce!" - style, which clearly identifies me as the *real* author of the message.

It too is part of the 'little bit' of the text: the scribe's 'signature', in short, and hardly deserves my attention. It's the first sentence about Deligne and me that obviously contains the essential 'message' of the passage. It tells me a great deal about certain dispositions in my friend and former pupil - and above all about a profound 'Unsicherheit' (insecurity, lack of assurance, - of a deep inner foundation)(\*). Here, no more than in any of the published texts signed by him(\*\*), or in the two minute-portraits that preceded them, there is nothing to suggest that my friend could have learned anything from me. But here he is, in no uncertain terms, presenting himself as *the father* of a vast unifying vision 'taken' from others(\*), as if subjugated by the intimate conviction of his profound inability to conceive himself and allow *his own* visions, as vast or even more vast, to blossom within him; and as if, in order to be and appear 'great', the only thing left for him to do was to disrupt his own vision. It was as if, in order to be and appear 'great', all that was left to him was the paltry resource of *taking back* for *himself* the halo with which it had pleased him from his youth to surround a prestigious elder who is now deceased (or at least declared so by a providential consensus...). Taking hold of a *halo*, rather than letting the still-formidable and nameless things that await him to be born and named germinate and blossom within him - rather than living out *his own strength*, which rests on the strength of his own life. who is also waiting...

(1 October) Last night it seemed to me that I was once again touching on the heart of the conflict - the same one I mentioned in general terms at the very beginning of Harvest and Sowing, eight months ago (in the section on 'infallibility (of others) and contempt (of self)', n° 4), and which I have

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(\*) The German word 'Unsicherheit' that came to me here has no equivalent in French, nor (I believe) in English. Its literal translation 'insecurity' can hardly be used to describe a psychological trait. The negative term "lack of confidence" is another makeshift approximation. It is understood that we are talking here about 'assurance' at a deep level, the lack of which can be perceived on certain occasions, while superficially the impression prevails of assurance, of perfect ease; they form a protective shell, of an inertia and a 'solidity' that are often considerable, foolproof...

(\*\*) At least in the ones I have seen so far.

(\*) There is a particular irony in the fact, moreover, that this *vision*, taken here from others as a 'halo' for himself, has in fact been scorned and systematically opposed since the 'death' of the master, by the very same person who appears to be the heir while at the same time setting himself apart and repudiating the inheritance. On this subject, see the three notes "L'héritier", "Les cohéritiers. . .", ". . . and the chainsaw" (n° 90, 91, 92); and for other illustrations, the procession X (Le Fourgon Funèbre), made up of the four "coffins" 1 to 4 and the

Gravedigger (notes n° 93 to 97).

found again 'in an extreme and particularly striking case', towards the beginning of L'Enterrement (in the note 'the knot', n° 65, 26 April). It was another unexpected encounter, in the course of a quotation that I ended up including in the wake of the other two, as a matter of conscience! I'd spotted the passage a few days ago when I was leafing through the famous booklet, and it struck me at the time, but I didn't stop to think about it. But yesterday, once I'd written it down in black and white, it immediately struck me as more meaningful, and more striking, than the two detailed passages I'd just copied down and which were supposed to form the main theme of the note I was writing. And yet there was no shortage of things that clicked in these two passages, giving rise to associations that, even four months a g o , I wouldn't have failed to develop over another ten pages, if not twenty. But it suddenly seemed to me that what I could have developed in this way was basically, with one exception at most, something *already known* that I found confirmed, perhaps from a slightly different angle, and above all: that they were *accessory* aspects in the end, the kind of aspect I had dwelt on sufficiently in the previous 'Compliments' note in May (and even throughout my thoughts on the Burial). The third passage, on the other hand, brought me back to something *essential*, and which I had tended to lose sight of throughout the long 'investigation' that was (among other things) my work on L'Enterrement.

I was tempted to leave it at that then, without at least trying to put into words what this single, pithy four-line sentence was saying to me, and which on one level was indeed 'heard'. In the end I ignored it. The words came slowly and hesitantly, while the impression, diffuse at first, became clearer as I wrote. Once I'd written it down in black and white, and pruned away what seemed unnecessary, I knew I'd identified what I'd 'heard' as well as I could.

It was getting prohibitively late, I really had to stop there. I went to bed happy, but not yet sure whether I would include what I had just written in my account intended for publication. After all, I could just as well leave it to the reader, if he was interested in going beyond the surface of a message, to find out for himself what *he* heard in it! It was only today that I realised that I would be including this passage, which expresses a certain perception or understanding that I have (or think I have) of something that seems to me to be important, and even crucial, as the mainspring of this Burial.

<sup>(106)</sup> (2 October) I would still like to pursue at least one of the associations of ideas mentioned above in the three-part Eloge Funèbre (from which I finally gave the full quotation yesterday). This association had occurred to me the day after 12 May, when I had just written the note "L'Éloge Funèbre (1) - ou les compliments" (n° 104). It touches on a certain aspect of things that often goes unnoticed, and which I only really began to realise five or six years ago.

Between the lines in the texts examined, we can see the cult of certain *values* asserting itself. For example, what is emphasised about Weil's conjectures, proven by Deligne, is their '*difficultré*'(\*) - not their *beauty*, their simplicity, the vast perspectives they opened up from the very moment they were enunciated by Weil. I'm also thinking of the fruits borne by these glimpsed perspectives, long before they were demonstrated, and of other glimpsed fruits that now fall at the right moment, once the last step has been taken in the long journey that led to their demonstration. It is the beauty, the extraordinary internal coherence of these conjectures, and the previously unsuspected links that they reveal, that have made them such a powerful and fertile source of inspiration for two generations of geometers and arithmeticians. The most profound part of my work (both the 'fully completed' work and the 'dream of motives') is directly inspired by them (through Serre, who was able to capture and communicate the full force of the vision expressed in his conjectures). Without them, neither A-adic cohomology nor even the language of topos would probably have seen the light of day. To put it better, this 'vast unifying vision' of (algebraic) geometry, topology and arithmetic that I set out to develop over a period of some fifteen years of my life, it was in these 'Weil conjectures' that I found a first and striking outline of it. And as the vision gained in breadth and maturity, it was this vision itself and the previously hidden things that it enabled me to grasp one by one, that told me step by step what to do, by which end to 'take' what was at hand. The final step in the demonstration of Weil's conjectures was neither

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(\*) (3 October) Difficulty described as "proverbial"! It makes little sense, except to impress those who are not in the know! The 'difficulty' of a conjecture can only really be appreciated once it has been demonstrated - it is its fruitfulness, on the other hand, that can be sensed from the outset, and which is often manifested objectively, even before it is demonstrated, by the work it has inspired. The 'great' conjectures are not distinguished from the others by their 'difficulty' (which is unknown - even supposing that the term has any meaning. . . ), but by their *fruitfulness*. I note in passing that this is a typically 'yin', feminine aspect of a thing, whereas 'difficulty' is a typically 'yang', 'masculine' value.

no more, no less, than *one* of the steps in a long and fascinating journey that began, I can't say when, certainly long before I was born, and which, even after I'm dead, will never be finished!

But following the spirit of the text quoted, one might think that Weil's 'conjectures' were a question of weights: here is the weight to be lifted 'à l'arrachée'! Two hundred kilos is no mean feat, the difficulty is proverbial, many have tried and not one has succeeded - until 'H-day' (like 'Hercules')! The result is astonishing ( $^{10^6} 1$ ), just look at the two quintals - no one would have believed they'd ever manage it. ...

The same spirit can be seen in the laconic commentary on the "difficult theorem" proved by Faltings: here again, in the very designation of this new stage in our knowledge of things, it is the *difficulty* again that is highlighted, to arouse the admiration of the crowds - not the prospects that open up, once a new summit has been reached(\*). It did not even seem useful to mention the name 'Mordell conjecture' (unknown, it is true, to a non-mathematical public) - as if the apprehension and the formulation of the conjecture (here, by Mordell) were an accessory, because 'easy'. Instead, there is an empty perspective on 'Fermat's theorem' (which is supposed to be 'enlightened'). It is true that the latter is universally known (even outside mathematical circles) as a weight of well over three hundred kilos (which has withstood three centuries of effort).

The first point I wanted to make is that the values extolled in these texts (with all due discretion, of course) are those that can be called the *values of muscle*, of the 'cerebral muscle' in this case: the one that makes it possible to surpass proverbial 'difficulty' records by sheer strength of wrist.

These are not just the values of the hero in the spotlight here, like those of the author of a certain jubilee brochure (an anonymous author whom I think I recognise). They are also the values that increasingly (it seems to me) dominate the world of mathematics and, more generally, the world of science. Even beyond this world, which is still relatively small, we can say that it is also, and increasingly, the values of

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(\*) What struck me most, from the moment I held in my hands Faltings' preprint in which he proves three key conjectures, including that of Mordell (discussed here), was the extraordinary *simplicity* of his approach, by which he proves in some forty pages these results that were supposed to be "out of reach"! (Compare note n° 3.)

of a certain 'culture', described as 'Western'(\*). Nowadays, this 'culture' and its values have long since conquered the surface of our planet, wiping out all the others as irrefutable proof of their superiority. The planetary symbol, the heroic embodiment of these values, is the cosmonaut in his watertight armour, the first to set foot on some unimaginably remote and desolate planet, in front of millions of transfixed television viewers.

These values, which in the absence of a closer definition I have limited myself to using a summary term with symbolic value, 'muscle', are not new. In ethnologist's jargon, we could also call them 'patriarchal'. One of the first written texts, it seems to me, in which their primacy is forcefully affirmed (force without reply!) is the Old Testament (and more particularly, the book of Moses). However, it is enough to read this fascinating document from a remote era to realise that the primacy of 'patriarchal' values, that of man over woman, or that of the 'spirit' over the 'body' or over 'matter', was far from going so far as to negate or despise complementary values (which were perhaps not yet perceived as 'opposing' or 'antagonistic')(\*\*). I don't know if the history of the vicissitudes of these two sets of complementary values has ever been written - and it must be a fascinating thing to pursue this history, through centuries and millennia, from the time of Moses to the present day. It is also the story, no doubt, of the gradual deterioration of a certain balance of 'values', 'patriarchal' or 'masculine' on the one hand, 'matriarchal' or 'feminine' on the other - of 'muscle' and 'guts', of 'spirit' and 'matter'; This degradation has clearly been in the direction of 'male' (or 'yang', in traditional Eastern dialectics) values, to the detriment of 'female' (or 'yin') values.

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(\*) When I refer here to the 'values' of our culture as they appear today, I mean of course the 'official' values - those conveyed by schools, the media and the family, and which are the subject of a general consensus in various professional circles. This does not mean that these values are unreservedly accepted by everyone, or that they form the basis of everyone's attitudes and behaviour. Moreover, it is with distress that honest people, the media and competent professional literature (written by educators, sociologists, psychiatrists, etc.) talk about "certain young people" in particular, who definitely don't fit in and who don't fit in with a certain picture!

(\*\*) The cult of the mother is a tradition deeply rooted in Judaism, which has always been a source of inspiration. This tradition is found, in a modified and more exalted form, in the Catholic tradition, with the cult of (the Virgin!) Mary. This tradition is found again, in a modified and more exalted form, in the Catholic tradition, with the cult of (the Virgin!) Mary.

It seems to me that our era is characterised by an excessive exacerbation of this cultural degradation. Among the latest acts in this story are the in-tandem 'space race' between the two antagonistic superpowers (imbued with essentially identical values), and the arms race (nuclear in particular). As the final act and probable outcome of this headlong rush to outdo each other in terms of a certain type of 'force' or 'power', we can already foresee some kind of nuclear holocaust (or other, there's an embarrassment of riches to choose from...) on a planetary scale. Perhaps it will have the merit of solving all the problems at once and once and for all. ...

My aim here, however, is not to paint a tantalising picture of the 'end of the world' (they didn't wait for me to do that), and even less to wage war against 'muscle' or 'brain' (aka 'mind'). I'm well aware that even my 'guts' would have nothing to gain from it! I value my muscles and my brain, which are no doubt very useful to me, just as I value my 'guts', which are no less useful. Rather, I think it would be useful to say a few words here (if I can) about how this deep conflict between these two types of values, conveyed by the surrounding culture, has played itself out in my own person. In more down-to-earth terms, it's also about the history of my attitudes (of acceptance or even exaltation, or rejection) towards two equally real and tangible *aspects* or *faces* of my person, inseparable and complementary by nature, and in no way antagonistic in themselves. I could call them '*the man*' and '*the woman*' in me, or also (to use less 'loaded' names, and which therefore offer less risk of misleading), the '*yang*' and the '*yin*'.

It would seem that for most people, the 'game is up' from early childhood, when the essential mechanisms are put in place that will silently dominate our attitudes and behaviour for the rest of our lives, with the efficiency of a perfectly tuned automaton. At the heart of these mechanisms are those of affirmation or rejection of such and such traits within us, or of such deep-seated drives, with either a yang or yin 'signature', or of such and such 'bundles' of traits and drives with a given signature, or even of the whole 'yang' or 'yin' bundle. It is these mechanisms which, to a very large extent, determine all the other choice mechanisms (affirmation or rejection) structuring our 'self'.

For reasons that are still a mystery to me, in my own case the story

of the relationships (both conscious and unconscious) between the 'T' ('the boss') and the 'male' and 'female' in me (both in the 'boss' himself and in the 'worker', who are both dependent on the double yin-yang aspect of all things) - this history has been more eventful than usual. I can distinguish three periods. In a way, the last period is similar to the first, which spans the first five years of my childhood. This third period, which I can call that of *maturity*, can be seen as a kind of 'return' to that childhood, or as a gradual reunion with the '*state of childhood*', with the harmony of the uneventful marriage of 'yin' and 'yang' in my being. This reunion began in July 1976, at the age of forty-eight - the same year that I discovered (three months later) a hitherto unknown power within me, the power of meditation(\*)).

The dominant values in each of my parents, both my mother and my father, were yang values: willpower, intelligence (in the sense of intellectual power), self-control, authority over others, intransigence, 'Konsequenz' (which means, in German, extreme consistency in (or with) one's options, ideological in particular), 'idealism' in both political and practical terms... In my mother's case, this valorisation took on an exacerbated force from a very young age; it was the flip side of a genuine hatred she had developed towards 'the woman' in her (and from then on, towards the feminine in general). This hatred in her ended up taking on a vehemence and force all the more destructive because it remained entirely hidden all her life (I myself ended up discovering these things only five years ago, three years after meditation appeared in my life). In such a parental context, it is a mystery (and yet a fact that is beyond doubt for me) that I was able to develop fully during the first five years of my childhood - until the moment when I was uprooted from my parental environment and my family of origin (made up of my parents, my older sister and myself) was destroyed by my mother's will and the political events of 1933 (so to speak).

(<sup>106</sup> 1) (3 October) Neither I nor Deligne have ever had the slightest doubt that Weil's conjectures might not be valid, and I don't recall anyone expressing such doubts. Describing the 'result' (i.e. the demonstration of these conjectures) as 'surprising' again shows a deliberate intention to impress. Moreover, at

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(\*) See the two sections "Desire and meditation" and "Wonder", n° s 36 and 37.

At no time since the introduction of "topology" and scalar cohomology did I feel that these conjectures were out of reach, but rather (from 1963 onwards) that they were bound to be proved in the very next few years. When I left in 1970, I had little doubt that Deligne, who was in the best position of all for this, would soon prove them (which he did), at the same time as the stronger "standard conjectures on algebraic cycles" (which, on the other hand, he set out to discredit).

Deligne is right to express reservations about the validity of these conjectures, and I am no more convinced of them than he is. But the significance of a conjecture does not depend on whether it turns out to be true or false, any more than its so-called 'difficulty' makes it 'out of reach' - which is entirely subjective. It depends solely on whether the *question* on which the conjecture puts its finger (and which had not been perceived before it was posed) - whether this question touches on something truly essential for our knowledge of things. It is obvious (to me at least!) that there can be no question of having a good understanding of algebraic cycles, or of the so-called 'arithmetic' properties of the cohomology of algebraic varieties (or even of the 'geometry of motifs'), as long as the question of the validity of these conjectures has not been settled. Even today, as at the Bombay Congress in 1968, I consider this question, along with that of the resolution of singularities, to be one of the two most fundamental questions in algebraic geometry. I am well aware of the significance of both! This potential fruitfulness cannot fail to manifest itself, as soon as we no longer limit ourselves to bumbling around a conjecture that has been declared 'too difficult', and someone finally takes the trouble to roll up their sleeves and get to grips with it!

(<sup>107</sup>) (4 October) I have already had occasion to mention an important aspect of these first five years of my life, as a 'privilege' of great price(\*): a deep and unproblematic identification with my father, which has never been touched by fear or envy. I became aware of this circumstance, and of the very existence, as well as the silent strength, of this identification with my father, only four years ago (during the meditation on my childhood and my life that followed the one on my parents from August 79 to March 80). This identification was like the peaceful and powerful heart of an identification

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(\*) See the note "The massacre", n° 87.

to the family we formed, my parents, my sister (who was four years older than me) and me. I had boundless admiration and love for both my father and my mother. For me, they were the measure of all things.

This in no way means that my attitude towards them was one of automatic approval, of blissful admiration. I probably didn't know that they were the measure of all things for me, but I knew full well that they were fallible like me, and there was no fear in me that would have prevented me from noticing a disagreement and expressing it clearly. In the conflicts that surrounded me, I wasn't afraid to take sides in my own way. This had nothing to do with a certain faith, a certain assurance that formed the deep, unshakeable foundation of my being - rather, it flowed spontaneously from that faith, from that very assurance.

Sometimes my father, in fits of impotent anger when my sister (without seeming to) took pleasure in provoking him, would hit her brutally - and each time I was outraged, in an outburst of unreserved solidarity with my sister. I think these were the only big clouds in my relationship with my father (there were none with my mother). It's not that I approved of my sister's sometimes dodgy tricks, nor do I think they really troubled me - *she wasn't* the measure of things for me, her tricks (the reason for which surely escaped me just as much as it did my father, who always 'worked', or my mother, who was never careful to intervene either before or after) - in a sense these tricks didn't really have any consequences for me. She was my sister, she was just the way she was, that's all. But for *my father* to indulge in such blind brutality...

The three people who were closest to me, who together formed the matrix of my early years, were torn apart by the conflict between each of them and themselves, and between each of them and the other two: the insidious conflict, with its impassive face, between my mother and my sister, and the violent conflict between my father and my mother on the one hand, and my sister on the other, each of whom, on her own account (and without anyone alive of my parents ever having pretended to notice), was working her footsteps... The mysterious, extraordinary thing was that, surrounded by conflict in this way during those most sensitive, crucial years of my life, it remained *outside* me, that it didn't really 'bite' into my being during those years and settle there permanently.

The division in my being, which has marked my life as much as anyone else's, didn't take root in those years, but in the two or three years that followed, from my sixth birthday onwards.

in my eighth year or so. At a certain point (which I thought I could pinpoint to within a few months of my eighth birthday) there was a certain *turning point*, after more than two years of separation from my parents (who didn't bother to give me any sign of life) and from my sister. It was above all a *break with my childhood*, 'buried' from that moment onwards by effective mechanisms of forgetting (which have remained in place, more or less, to this very day). At some deep level (not the deepest, though...) my parents were then declared by me to be 'foreigners', just as my childhood was now declared to be 'foreign'. I *gave in*, in a sense: to be accepted in the world that now surrounded me, I decided to be like 'them', like the adults who made the law there - to acquire and develop the weapons that command respect, to fight on equal terms in a world where only a certain kind of 'strength' is accepted and prized.... In fact, it was this kind of strength that was preferred by my parents, who surrounded me in my early years. And here I come back to this 'mysterious thing' (from which I've just distanced myself, following the thread of another association aroused by this thing), the *absence of division in me*, in those first years of my life.

Perhaps the mystery for me no longer lies in this absence, but rather in this: that my parents, both my father and my mother, should then have *accepted* me *in my totality*, and totally: in what in me is 'virile', is 'man', and in what is 'woman'. Or to put it another way: that my parents, both torn apart by conflict, each denying an essential part of their being - each incapable of a loving openness to themselves and to each other, as they were of a loving openness to my sister... that they should nevertheless have found such an openness, such an unreserved acceptance, towards me, their son.

To put it another way: at no time in these first five years of my life have I felt *ashamed of who I am*, whether in my body and its functions, or in my impulses, inclinations and actions. At no time have I had to deny anything about myself in order to be accepted by those around me and to be able to live in peace with them.

Of course, there were times when I did things that didn't 'fit'; like all children I was bound to be a pain, even unbearable when I got down to it - and it was clear from time to time that I needed to put things right. I didn't lay down the law, nor was I tempted to do so, because I didn't have to compensate for some secret mutilation. And in my parents' love for me, there could have been no room for adulation, for indulgence in whims - for

unconditional approval. But while I was bound to be 'sent packing' by my father or my mother (just as the reverse could sometimes happen), in those years neither of them ever made me feel ashamed of anything I did or behaved in a way that didn't please them.

Against the backdrop of a deep and unambiguous identification with my father, I now see myself as a child, imbued with both virility and femininity, both strong.

It seems to me that in each being and in each thing, in this indissoluble and fluctuating marriage of the yin and yang qualities within it that make it what it is, and whose delicate balance is the profound beauty, the harmony that lives in this being or this thing - that in this intimate union of yin and yang there is often (perhaps always) a background note, a 'dominant', which is either yin or yang. This background note is not always easy to detect in a person, because of the more or less effective and complete mechanisms of repression, which distort the game by substituting a borrowed image for an original harmony. So my 'brand image' for forty years was almost exclusively masculine

- without ever being questioned or even detected as such, either by myself or (it seems to me) by others, until I was forty-eight. I tend to believe, however, that the background note present at birth remains present throughout life, at least in deep layers that will perhaps never find the opportunity to come to light. In my own case, strangely enough, I still can't say what this dominant note is, the one that permeated my early childhood and was 'mine' even at birth. Various signs have made me suspect on more than one occasion that this note is 'yin', that it is the 'feminine' qualities that dominate my being, when it finds the opportunity to manifest itself spontaneously, in the moments when it is free of all kinds of conditioning that have accumulated in me since childhood. To put it another way: it could be that what is the creative force in my body and mind, what I have sometimes called 'the child' or 'the worker' in me (as opposed to the 'boss' who represents the structure of the self, i.e. what is conditioned in me, the sum or result of the conditioning accumulated in me) - that this force is even more 'feminine' than 'virile' (whereas by nature and necessity it is both).

This is not the place to go into all these 'signs'. The important thing is *not* whether this deep dominant note in me is 'feminine' or 'virile'. The point is

Rather, that I know how to *be myself* at every moment, welcoming without reticence both the traits and impulses in me by which I am "woman" and those by which I am "man", and allowing them to express themselves freely.

When I was a child, in those early years, it wasn't unusual for strangers to mistake me for a girl - without this ever creating the slightest unease or feeling of insecurity in me. I think it was mainly my voice that had this effect, a very clear, high-pitched voice - not to mention the fact that I had long hair (usually dishevelled), perhaps simply because my mother (who had plenty of other things to worry about) didn't often take the time to cut it for me. Besides, I was as strong as a bull and I didn't mind a bit of violent or daredevil play, which didn't prevent me from having a penchant for silence, even solitude, and a penchant for playing with dolls (\*). I don't remember anyone making fun of me for this, but it certainly happened here and there. If such incidents passed without leaving any trace of injury or humiliation, it's surely because they were not echoed or amplified by any feeling of insecurity in me, whereas the acceptance of who I was by those who were the only ones who really mattered to me was beyond question. Mockery could never have reached me; it could only have been directed at the person who must have seemed so foolish to pretend to find fault with the most natural thing in the world.

I was well aware, moreover, that this kind of rather strange silliness is by no means an uncommon occurrence, and that the mere sight of nudity can cause scandal! Yet for as long as I could remember, I had seen my mother, father and sister naked, and had every opportunity to satisfy my legitimate curiosity as to how each of them and myself were made. It was quite clear that there was no cause for scandal in the conformation of men or women, which seemed to me to be just fine as it was - and more particularly (I made no secret of it) that of women.

(<sup>108</sup>) (5 October) It was in 1933, when I was in my sixth year, that the first crucial turning point in my life took place, which was at the same time a crucial turning point in the lives of both my mother and my father, in their relationship to each other and to

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(\*) If this tendency seems rare in little boys, I think it's mainly because it's systematically discouraged by those around them.

their children. It was the episode of the violent and definitive destruction of the family that the four of us formed, a destruction of which I was the first and only person, forty-six years later, to acknowledge and follow the events, in my parents' correspondence and in one or two exsanguinated, enigmatic and tenacious memories, patiently probed and deciphered - long after the death of my father and that of my mother(\*)).

It is not my place to dwell here on what I have learned and understood in the course of this long work, about the significance and meaning of this episode. Three days ago I already alluded to this turning point(\*\*) as marking the abrupt end of the first of the three great periods in the history of the marriage of yin and yang in me. In December 1933, I found myself hurriedly dumped into a foreign family that neither I nor my mother, who had brought me there from Berlin, had ever seen. In fact, these unknown people she was taking me to were simply the first people to come along who were willing to take me in as a 'boarder' for a very modest pension, and with no guarantee whatsoever that it would ever be paid, while my mother prepared to join my father, who was moping around waiting for her in Paris. My parents had agreed that everything would work out for the best, both for me in Blankenese (near Hamburg) and for my sister, who for a few months had been dumped at the end of the line in an institution in Berlin for handicapped children (where she had been well looked after, even though she was no more handicapped than I or our parents).

At the end of six strange months, heavy with dull menace and anguish, I found myself overnight in a world totally different from the only world I had known in my life, the one formed by my parents and my sister and me. I found myself as one of a group of boarders, eating separately from the family and looking like second-class children to the children in the house, who formed a world of their own and looked down on us. I received a hasty, stilted letter from my mother from time to time, and never a line from my father in the five years I stayed there (until 1939, on the eve of the war, when I finally rejoined my parents under the pressure of events).

The couple who took me in quickly took a liking to me. He, a former pastor

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(\*) My father died in Auschwitz in 1942, my mother in 1957. The work I'm talking about here took place between August 1979 and October 1980.

(\*\*) See the end of the note "Yang buries yin - or muscle and guts", n° 106.

who had left the priesthood and lived on a meagre pension and private lessons in Latin, Greek and mathematics, and his lively and sometimes mischievous wife, were unusual people, endearing in many ways. He was a humanist of vast culture who had lost his way a little in politics, and had run afoul of the Nazi regime, which eventually left him alone. After the war I got back in touch with them and remained in regular contact with them until both died(\*)).

From him and especially from her, as from my parents, I received the best as well as the worst. Today, with the benefit of hindsight, I am grateful to them (as I am to my parents) for the 'best', as well as for the 'worst'. It was the best and the worst I received, first from my parents, then from them, that formed the bulk of the voluminous 'package' I received as a child (just as everyone receives theirs. . . ), which it was up to me to unpack and examine; they are part of the substance, the richness of my past, from which it is up to me to nourish my present.

My new environment was very 'proper' and conformist in many respects, with the usual repressive attitudes to everything to do with the body and, more particularly, sex. But it took several years, I think, for me to internalise and take on board these attitudes, such as the shame of showing myself naked, which went hand in hand with an ambiguous relationship with my body. This shame, inculcated from an early age, is one aspect of a deep-seated division, in which the body is the object of tacit contempt, while so-called 'cultural' values (confused with the intellectual capacity to memorise and so on) are given pride of place. This division in me remained ignored until my forty-eighth year, when it began to be resolved. This was the second great turning point in my life, marking the advent of the 'third period' in the history of my relationship with myself, that is to say, also my relationship with my body, and with the 'man' and 'woman' in me. But before that I had ample opportunity to help pass on this division to my children (\*), whom I've seen pass it on in their turn...

I alluded yesterday(\*\*) to the 'changeover' that finally took place within me. With a

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(\*) She died at the age of 99, two years ago, and I was able to see her dead again, face to face with her, the day before the funeral.

(\*\*) At least, to the four of them that I helped to raise. The fifth and last was raised by his mother, and so far we haven't had a chance to get to know each other.

(\*\*\*) See the beginning of the previous note "Hatching of strength - or weddings", note no.° 107.

With a time lag of more than two years after the uprooting from the initial family environment (or better said, after the *destruction* of this environment), this change of direction consecrates the setting up of the current repressive mechanisms, from which my childhood had until then had the rare good fortune to be exempt. I have so far identified two major forces of a repressive nature, which have dominated my adult life and much of my childhood (<sup>108</sup> 1). I think I can say that they did not appear gradually, but that in my case these mechanisms appeared more or less overnight and in all their force, as the consequence of a deliberate *choice*, at an unconscious level. I described this choice earlier as 'abdication', but at the same time it was also a powerful principle of action: 'I'll be like 'them" (and not 'like me') also meant: I'm going to 'bet' on 'the head', no worse in me than in anyone else after all, and fight and 'them' with their own weapons!

One of these mechanisms, and the one I'm most interested in here, is one of the most common: the *repression of my 'feminine' traits* (or those perceived as such by common consensus), in favour of 'masculine' values. The other side of the coin was, of course, the complete reversal of my 'manly' traits and aptitudes and the over-development of these, which took on an inordinate amount of importance.

If there's something unusual here, it's not of course the simple *presence* of this double mechanism, nor (it seems to me) the strength of the 'repressive' component in the strict sense, the strength of the repression of 'yin' traits, attitudes and impulses. There's no comparison here with what happened to my mother, whose life (and that of her family) was devastated by her hatred (which remained hidden all her life) of what made her a woman. At no time, I think, were my ways entirely devoid of a certain gentleness, even tenderness, which stubbornly rounded out the character I had carved out for myself as a child, and which often attracted sympathy and affection. The exceptional side of me is more likely to be found in the *excessiveness* of my investments, in the excessiveness of the energy I invest in my tasks, without allowing myself to be distracted by a glance to the right or to the left! Outside of the work itself, my mind is constantly focused on accomplishment, on completing this or that stage of the work. This attitude ("Zielgerichtetheit" in German, "aimdirectedness" in English) is par excellence a yang attitude, an attitude of *tension*, of *closure* to everything that doesn't appear to be directly linked to the task.

This excess was likely to conjure up in others the image of a kind of 'super-man' or 'superwoman'.

"This image is certainly admirable (given current values), but it immediately arouses (at a level that remains unconscious for the most part) instinctive reactions of defence or even antagonism in the face of such a display of strength, perceived as threatening or even aggressive, or in any case dangerous (<sup>108</sup> 2). Above all, this image irresistibly evokes the image of the '*super-father*', and immediately sets in motion the ambiguous multiplicity of reactions of attraction and repulsion built around the age-old conflict with the father. ... This is where MU has a contribution to make in these relationships of *ambiguity*, which have been so common in my life, and with which I found myself confronted so many times in the course of Harvest and Sowing. This ambiguity is reinforced, not diminished, by the persistence of yin traits in me that fuel a sympathy that the mere hypertrophy of yang traits into a kind of gigantic 'superman' would be powerless to arouse.

And once again I can see, in these endless 'relationships of ambiguity', that I'm only reaping what I've sown myself, even if each time the harvest turns out to be unexpected (and unwelcome...)! For hasn't the motivation (or at least *one of* the motivations) that drives 'the boss' in me to constantly surpass himself in the accumulation of works, been precisely to constantly force and boost the esteem of my peers (in the first place) and of my mistakes (moreover); to hear some of the best lament that they can't keep up with me, at the rate I'm going! Yes, there has indeed been in me this secret desire to arouse in others (as in myself) this 'larger than life' image, disproportionate - like the very person it reflects - and which obstinately comes back to me through the other: in clear and lofty words, through the praise expected (and taken as a due) - and *also*, through the obscure and deep channels of muted enmity and conflict. ... (\*)

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(\*) (6 October) To tell the truth, 'this secret desire' that I've just put my finger on again, is not yet consumed today, even if it has finally been detected (just a few years ago...), and if it is less all-consuming today than it was in the past.

(<sup>108</sup> 1) (6 October) What I mean is that the forces of a repressive nature that have played a part in my life seem to take mainly, if not exclusively, one of two specific forms burying the past, and emphasising my 'virile' traits to the detriment of my 'feminine' traits. I don't mean to say that these two 'forces', both repressive in nature (i.e. aimed at 'repression', at suppressing a certain reality), are the only ones that have 'dominated my life'! This would be to forget the whole non-egotic aspect of my being, the drive for knowledge expressing itself at the level of the body as well as the mind (on this subject, see in particular 'My passions', section n° 35).

Even among the forces structuring the ego, emanating from the 'boss', there is at least one that is not in itself repressive, that predates the forces of repression and whose role in my life was even more essential: identification with my father, who was like the 'peaceful and powerful heart' of the feeling of my own strength. This identification was in no way an exaltation of certain values or qualities (let's say virile) to the detriment of others ('feminine'). Irrespective of the values my father professed, his personality (until 1933, when a shift took place within him(\*)) was marked by a strong yin-yang balance, in which intuition and spontaneity were no less important than intellect and will.

Finally, as another important 'force' of an egotistical nature, intimately linked to the repressive mechanisms (or, to put it better, of a 'repressive' nature itself), there is the eternal *vanity*, which has played as heavy a role in my life as in anyone else's. But this 'force' is so universal in nature, just like the dominant role it plays in everyone's life (in more or less coarse or subtle form), that there is hardly any need to mention it. But this 'force' is of such a universal nature, as is the dominant role it plays in everyone's life (in a more or less coarse or subtle form), that there is hardly any point in including it expressly in a survey of the specific forms taken in a person by the forces and mechanisms that structure the ego and give it its particular physiognomy and foundation.

(<sup>108</sup> 2) (6 October) There is no "aggressive" intention in this "deployment of force".

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(\*) Remarkably, this 'shift' in my father (then aged 43) was towards a *super-yin* state, towards a kind of pasha-like passivity, in close connivance with my mother, who played a super-yang role. She took charge of him instead of her children (they were written off, at least until 1939, the year when, under the pressure of events and against her will, she finally took me back to her. . .). ) This relationship of dependence on my father and the yin-yang role reversal between my parents lasted until my father died in 1942.

in the usual sense of the word, neither conscious nor unconscious, just an unconscious desire to impress, to force esteem. It's true that the term "forcing esteem", which comes back to me spontaneously, already carries a connotation of *constraint*, close to that of "aggression". This unconscious intention to coerce, also perceived at an unconscious level, must often be experienced as a kind of aggression (even though this experience remains hidden, as do the antagonistic reactions it triggers). At the same time, this experience is often confused with similar childhood experiences involving the father, who appears as the main repressive authority figure, or even as a crushing rival, envied and hated.

Even without such an amalgam, and independently of any perception on the part of others of an intention of 'constraint' in me, there must often be the perception of a strong *imbalance*, a fundamental disharmony, in this exclusively yang 'deployment of force' (in its spirit and intention, at least). This disproportion is harmful to the main person concerned, myself, and in fact 'dangerous' to his very physical survival (as the health incidents of recent years have clearly shown me!). This is undoubtedly what I was thinking about when I wrote that 'such a display of force' was felt 'in any case to be dangerous' - dangerous 'by nature', an example not to be followed . . . ! Such a feeling is surely enough to provoke "defensive reactions", even in the absence of any aggression or intention to aggress.

It is true that such relations of ambiguity recurred after 1976, with some of my students in particular, at times when all mathematical investment was absent, and when there was no apparent 'deployment of force' in my life. It's also true that the 'displays' in question in the *past* have created a *reputation* which continues to stick to me, especially in my professional life, and which to some extent replaces the perception of who I am *in the present*. What's more, I've acquired such an ease in dealing with certain mathematical subjects that, even outside my mathematical periods and with the help of my reputation, this ease or natural mastery can already have the effect of 'deploying force' on unmotivated students, and make them feel me (despite certain pleasant or even reassuring features) as a kind of Superman (a bit Superpere around the edges!).

Moreover, as a flip side of the ease I'm talking about, I often tend to underestimate the difficulty that a particular student may have in acquiring a particular set of skills, or in developing a particular ability.

This tends to place him at odds with my expectations. (On this subject, see the note "Failure to teach (1)", n° 23 iv.) Such a situation must quite often be one of the important ingredients of a false relationship with the father. ...

(<sup>109</sup>) (9 October) When I finished the previous note(\*) four days ago, I felt very happy. I found myself unexpectedly reconnecting with an intuition that came to me on a certain Sunday 17 October 1976 (eight years ago, give or take a few days) - the intuition of the devastating effect, in my life and in my mother's, of a 'certain force' within me. It was the first time in my life that I had given any thought, however brief, to what my life, and above all my childhood, had been like. It was also the day after I had discovered the power of meditation (\*\*), and it was the first time since then that I had made use of this power, so long ignored. It was not by design, but by the effect of a profound impulse, as if moved by a very sure instinct, that the reflection that day ended up being directed towards my childhood. Only in retrospect can I appreciate the extent to which it was the source of my true strength, as well as of the conflict and division within me, that a deep need to know had carried me to that point. For nearly three years I never returned to it, distracted as I was by the 'order of the day' during those years, without realising that I was remaining on the periphery of the conflict in my life, while stubbornly staying away from the heart of it: from that childhood drowned in mist, which seemed so infinitely far away...

I have just gone through again, 'diagonally', the eighteen exceptionally dense pages of this crucial meditation in my life. It was during the night that followed this meditation, or rather in the early hours of the morning after this night of meditation, that I had a dream of overwhelming force - the first dream in my life whose message I probed passionately. I was no more aware then of where I was going and what was happening than I had been the day before when I was "discovering meditation". For four hours I delved into the meaning of this experience, this dream-parable, through successive layers of increasingly burning meaning, before arriving at the heart of the message, its simple and obvious meaning.

It wasn't the sudden trigger of an understanding of 'intelligence', or even of the 'intelligence of the world'.

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(\*) See the note "Yang buries yin - or the Superfather", n° 108.

(\*\*) See the section "Desire and meditation", n° 39.

like a sudden light in a darkness or half-light. It was more like a deep wave born in me that suddenly swept through me and in its vast waters brought me a meaning that had eluded me until then: that I was at this moment reunited with a very dear and precious person, whom I had lost since childhood...

That moment felt like a *birth*, like a profound renewal. This feeling remained very strong throughout that day, and again in the days that followed. Looking back over eight years, that moment still seems to me to be the most creative moment of all in my life, and an essential turning point in my spiritual adventure. It had certainly been prepared for by many other 'moments' in the days and months leading up to it. Perhaps the first precursor was that 'salutary uprooting', more than ten years earlier, from an institution where I intended to end my days (\*). These earlier moments seem to me to be the ingredients, or rather the *means* at my disposal, with which I was able to cross this other 'threshold' that was before me without my even noticing it, which was at a deeper, more hidden level than others I had crossed. Everything was in place, for a few days or hours, for me to cross it - and I could cross it, just as I could not cross it, day after day for the rest of my life...

And also, with this threshold well and truly crossed, the way was opened towards other *fran-chissements* still, towards other 'awakenings' or '*réveils*', each of which by its very nature is also a renewal, and to some extent, a 'new birth', a re-birth. I've avoided some of them for months, even years, before finally taking the plunge, relieving myself of some nagging illusion that had stood between me and the full flavour of my life and the world around me. And I'm sure there are some I'm still avoiding as I write these lines.... .

From the point of view of my reflections over the last few days, it is this moment of reunion with my childhood, thought to have been lost and dead for a long time, which marks the end of the 'second period' of my spiritual journey: that of the predominance, in my personal life, of *egotistical mechanisms*, against the creative forces, the forces of knowledge and renewal, which had gone through an almost complete stagnation of forty years. It was also a time when a 'certain strength' prevailed, a strength that was almost exclusively 'virile' in character, in the image of the values in vogue in the surrounding world, at the expense of the 'masculine'.

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(\*) See note no.° 42, of the same name.

the deep 'feminine' aspects and strengths of my being, ignored and repressed (with never complete success, thank God!).

The very first intuition about the destructive nature of this force, which had dominated my life as well as my mother's, and that of other women who had been important in my life - this intuition made a brief appearance during these days of intense maturation, thanks no doubt to the resurgence of yin, 'feminine' energy, in my conscious apprehension of things. Contrary to what I thought I'd hastily remembered earlier, this appearance didn't take place in the meditation on the eve of the reunion, but a few hours afterwards, in a short meditation on the meaning of what had just happened. The intuition was born and took shape at the very end of the few pages of notes in this meditation. I saw the destructive nature of this 'force' (which today I would call 'superyang force', i.e. excessively yang-dominant) first in my mother, then in other women, and then in these final lines:

"As for the "strength" in myself, it was certainly this that made me the target and object, expected throughout a young life, of the secret hatred and resentment of M., then of J., then of S. - a hatred deposited in them long before they knew of my existence, in the distraught days of a childhood deprived of love".

The word 'childhood', in the last line again, which bears witness to an important day in my life, appears for the last time for almost three years! As for the intuition about the nature of the superyang force in me, as a provoker of antagonistic reactions, even hatred and resentment, it tended (it seems to me) to sink into oblivion until the last few days. More precisely, it remained present only in my perception of certain important relationships in my life (and above all, relationships with women I've loved). On the other hand, it hasn't really penetrated situations of conflict that are a bit 'mainstream' (\*), with certain students in particular, as I've had to examine or evoke many times in the course of Harvest and Sowing. During all this reflection, the fact that, by a sort of involuntary 'provocation', I myself had made my own contribution to the conflict situations I was evoking or examining here and there

- this fact has often remained completely hidden, whereas the contribution of the protagonist

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(\*) Or treated as such. ...

was quite clear to me. This is of course a very common reflex, not to say universal! The reflections I've had over the last few days have managed to defuse it and, at the same time, to make me see it again in myself - by suddenly bringing me face to face with myself - with a *certain* me, at least - at the bend in the road (of a reflection on yin and yang...).

My brief reflection of four days ago barely scratches the surface of the many aspects of myself through which the yang imbalance in the 'persona' I'd played since childhood was felt; and the crushing effects this imbalance could sometimes have on others. On those in particular where the yang-type strength was still lacking - and first and foremost on my own children. I'm thinking here above all of a certain 'mode' of peremptory assurance on which I operated, in all the things (and there were many of them) about which I had, rightly or wrongly, a way of seeing or feeling, or strong opinions. Of course, the idea would never have occurred to me to impose these ways of seeing on anyone, least of all on my children - and because of this absence of any desire for constraint in me (at least on a conscious level), I was unable for most of my life to realise the extent to which these ways of being in me (which seemed spontaneous and natural to me, and whose complex nature I was far from understanding....) - to what extent they have the same effect on my children and others as a constraint; or rather, an even more insidious effect: that of arousing or maintaining in others an insecurity about the value of their own feelings, ways of seeing, opinions - as if these (in the face of my unfailing assurance, even my pained astonishment) didn't even have *a place*.

I have a feeling that the development of this propensity in me, particularly in my relationship with my children, could well be quite complex, intertwining intimately with the vicissitudes of my married life. This is not the place to try and unravel the mysteries. nor to make a more or less complete inventory of the other aspects of my person through which this imbalance manifested itself, of which I tried in the previous note to identify one particularly apparent aspect: that of the 'deployment of force'.

It would be wrong to think that this imbalance, cultivated over a lifetime, and the multitude of psychic mechanisms through which it manifested itself, disappeared overnight as if by magic. I wasn't expecting anything of the sort, either in this case or the next.

day of the reunion, nor in the days and weeks that followed.

(10 October) These were days of melting ice, carried along by a powerful influx of new energy - days of inner work and wonder at the new worlds I saw opening up day after day, taking shape in the humble weave of everyday events and unfolding under the intense action of eyes eager to see. These were also the days when I began to feel the first inkling of the richness of this unknown that was suddenly calling out to me, that I had ignored just the day before. I apprehended it through these 'bits' that had just made themselves known to me, in the very moment of the reunion, and in the unpredictable and unforeseen journey that had followed. I felt that this 'birth' through which I had just passed was just the *beginning* of something entirely unknown, or rather the *recommencement* of something that had been interrupted, cut off or stifled one day, and then mysteriously set off again. To tell the truth, this intense 'coming' had already started up again in the preceding months, but at a level where introspective *thinking* had hardly played a part.... .

One of the profound aspects of this becoming that had come to life again, of this work that had resumed, was the gradual restoration of the original balance of 'woman' and 'man', of yin and yang in me, over the days, weeks and years. In a way, I can say that since the moment of the reunion, 'childhood' or the state of being a child has remained present, 'in power', through a deep and indelible knowledge within me of my own nature, of my essential, indestructible *unity*, beyond the effects of a certain 'division' that often continues to agitate the surface of my being. The very word 'child' or 'childhood' to designate this *thing*, this unity of being, did not appear until years later, around the time when I began to become acquainted, at the level of conscious thought, with the double yin-yang aspect of all things. This was also the moment when the knowledge (or at least the presentiment) emerged that the state of childhood, the creative state, is that of the perfect balance of yin and yang forces and energies, that of the 'marriage' of yin and yang, manifesting itself in a state of creative harmony.

It seems to me that at a certain level, this knowledge of my fundamental unity is present at all times, and that it *acts* at all times. It is also true that this action is more or less sensitive and effective depending on the moment, and that it is by no means in the nature of a more or less permanent elimination, or even a wholesale destruction of the egoic forces, of the 'boss' therefore - or even of an elimination of the forces of repression (which form the 'boss').

a large part of the "mol", if not all of it. . . ). These are the forces of surreptitious concealment of the reality that surrounds me and of the reality that unfolds within me - the forces that are constantly and obstinately at work to maintain against all odds the tenacious illusions that would otherwise collapse under their own weight... Some of these mechanisms of repression have been identified one by one and have disappeared. I got rid of some of the illusions that weighed heavily on me, and I cleared up the few stubborn doubts that, for a lifetime, had been relegated (by the 'boss') to rotting in garbage tunnels, never to be examined. Their message finally heard, these doubts have disappeared, leaving a peaceful and joyful acquaintance. I've also spotted some very powerful pressure mechanisms, deeply rooted in the self, which I've come to realise (over the last few years) have had a considerable impact on my life, now as never before. They work towards yang imbalance, towards the occultation of certain yin forces and faculties. I don't know whether these mechanisms will ever be defused - and I know it's up to me. No doubt they will vanish on the day, and only on the day, when I have entered into the origins of the conflict in my life much more deeply and fully than I have done up to now.

At the moment, with my life currently focused on a major mathematical investment, I can safely say that it's not going anywhere!

(<sup>110</sup>) (11 October) Over the last day or two I've wanted to take stock, in a few words, of where this 'gradual restoration of the yin-yang balance' in me stands (after eight years).

Perhaps the most important change of all is a much greater *acceptance* than in the past of myself as I really am from moment to moment. Another way of putting it is that the mechanisms of repression within me have become much more flexible. As I said yesterday, some have disappeared once they've been discovered and understood, and others, which I'd ignored all my life, have become familiar to me in their everyday manifestations. I see them in action, not as enemies that I should try to extirpate at all costs, but as part of the multiplicity of facets of my conditioned being, and therefore of the richness of the present 'given', which faithfully reflects my past history; both the 'ancient' history of my conditionings and the roots of division in my being, and the more recent history of my maturation, the work by which I end up unpacking, 'eating' and assimilating the initial package bequeathed to me.

by my parents and their successors. This 'acceptance' in me therefore includes not only the impulses and traits of the 'child' that I had long ignored and repressed (particularly those that reflect the feminine aspects in me), but also the mechanisms of repression specific to the 'boss', in other words the inveterate mechanisms of 'non-acceptance'! Accepting the latter has nothing in common with 'cultivating' or fortifying them. On the contrary, it's an essential first step towards unravelling them or defusing them to some extent, through the effect of curious and loving attention. The experience of these eight years gives me the conviction that, as long as this attention goes deep enough and to the very root of the repression, the latter is resolved and disappears by releasing considerable energy - the energy that until then had been immobilised to maintain against all odds such and such a set of repressive mechanisms, and the habits of thought and others that serve to maintain them.

But it was not in relation to the 'knotted' aspects of myself that this new acceptance of myself first appeared in my life. It came without fanfare, even before the discovery of meditation, even before the 'reunion' that followed it so closely. It was in July 1976, during a brief love affair with a young woman, G., perhaps a little more 'homely' in her ways than the women I had loved previously. As chance would have it, the material circumstances surrounding this love affair were such that I found myself placed in a typically 'feminine' role. I did the housework and prepared the evening meals, while waiting for my husband to come home from a long and tiring day's work tending a herd of one hundred and fifty goats in the hills, which she also had to milk in the evening. It just so happened that this unusual role of housewife suited me like a glove. It may seem a small thing

- But then it clicked. The link was made with certain impulses and desires in my love life, expressed for the first time in certain love poems, where the experience of love appears, without any ambiguity, as 'feminine'. I understood then, without reflection or 'effort', without any hint of reticence or embarrassment, that in my body as well as in my desires, in my feelings and in my spirit, I was a woman, as well as a man - and that there was no conflict whatsoever between these two realities pro- merged in my being. In those days, the dominant note was feminine - and I accepted this gratefully, in mute astonishment. When I thought about it, there was a silent, very gentle joy in me.

This joy was self-sufficient, it didn't need to be expressed in words.

either to myself or to others. I don't know if I mentioned it to the woman whose lover I was, or perhaps whose lover I was... . Surely, on some level she knew, without my having to say so.

This joy has not faded, it has remained alive to this day. It comes from living knowledge, like the fragrance that accompanies a flower. In certain moments or periods of my life, this knowledge, and the joy that is a sign of it, is more present than in others, more strongly active. But I don't think it ever leaves me.

When I spoke here and there about this experience and this knowledge, in the weeks and years that followed, it was each time as if I were communicating something of great value to others, in a moment when I felt they were open to receiving, if only for a few moments, something of this joy within me. I never felt embarrassed to talk about it, as if it were something a bit scabrous. (Perhaps there would have been such embarrassment at times, however, if the reality and strength of the 'man' in me had not been above suspicion!) And I also remember one occasion when I decided to strut my stuff, showing off and winning on both counts.

- all I needed was to have my period like everyone else and give birth to a kid that dry.

My new feminine identity, superimposed on my masculine identity, had an immediate effect of renewal on my love life. It had a very strong impact on the women I subsequently became lovers with, awakening in the lover masculine impulses that had been carefully repressed throughout her life, and which until then had only been able to express themselves 'on the sly', as a kind of burr, unworthy of appearing in the conscious experience of love.

The unconscious experience of love is rich in archetypal impulses, one of the most powerful of which is that of returning to the Mare, to the original bosom. Such an archetype is present in the deepest layers of the amorous experience, in both men and women. In women, resistance to the satisfaction of such an impulse in the couple's experience of love is even stronger than in men, where it comes up against a key taboo, and not two as in men. For both men and women, the satisfaction of these impulses - in the shared experience - often remains more or less symbolic and, above all, hidden from consciousness. When such an archetype and this experience rise up from the deepest layers into the light of day, into the field of conscious gaze, this experience is immediately transformed, acquiring a di-

mension. At the same time, considerable energies, previously compressed by repressive mechanisms or bound by the tasks of repression, are released. The effect is an immediate *liberation* of the erotic impulse, manifested by a new intensity and a new fullness in the experience of love.

From the foregoing, it will surely be clear that this new acceptance of myself has gone hand in hand with an acceptance of others. The two are inextricably linked. It goes without saying that we're talking here about 'acceptance' in the full sense of the word, which in no way means *tolerance* (often bittersweet) towards such and such 'foibles' or 'faults', which we feel are an unavoidable evil that we have to 'live with'. In such an attitude, I sense above all a resignation, not to say an abdication, and certainly not a source of joy, nor a surge of awareness of something worth knowing: the presumed, unknown depth behind the flat surface of such 'faults' or 'shortcomings' that we are willing to tolerate. ...

The fact that we are talking here about a joyful, creative acceptance in no way means that this acceptance is total-yesterday I already realised that this was not the case. An attentive reader will already have noticed this for himself more than once in the course of Harvest and Sowing, as I've sometimes realised in passing, when I've been confronted once again with this eternal mechanism within me of *rejecting* everything that presents itself in an unpleasant guise, in others or in myself. (But when it comes to myself, this mechanism more often than not has the effect of not even taking note of the unpleasant thing in question...)

The acceptance I'm talking about is rooted in an *interest* in the thing being 'accepted', whether in oneself or in others. Whereas acceptance is in itself a typically 'yin' inner disposition, this connotation of 'interest' that it takes on in me is 'yang' in nature - it's the 'yang in the yin', in the delicate Chinese dialectic of the infinite interweaving of yin and yang... I was going to venture to say, somewhat in the same vein  
That there was a pure and simple identity between acceptance (the real thing!) and this interest, this curiosity. However, as I reflect on the matter, I realise that there is another way of accepting things, which is more totally yin in nature than the one I'm used to. It's like *welcoming* the thing you're accepting, rather than rushing towards it to probe it. (This nuance of acceptance seems to me to be the 'yin within the yin').

The impulse of interest and the attitude of welcome can both form the background note to acceptance of others or of oneself. What both have in common is *sympathy*. This too is one of the forms of *love*. If there is any profound identity to be identified here, it would be the observation that *acceptance is a form of love*. Love of self, love of other, both indissolubly linked. ...

Except in rare moments, my interest is more intensely involved when it's a question of my own person, than of that of others. It is this passionate interest in myself that has animated the long periods of meditation over the last eight years. It's true that knowledge of the self is at the heart of knowledge of others and of the world, and not the other way round - and I feel that it is towards the heart of things, towards what is most essential, that my new passion, meditation, has led me and continues to lead me. My interest in others has become more fragmented and reluctant over the years, as has the acceptance that comes with it. One of the ways it has manifested itself concretely is in a lesser propensity to talk when I'm in company, and in an attitude of listening. For most of my life, this ability to listen had been almost entirely lacking. Even after the great turning point of my reunion, I often had to realise that I had spoken out of turn, because I lacked the ability to listen and to discern, before this inveterate propensity began to pass me by. If it has become much less invasive, and has even virtually disappeared, it's in no way the result of some self-imposed discipline (such as: you won't open your mouth unless. . . ). It's simply because I've lost the urge to talk, at times when I feel that it's useless, that it doesn't contribute anything to others or to me - at least nothing of any value to me. If I can now often sense such things, it's probably because I've become more attentive. This too has not come about as a result of discipline ("you'll be careful to open your ears wide when..."), but I can't say how. In any case, I feel better for it, life is that much more interesting (and especially less noisy!). And other people feel better too...

I think I really started to talk less, as soon as that force in me that always pushes me to want to rectify what appear to me (rightly or wrongly) to be 'errors' in others disappeared - as if it wasn't enough for me to detect and rectify my own! It's also the force that drove me (and sometimes still drives me) to want to convince others of this or that, instead of simply looking at the facts.

why so-and-so so desperately prefers to believe this rather than that (which seems like 'that' to me, and which I'd really like to convince him of!); or why I'm so keen for him to believe that rather than this. This almost universal force within us, which constantly pushes us to seek in the approval of others (and only one. . . ) the confirmation of the validity of what we hold to be true - this force deeply rooted in the ego has finally, I believe, let go of me. It was a great relief, the end of a tremendous dispersion of energy. It was when I finally realised, two years ago, the extent of this force in my life, its nature, and the extraordinary dispersion of energy it represented, that it was defused - and that I found myself lightened by the blow "of a weight of a hundred tons". To be aware, without reticence, of the echo that others send back to us about who we are, without being bound by any desire or 'need' (however hidden) for approval or confirmation - that's really what it means to be 'free of them'. It is such a need or desire that really constitutes the 'hook', discreet and unfailingly solid, by which the conflict can 'hang' in us, and by which we are (whether we like it or recognise it, or not) under the dependence of others, of their goodwill - by which, in short, they 'hold' us, and (for all intents and purposes) us to their will. . .

Logically, accepting others should also mean accepting their way of seeing things, whether or not they seem wrong to us, and even when it comes to their way of seeing our own precious person (including our own ways of seeing... ). But that's where the problem lies - it's the crux of acceptance of others, not acceptance of more or less embarrassing common 'faults' that don't directly involve ourselves. Quite often, moreover, if we reject such 'faults' in others, it is above all because they make us feel directly challenged, simply by the fact of being confronted with ways of being which seem to us (rightly or wrongly) to be the opposite of our own. In other words, it is an *insecurity* within us, manifested by reactions (more or less apparent or hidden) of vanity, which is the great obstacle, opposing our acceptance of others. But this deep-rooted insecurity, compensated for by the movements of vanity, seems to me to be indissolubly linked to the non-acceptance of ourselves, and is like its inseparable shadow.

So it's full self-acceptance that appears here as the key that opens us up to acceptance of others. And this link, which has just appeared to me here, links up with another profound link that I've known for a long time, perhaps for as long as I can remember: that self-love is the heart,

the love of others.

(<sup>111</sup>) (13 October) Yesterday I didn't continue writing the notes. Instead, I amused myself by reviewing a number of yin-yang 'couples'. I started with the ones that popped into my head, a bit by luck of the draw, then I got bored with the game, and ended with a sort of 'census' of all the ones I could get my hands on. I started because I thought that a lot of what I'd written recently might well go completely 'over the head' of a reader who wasn't already at least a little familiar with the double yin-yang aspect of things. It might be worth taking the trouble to give at least a few striking examples of such couples, in addition to those that had crept in over the last few days. Then, driven by the little systematic devil (or angel, I don't know...) in me, I ended up digging out my visible reflections from five years ago on this theme. Over the course of a week or two I had fun 'collecting' a hundred or two of these very suggestive couples, which were then assembled by affinity into about twenty groups. As this reflection took place on the fringes of the famous 'poetic work' I was writing, I couldn't help arranging these groups as best I could, by affinities and filiations of meaning from one group to the next. Last night, taking a step back, and without a poetic straitjacket around my neck, I came up with eighteen groups (instead of twenty), by grouping them perhaps a little more rigorously. I suspect, moreover, that there must be many more groups, perhaps even an unlimited number, corresponding to modes of apprehending reality that I didn't think of in the course of the work (nor, perhaps, ever again).

As for the eighteen groups that I did identify, I tried to assemble them into a diagram (or 'graph') following the main affinities that link them to each other. Some of these links only came to my attention in the course of drawing successive drafts of the diagram. The work here was really very close to the familiar mathematical task of trying to capture graphically, as strikingly as possible, a more or less complex set of relationships (given, for example, by 'applications', represented by arrows) between a certain number of 'sets' or 'categories', appearing as the 'vertices' of the 'diagram' you are trying to construct. Here too, essentially aesthetic requirements, in particular symmetry and structural transparency, frequently lead to the introduction (and therefore, if necessary, the uncovering) of 'applications'.

In the end, I had to come up with new diagrams (to discover or even invent) with 'arrows' or links that I hadn't thought of at the outset, and sometimes even with new 'vertices'. In any case, after five or six successive drafts, I finally came up with a diagram, vaguely in the shape of a Christmas tree, which satisfied me for the time being - especially as it was getting prohibitively late!

I went to bed happy, feeling that I hadn't wasted my time, even if my grades hadn't improved a bit(\*). But I had got back in touch with things that were decidedly juicy - each of these groups was rich in weight and mystery, and each of the yin-yang pairs that were supposed to constitute it (but which rather, all together, *point to* it, without in any way exhausting it) - each of these pairs had something delicate and important to tell me about the nature of this world in which I live, and often about my own nature. I rediscovered with renewed strength a feeling that was already present five years ago: that the delicate interplay of yin and yang, of the 'feminine' and the 'male' in all things, is an incomparable thread leading to an understanding of the world and of ourselves. It leads us straight to the essential questions. Often, too, the very 'yoga' of yin and yang - the very act, I mean, of paying attention to the aspect of things and events that is expressed in terms of yin-yang balance and imbalance - provides the first key to a better understanding of these questions, and to an answer.

I apologise if for some readers I have given the impression, over the last page or two, that I've been talking about the sex of angels, when they wouldn't even really see what these famous yin-yang 'couples' I'm talking about are, and even less so these 'groups' into which some of them come together, which groups in the end are supposed to come together in a 'diagram' (maths is useful after all!). I should give at least one of these groups here - and I feel like taking the one I spontaneously started with yesterday, the one that ended up appearing in the course of reflection as the 'primitive' group(\*), from which all the others seem to gradually emerge, through some sort of successive 'filiations' (continuing on my famous diagram of eight 'generations'...). Here, then, is the list of 'couples' that I have identified, constituting this primitive group (which we could name by the first of these couples,

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(\*) In compensation, I could apply for a patent on the invention of a new poetic form, the so-called 'non-linear' or 'diagrammatic' poem.

namely "the *action - inaction* group").

Action - inaction  
activity - passivity  
wakefulness -  
sleep subject -  
object  
generate - design(\*)  
execution - design(\*)  
dynamism - balance  
momentum - sitting  
ardour - perseverance  
ardour - patience  
passion - serenity  
tenacity - detachment.

I'd like to add the following two couples, among a dozen or so 'latecomers' who came to me again this morning, following on from my thoughts yesterday:

know - know explain -  
understand.

Needless to say, in these couples, it is the term 'yang' or 'masculine' that is used first, following the custom of our patriarchal society, where the man gives the name to the couple? On the other hand, traditional Chinese society is considerably more patriarchal than ours, when we follow Chinese usage to talk about the relationship between yin and yang,

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(\*) (November 6) In fact, there is an even more primitive group, which can be called the '*father-mother*' group. On the subject of this 'oblivion', see the note "Our Mother Death - or the Act and the Taboo" (n° 113). Begetting" couples

- conceive" and "execution-conception", which I have included below in the (supposedly "primitive") action-inaction group, are visibly more naturally inserted in the "mother group" formed around the "father-mother"

couple.

we always put yin ("feminine") first, for example by speaking of "yin-yang balance" (instead of yang-yin). The meaning of this usage surely lies in the archetypal intuition that it is yang that is born of yin, which is the 'most primitive' principle of the two, and not the other way round. ...

This is not the place to comment on any of these couples. However, if you feel challenged by them, if you sense (albeit obscurely) that each of them has something to say to you about the world and about yourself - about balance and imbalance, about the internal dynamics of beings and things... then you can dispense with detailed comments, and take this challenge as a starting point for your own reflection.

(<sup>111</sup>) There is only one point I would like to stress here, common to all yin-yang 'couples' without exception. It is also the most crucial thing of all, it seems to me, for an understanding of the nature of the relationship between yin and yang, and hence of the nature of each of these two principles (or energies, or aspects, or forces. . . ) in the Universe. It is this: each of the two terms of one of these couples, such as action-inaction, *in the absence*(\*) of the other term, constitutes a state of serious imbalance, and ultimately (when the 'absence' in question is almost complete, and prolonged) a state which leads to the destruction of the thing (or being) in which this imbalance takes place, and even of it and its surroundings.

Thus, a state of uninterrupted *action*, which does not alternate with sufficient periods of *inaction* and rest, leads to exhaustion, illness and (ultimately) death - something which has been most topical for me recently!(\*\*) But conversely, a state of excessive inaction leads to a weakening and sclerosis of the capacities and functions of the body or psyche (depending on the case), and ultimately to destruction. In the case of my 'incident-disease', moreover, I have a simultaneous example of the *two* imbalances: action

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(\*) (16 October) In fact, this 'absence' is never total, it seems to me - in no thing is yin or yang present in a pure state, without the simultaneous presence of its complementary, however slight. The 'imbalance' I'm talking about is therefore characterised, not by the total absence of one of the two complementary terms (something never achieved), but by a state of excessive *weakness* of that term. Another type of imbalance, or morbidity, occurs when *both* terms are 'absent', or more precisely, are present but very weakly. Thus, in the case of the 'action-in-action' couple, a state of *agitation*, which does not 'act' strictly speaking (except to perpetuate itself, to maintain confusion), while dispersing energy, can undoubtedly be considered as such an imbalance 'by default' (of yin *and* yang).

(\*\*) On this subject, see the first two notes (n° 98, 99) of Cortège XI, "Le défunt (toujours pas décédé...)".

excessive activity of the mind, inaction of the body (and sufficient rest for neither. . . ). This 'explanation', in this case of the 'philosophy' of balance and imbalance of yin and yang, remains superficial, in the sense that it does not touch on an inveterate cultural bias, valuing the term yang, action, by *opposing it* to the term yin, inaction. Inaction is seen as a 'negative' thing, not productive or interesting from any point of view, accepted at best as a stopgap, which unfortunately is imposed even on the best will in the world, since you still have to rest from time to time to be able to continue to invest yourself in action (or else, as I've just explained, you'll be overworked and God knows what else...). In short, inaction is seen as the humble handmaiden of action, which is unfortunately indispensable but otherwise unworthy of attention or esteem.

Of course, this 'official' valuing of action over inaction immediately sets in motion resistance mechanisms in the individual (which often remain hidden or at least very blurred), expressing themselves through an *opposite* valuing: The real *raison d'être* is to be able to do something, to be able to do something. The real *raison d'être* of action is to earn a crust and a living (that's the indispensable part), and beyond that and above all, to have some nice leisure activities (during your working life), and a nice retirement and pleasant permanent leisure activities later on, when you're exempt from the regrettable obligation of 'work'. This time, it's inaction (aka 'leisure') that is more or less consciously valued, and it's action that is its humble servant. There is therefore a *reversal of roles*, but always with the same imbalance: that which consists of the *antagonism* established by the person concerned (under the pressure of cultural conditioning) between two essential aspects or poles of his life; an antagonism which is expressed and perpetuated by a state of despotic preponderance of one of these aspects, and servitude of the other.

It seems to me that, more often than not, the two attitudes and values are superimposed in the same person, one dominating at the conscious level, the other at the unconscious level. The superimposition of these two opposing imbalances clearly does not produce balance! Balance, on the other hand, flows naturally from an understanding of the true nature of action and inaction (even when such an understanding remains purely 'instinctive', manifesting itself directly in balanced behaviour, and in no way in verbalised 'knowledge'). *In action in the full sense of the term, there is also inaction - it is*

I mean *in the very moment*, and not just 'after', because you have to rest after the action! This 'inaction' in the 'action', the 'yin in the yang', is like a deep calm that serves as a foundation for a movement that would take place on the surface. It is manifested, for example, by the impression of perfect relaxation that emanates from a feline in motion, whether it's the first alley cat that comes along, or a lioness with a powerful build...

And in the same way, *in true inaction*, even total inaction, *there is action*. So *sleep* is rich in dreams that speak to us about ourselves, through which we live *another*, more intense and more delicate life, which we are often too sleepy or too faint-hearted to live in the waking life. And it's enough to contemplate a sleeping baby, or just to be roused from a deep sleep, to feel that even without dreams, truly good sleep is a kind of *work in its own way*; something that absorbs us completely, 'replenishing' in short an energy that has been dispersed and that we come to *replenish* at its source... Once again, this is the 'yang in the yin', without which the yin itself would be destructive.

Thoughts along the same lines could surely also be developed for *waking* inaction, outside sleep time. All we have to do is observe carefully, on the spot, any state we perceive as 'inaction'. You will realise that in inaction there is action, even if it is the sterile cackling of a thought that continues to go round in circles even though it has stopped working. But to tell the truth, it is inappropriate to call this purely mechanical movement, which continues by the mere effect of inertia - by the inability to stop the machine! And it is certainly not this inner agitation that will give 'inaction' a yin-yang harmony that will make it beneficial. On the other hand, this may be the case with various activities designed to fill leisure time (when these are nevertheless experienced as a state of inaction). But even in the state of complete rest of a state of convalescence, let's say, there can be action, otherwise this rest or 'inaction' becomes *sluggishness*, certainly not conducive to convalescence (that is to say, to restoring a disturbed balance!). For example, this state of rest can give rise to attention to one's own body and to one's immediate surroundings (which are like a second skin to one's own body...), an acquisition of knowledge, or even a communion, which in itself has the character of genuine 'action'; for there is no doubt that *learning* is indeed an *act* (since it has an unquestionable *effect*: the appearance of knowledge...).

Looking one by one at the fourteen couples I included in the action-inaction group

(and I'm sure we could find many others that fit in naturally), we can see that for all but perhaps one of them, it's the first term, 'masculine', which is invested with prestige, with 'value', according to the attitudes-reflexes conveyed by our culture and inculcated since childhood. This is the sign of the same inveterate imbalance in our culture, the imbalance marked by the exclusive valorisation of the yang, to which I referred earlier (\*). The same observation can be made for almost all the yin-yang couples I've come across - it's a really striking thing, which I'd never before taken the time to check out in such detail.

Among the pairs written earlier, the only one that seems to me to be an exception is the *passion - serenity* pair, given that in common usage, the word 'passion' is often associated with the image of unleashing, of violence, or even of *letting oneself go*, annoyingly close to the cloud of associations surrounding a word like '*turpitude*'. As chance would have it, *laissez- aller* and *turpitude* refer to states of psychic imbalance characterised by an excessive *yin*, feminine preponderance! And symmetrically, following the same push-button mechanisms (which reveal our current conditioning, and in no way the nature of a thing like '*serenity*'), the word '*serenity*' is associated (as opposed to '*passion*') with the image of *self-control* - a quality which, as it happens, is essentially masculine. (In fact, the *yin* counterpart of '*control*' is not '*passion*', but '*abandonment*').

What is happening here, then, is that as a result of a general confusion in people's minds about the nature of certain things, expressed by an equal confusion in the use of certain words that are supposed to designate them, there is a confusion of the yang-yin couple '*passion-serenity*' with the whole of the two notions

release - control,

whose terms are yin-yang (without constituting a 'couple', as the two terms have no desire to marry!). So it seems to me that the so-called 'exception' to the rule (of systematically valuing yang) is, on the contrary, a particularly interesting confirmation of it! And I wouldn't be surprised if the same were true of the other few examples I've mentioned, where in a yang-yin couple, it's the *yin* term that seems to be valued.

In fact, I'm not at all sure that this distortion in the world view that I

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(\*) See the note "Yang buries yin (1) - or muscle and guts", n° 106.

I don't know whether this distortion, this imbalance, is so much less in the Chinese tradition, or even in the Chinese world (or more generally the 'oriental' world) today. There are no signs in everyday life that would lead me to suppose this, either from my Oriental friends or from the echoes I have heard of tradition and life today in China or other countries in the Far East - quite the contrary. Rather, it seems to me that a fine perception of yin-yang dynamism has been confined almost exclusively to the *practice of certain arts*.

- such as calligraphy, poetry, the culinary arts and, of course, the medical arts(\*)).

It is the latter in particular, under the name of "Chinese medicine" and thanks to the spectacular successes of acupuncture, which over the last twenty years has come to be regarded as a prestigious discipline in our country. Yet many people are still unaware that in Chinese medicine, the alpha and omega of our understanding of the body, of the circulation of energy in the body and of its disturbances (which constitute the morbid states we call 'diseases'), lies precisely in a very fine dialectic of yin and yang. The fact that this dialectic 'works', since 'Chinese medicine' based on it is effective (including in many cases that escape the means of the Western panoply), can be considered as a kind of 'proof' of the reality of the 'principles' or 'aspects' or 'modes' (of apprehension, or of existence) of yin and yang - that they are not pure speculations out of the hats of certain philosophers and other poets (not to say fumists).

It is true that one might ask what is the point of such proof, and indeed of any 'proof' whatsoever of the validity of this or that worldview. Even supposing that the proof was convincing (i.e. that the person concerned was willing to allow himself to be convinced), and even and above all, that the vision in question was profound and therefore beneficial.

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(\*) (21 October) I've left out the *divinatory art* of the *I Ching* or 'Book of Changes', which today enjoys great popularity in certain circles in both Europe and America. The 64 'hexagrams' that make up the basic 'words' of the divinatory language of the *I Ching* are none other than the 26 possible combinations of sequences of six 'signed' yin and yang, from pure yin (six repetitions of yin) to pure yang (six repetitions of yang). There seems to be here a kind of alchemy of great finesse in the combinations of yin and yang, which (it seems) had fascinated Jung. The interest of this alchemy (particularly as a 'collection of archetypes') seems to me to be independent of its use in divinatory art, and of the credit we are prepared to give to such use.

the best evidence in the world is powerless to *communicate a vision*, let alone a vision of the world. It doesn't do you any good to be stubbornly 'convinced' of a vision that remains alien, misunderstood. To tell the truth, it doesn't even make sense - or to be more precise, the true meaning of your 'conviction' is no more understood by the person concerned than the vision you are pretending to incorporate into your heavy cultural baggage.

When the vision is understood and assimilated, the very question of 'proof' seems strangely absurd - a bit like proving that the sky is blue when you can see that it is blue, or that the scent of a flower you love is good...

(<sup>112</sup>) (17 October) My first thoughts on the dual aspect of 'feminine' and 'masculine' came from a reflection on myself. It was towards the beginning of 1979, at a time when I was still unaware of the Chinese words 'vin' and 'yang', and of the existence of a kind of subtle 'philosophy' of the incessant interplay of yin and yang in Chinese cultural tradition. I learnt about this towards the end of the same year, I think, from my daughter and especially from my son-in-law Ahmed, who was just beginning to take an interest in Chinese medicine, and became very interested in it over the next few years. Most of what he told me overlapped with and confirmed the vision I had arrived at, which came as no surprise. If there was any surprise, it was rather in the few cases of 'couples' where the 'natural' yin-yang role seemed to me to be reversed, in the Chinese tradition. My reflex (strongly 'yang' in this case!) had been - a gut-level conviction that this 'reversal' must be due to a cultural distortion, without actually looking too closely(\*) - it was at a time when my past lessons on the feminine-masculine seemed very far away, while I was engaged in a far more personal meditation on the lives of my parents and on my childhood. It was only months or years later, I think, that through a certain amount of cross-checking, I came to realise that in some cases my apprehension of the feminine and the masculine had not been fully realised.

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(\*) This reaction of peremptory assurance, with regard to a thousand-year-old tradition that could have encouraged me to be more cautious, is the same one that, as a child, made me reject the formula (quite complicated, I must say!)  $\pi = 3.14\ldots$  taught by books, in favour of  $\pi = 3$ , which I had convinced myself by my own means. (See the note "Squaring the circle", n° 69.) It is true that for this story of yin and yang, I had had ample opportunity to realise the extent to which the apprehension of the nature of the "feminine" and the "masculine", and of their interrelations, is distorted by inveterate cultural distortions of considerable force. On the other hand, I didn't yet realise the extent to which a precise and delicate understanding of these relationships was also essential in the practice of certain traditional Chinese arts, and pushed to a degree of great finesse.

that I had been a little hasty in lumping together situations of a different nature that the Chinese yin-yang dialectic was careful to distinguish (<sup>112</sup>). Now I realise that my apprehension of yin and yang is still relatively crude and static, especially when compared with the finesse required to practise certain traditional chi- nois arts such as medicine (which is also closely linked to dietetics and the culinary arts), where this apprehension ends up becoming like second nature.

More than once, I have had the impression that among practitioners of these arts, whether Oriental or European, this finesse of apprehension remains fragmentary, in the sense that it remains, to a very large extent, carefully confined to the practice of this art. In everyday life, it acts more like ordinary 'knowledge', purely and simply superimposed on the 'knowledge' of cultural (and other) conditioning, and remaining more or less a dead letter vis-à-vis the latter. To put it another way, I got the impression that the vision of the world and of oneself, and the mechanisms of repression in the perception of reality, are in no way different in these 'informed' people than in ordinary mortals.

This impression overlaps with another I got from reading two or three texts, written by Europeans who are supposed to be 'in the know', which offer an insight into the traditional Chinese philosophy of yin and yang. (One of the authors is a well-known French orientalist, whose name now escapes me). The thing that struck me was that in these texts, yin and yang are presented as '*opposing*' (or '*contrary*') or even *antagonistic* principles (the latter term appears several times in one of these texts), rather than *complementary*. This '*opposition*' or '*antagonism*' would have its typical expression in that which would take place between woman and man within human society, and within the couple constituted by society.

Antagonism in the husband-wife relationship is a reality in both East and West. It is deeply rooted in culture, so much so that it can sometimes appear as one of the (sometimes confusing!) aspects of the human condition, or even as the root of conflict in man or in human society. The reality of this antagonism is irrefutable, and it certainly goes beyond the common clichés that do their best to exorcise it. This 'social' reality is the product of immemorial conditioning, which very early on takes root in and structures the developing 'I'. However, beyond

In this reality, there is a deeper reality, coming from much further back, which is decisive in the love drive itself. It is the reality of a profound, essential *complementarity* between the sexes, in which there is no place for any kind of 'antagonism'. It is also the reality that is clearly manifest in all living species, with the sole exception of our own, where it is largely obscured by cultural antagonism, and therefore by a state of *division* specific to man and human society.

The common romantic clichés, such as 'Nous Deux', which dominate much of literature and the media, highlight the fact that men and women are 'complementary', while at the same time casting a discreet veil over the troubling antagonism between them, or (at best) treating it as a sort of slightly spicy accident, a welcome way of spicing up a meal that is otherwise a little too dull or syrupy. As soon as you get beyond these reassuring clichés, you are immediately confronted with the reality of this male-female antagonism - a reality that is apparently universal, and one that is, moreover, as tenacious as any weed! But to start from this omnipresent and irreconcilable reality, to institute a kind of cosmic antagonism of yin and yang, of 'feminine' and 'masculine', is to project onto the entire Universe the state of tearing apart, of profound division of human society and the individual, a disease therefore peculiar to our species. It is also to perpetuate our own ignorance of *another* reality within ourselves (in line with this cosmic reality of the harmony of complementarity), a reality that is just as tenacious (or, to put it better, indestructible), but more hidden. This reality runs counter to the conditioning that tacitly establishes a de facto antagonism between woman and man, wife and husband, and between what is 'woman' and what is 'man' in ourselves.

To tell the truth, this *dualistic* or *warlike* vision of the Universe, in which one aspect of things would be at constant war with an equally essential 'symmetrical' aspect - this vision is in no way the fruit of a *reflexion*, which would 'start' (as I wrote just now) from the reality of conflict in the human couple and in human society, and then 'deduce' (or 'institute', as I wrote more aptly) it in the Cosmos as a whole. It is no more and no less than the faithful expression, automatic as it may be, of cultural conditioning, and it serves an essential function of that conditioning: *the maintenance of conflit, of division within the person himself*. Clearly, it would be impossible to maintain this antagonism between "woman" and "man" in me, or rather, this antagonism would already be resolved, *as soon* as I took the leisure to contemplate the Universe with these eyes received at

my birth, and where I see that everywhere, except (apparently...) in myself and among my fellow human beings, the 'feminine' and the 'masculine' are each other's indissoluble complements; that it is from their marriage and union that harmony, creative force and living beauty are born in all the living and 'dead' things of Creation. On the other hand, if I claim to 'see' everywhere in the Universe 'oppositions' and 'antagonisms' where they do not exist (and even though in doing so I would be following a venerable tradition that is thousands of years old), I would in no way be using my eyes, but rather confining myself to *repeating* (like everyone else) what has been repeated from generation to generation since perhaps the dawn of time; and in any case, to obey the silent and imperative injunction of cultural consensus - the very injunction that has firmly established in me a division, a conflict that I would claim to rationalise (and thereby perpetuate) as a 'cosmic necessity'.

There is certainly a lot to be said about antagonism in couples, and more generally about female-male antagonism - and I trust that much has been written on the subject, including some relevant stuff. This is not the place to dwell on this most interesting theme, particularly on the particular form that this antagonism takes in our patriarchal society. It seems to me that among those who have seen it clearly, there are many who hold the structure of society, reflecting and embodying the preponderance of men over women, to be responsible for this antagonism. They are certainly right - and I suspect that in a society with a pronounced matriarchal tendency, a similar antagonism must be found, manifesting itself more or less symmetrically. What I would just like to add is that this causality seems to me to be *indirect*, that it seems to be exercised through the intermediary of a more hidden causality, touched upon in today's reflection. This more hidden and more essential cause of the division in the couple is the state of division *within the person*, both woman and man, with regard to their own drives (and in particular those of sex) and their own faculties. I see this as the real root of the antagonism between man and woman, as well as of their *mutual dependence* at the spiritual level, I mean the *lack of inner autonomy* of both.

This division within ourselves consists of the intimate and secret conviction, in both of us, that we are only *half*. One of the signs of this conviction is this diffuse and insidious feeling, never examined, of *cracking*, of *mutilation* perhaps, from which only the partner of the other sex could deliver us, temporarily at least. Behind the air of circumstance

Whether we call ourselves "macho" or "Circe" (and many others), everyone, men and women alike, find themselves in the position of a *beggar* vis-à-vis their potential or real partner, someone who expects a fleeting release from the (more or less) goodwill of the other, which he hopes will be complete and which always turns out to be lame, from his pitiful state as a cracked pot, not to say broken - *half a pot in short*, which is looking for another to glue itself back together as best it can (and rather badly than well, as you can guess...).

This feeling of fracture, or again, this *ignorance* of our true nature, of our fundamental *unity* beyond the physiological specificity linked to our sex - this deep division within us seems to me to be the product of social conditioning alone. There is no trace of it, at least in the first days and months of an infant's life. This conditioning is by no means reduced to valuing the 'masculine' to the detriment of the 'feminine', or vice versa. After all, if I feel, accept and am accepted as *both 'male' and 'female'*, with a 'background note' that can vary from one facet of my person to another, and that is by no means limited to the dominant (albeit very important) position that prevails in terms of my genitalia - then it doesn't really matter whether it's the 'masculine' or the 'feminine' that is valued around me. At the level of my sexual drive, my personal 'value' would in any case tend to gravitate towards the opposite sex to my own (sorry, complementary, I meant), without feeling inferior (any more than superior) in the face of this being who is *different* in body, towards whom I am drawn by an imperious and profound drive. Moreover, whether it's a question of valuing sex or anything else, the importance of the 'value' or prestige attributed by social consent (to oneself or to others) is relatively secondary, not to say minimal, for a person who is not (or is only slightly) affected by this feeling of 'fissure' I'm talking about.

- in a person who lives this spontaneous *self-assurance*, which is neither arrogance nor a facade, but the manifestation of an intact knowledge of his own nature.

One sign among others that the 'crack' or division(\*) in the person is not just the product of valorisation, is that this division is as rife in men as in women, in the one who is supposed to be the 'beneficiary' of this consensus that claims to be the 'beneficiary' of the consensus that claims to be the 'beneficiary' of the consensus that claims to be the 'beneficiary' of the consensus that claims to be the 'beneficiary' of the consensus that claims to be the 'beneficiary' of the consensus that claims to be the 'beneficiary'.

(\*) I refrain here from using the rather fashionable expression "castration", a term of great violence (superyang for that matter!), which has the added disadvantage of suggesting the image of an irreparable, irreversible mutilation, and thereby stimulating reactions of dismay, revolt or resignation likely to reinforce a state of blockage, rather than encouraging its evolution in the direction of a gradual resolution.

"This division is all the more acute, all the more violent, when the repression of one sex for the 'benefit' of the other is stronger, more ruthless. We can see that this division is all the more acute, all the more violent, the stronger and more ruthless the repression of one sex for the 'benefit' of the other. It could be said that the principle followed by 'Society' (the source and instrument of repression) in setting up repressive mechanisms is: '*divide and rule*'! But this "division" created by the Consensus to break up and enslave both men and women is also played out on *two levels at once*. The most visible picture is that of the *division within the couple*, achieved (\*\*) by establishing a more or less tyrannical preponderance of one sex over the other - of the man over the woman, or vice versa. One is supposed to reign over the other - and both end up as slaves(\*\*\*). Because when the wife or husband is scorned, it is *both of them* who are scorned - scorned by others sometimes, but more deeply and above all, *scorned by themselves*.

And here we come to the more hidden 'second picture' of the game of division. This is the *division within the person himself*, the hidden spring of the couple's division. It is accentuated by the latter, without however being reduced to it, and it is by no means produced by the sole valorisation of one sex to the detriment of the other. Rather, it is the product of a silent and incessant *constraint* exerted on us by those around us from our earliest years. This constraint pushes us to deny, on pain of rejection, an entire 'side' of our person (the 'yin' side, or the 'yang' side (\*)) rejected as ridiculous or unseemly, and in any case, as *unacceptable*.

(<sup>112</sup>)(\*\*) Thus, in the *matrix-embryo* and *vagina-penis* pairs, the distribution of roles is as follows

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(\*\*) (October 21) At least on the surface. But as suggested above, if we go deeper into things, we realise that this division in the couple, maintained by the preponderance of the man over the woman, has a deeper 'root', which I'll come back to a few lines later.

(\*\*\*) Slaves, moreover, who would not for anything in the world part with their chains, which are more important to them than any other.  
expensive than life...

(\*) In principle, and barring accidents, the sense of constraint leads men to deny their yin side, and women to deny their yang side. The situation is more delicate for the woman, who is supposed to deny the very traits in her that are given prestige by social consensus, and which she therefore feels encouraged to want to cultivate. She thus finds herself subject to two pressures in opposite directions, and the task for the unconscious of structuring an 'operational' identity becomes that much more complicated.

(\*\*) This footnote is taken from a footnote to the previous footnote (see reference in the first paragraph). of it).

There is no doubt about the yin-yang relationship, and the yin term surrounds and contains the yang term. This had led me to hastily conclude that in the *container-content* pair it was the 'content' that was yang, without being warned by the *form-ground*, *exterior-interior*, *periphery-centre* pairs (where, as I had clearly sensed, the first term is indeed yang, as well as being the 'con-tenant'). In fact, in the matrix-embryo and vagina-penis pairs, I had wrongly emphasised the 'geometrical' or configurational aspect of the relationship between the two terms, a secondary aspect to the main one, which in this case determines the distribution of roles: *what nourishes* is yin in relation to *what is nourished*, which is yang, and *what penetrates* is yang in relation to *what is penetrated*, which is yin (likewise *what gives* in relation to *what receives*).

My reflections on yin and yang, however limited they may be, have given rise to an intimate conviction in me that, beyond the differences in individual apprehensions about the distribution of yin-yang roles (or also, about the yin or yang 'background note' in a given person dis- ons), an apprehension which is highly subject to 'cultural distortion', such a 'natural' distribution (or 'background note') does indeed exist. It has a reality that is just as irrefutable, 'cos- mical', and immutable (as far as the distribution of roles in couples of a universal nature, such as those discussed so far, is concerned), as a physical law, or a mathematical relationship, even if it cannot be 'established' either by experiment (in the sense in which this term is understood in the practice of the natural sciences), or by a 'proof' or even a 'demonstration'. This reality of yin and yang is apprehended by direct perception, which can be developed and refined (among other things) by sufficiently deep reflection.

It seems to me that one of the main effects of such reflection is precisely to help us overcome the cliché reflexes programmed into us by the surrounding culture, in order to regain contact with reality itself. This, it seems to me, is already present in deep layers of the psyche, as a kind of archetypal knowledge, beyond the reach of cultural conditioning. The role of reflection is to enable us to regain contact with this knowledge already present, and to carefully decant it from superficial 'knowledge', i.e. from cultural conditioning.

The work I've started in this direction has been important for my understanding of the world and of myself, and hence for my daily 'doing' and the way I lead my life. This work (as on many other occasions) seems to me to be an *initial*

like a door I've just pushed open to a vast panorama I've yet to explore. I've got everything I need to do it - but I don't know if I ever will<sup>(\*)</sup>. Mathematics aside, there's no shortage of equally 'juicy', more personal and even more burning themes for reflection, which will no doubt be given preference over more general reflections on yin and yang...

(<sup>113</sup>) (21 October) Three days have passed without writing any notes. My days have been absorbed by other tasks and events. One of these was a visit from Pierre, who arrived last night with his little daughter Nathalie. He's thinking of staying until tomorrow evening, and in the meantime read what's been written about the Funeral. That might be a bit short for something that took me nearly three months to write. ...

The time I was able to devote to reflection, I spent playing with yin-yang 'couples' and the groups they form. It's a fascinating subject, combining the very special flavour of investigating a mathematical 'structure', the nature of which gradually becomes clearer as the work progresses, with that of a reflection on the world and on existence. Each of the main yin-yang pairs represents a kind of '*keyhole*' (among an infinite number of others), revealing a certain aspect of the world, or a corner of it. The 'groups' of pairs that I have identified so far seem to correspond more to different possible ways of apprehending things in the Universe, like so many *doors* that open onto it and show it to us from so many different angles. Each of these 'doors' has a large number of keyholes, perhaps even an unlimited number, through which to look - until perhaps we simply push the door open? For the time being, I've confined myself to finding a good number of these holes (I've found well over two hundred), and sticking my eye in each one, even if only for a few moments, realising each time that there would be something to look at for a good while without wasting my time, quite the contrary! But I'm even more impatient to go and have a look at such and such a hole through which to look again, and also to go round all these doors and orient myself as best I can how they are arranged one after the other.

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(<sup>\*</sup>) Just as I don't know whether the kind of work I see opening up before me has already been done (the study, in short, of a kind of local and global 'map' of the qualities of things in the Universe and of their modes of apprehension, in the light of the harmony of the complementary yin-yang.) In any case, this is an entirely incidental question, given that the point is not to present a doctoral thesis on this or that, but to deepen an understanding of the world and of oneself, which can only be the fruit of personal work.

in relation to the others, and perhaps also according to which "patterns" are arranged in one or other of these holes which made their existence known. ...

Finally, the eighteen 'doors' I had detected just over a week ago were augmented by three more, making a total of twenty-one, arranged in a dia- gram (which I had described as 'vaguely Christmas tree-shaped'), now comprising a 'trunk' of nine 'vertices' (or 'doors', or 'groups', or 'angles'), connected by vertical 'edges' or 'links', with six other vertices on either side of the trunk connected to it and to each other, so as to form the 'branches'(\*)).

Funnily enough, of the three 'new' groups that have appeared in recent days, one is the most obvious, the most primordial or primitive of all: it's the one that corresponds to the very first intuition of yin and yang as the 'feminine' or 'female', and the 'masculine' or 'male'. It seems to me to be expressed most strikingly by the archetypal pairing of '*father and mother*' (in preference to 'man and woman', which is part of the same group). This group is strongly charged with sexual connotations, appearing in pairs such as "*engendering - conceiving*" or "*penis - vagina*", themselves part of the cloud of associations around the *act* par excellence, the archetypal Act: the creative embrace that

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(\*) (24 October) I'd be at a loss to predict whether or not yin-yang pairs will eventually appear that don't fit naturally into any of the groups I've mentioned so far, i.e. whether there are *other* yin-yang groups or 'doors' opening onto the world, or even an unlimited number of them?

The fact that I couldn't find another one wouldn't mean that there couldn't be an infinite number of others, perhaps even an infinite number of others that escape human experience, our means of perceiving the Universe. This reminds me that more than once in recent years I have been struck by the intuition that, from the ant or the tiny aphid to the mammals that are already very close to us, every animal species has means of perceiving and apprehending the Universe that escape any other species, including our own; so that when it comes to the wealth of sensory ways of apprehending (let's say) what surrounds us, our species does not 'cover' or 'contain' any other, any more than any other contains us.

The 'no more than' that I've just hazarded seems hasty, even excessive, given that in terms of the richness and finesse of purely sensory perception, the evolution of our species would tend to go in the opposite direction, to *regress*. It's only at the level of the intellect, of the finesse of mental imagery, and particularly that linked to language, that we excel over other species, it seems to me. It's no coincidence that most of the yin-yang pairs that spontaneously came to my attention belong to this specifically 'human' register, while only a handful have (among other things) an obvious sensory connotation, such as shadow-light, cold-hot, low-high, and a few others.

transforms (potentially at least) the woman into a *mother* and the man into a *father*, through the appearance of *the child*, the Work resulting from the Act.

These connotations of the love drive were constantly at the forefront of my thinking five years ago. What's more, they were given almost uninterrupted lyrical emphasis throughout the 130-odd pages of the famous 'poetic work' into which the reflection had then been condensed, producing a wearying effect on even the most willing reader. It must have been a reaction of annoyance at this double 'deliberate intention', poetic and erotic (\*), in my only reference text for my reflections over the last few days, that I simply 'forgot', among the famous groups of yin-yang couples, the one that naturally opened the procession (and quite rightly so) in this unfortunate text.

The title of the work in question, 'In Praise of Incest', was also a tad provocative, and likely to give the wrong idea about his intentions and his 'message'. These evolved quite considerably during the writing process - the poetic straitjacket did not prevent the work from deepening and decanting. My first and main aim was to explore a certain aspect (which I felt to be profound and essential) of the love drive, as I knew it from my own experience. So it was primarily a question of the erotic drive in *men*, or more precisely: the '*yang*' drive, which corresponds to the 'male role' in the game and in the act of love, but which is present with varying degrees of strength (\*) in women and men alike. For a long time, perhaps for as long as I can remember, I've known that this impulse, by its very nature, is '*incestuous*': it's also the impulse to '*return to the Mother*', to return to the bosom of origin. It is also the impulse to '*return to Mother*', to return to the original bosom. This great return is 'staged' and relived in the course of lovemaking, culminating in *annihilation, extinction of being, death*. To experience the fullness of the act of love is also to experience *its fullness*.

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(\*) (October 24) This deliberate statement of form reflected an inner attitude, the choice of a certain role - the role of *apostle* of a message. On this subject, see the end of the section "The Guru-not-Guru - or the three-legged horse" (n° 45), and the related note n° 43.

(\*) (24 October) This presence is often more or less totally concealed by the mechanisms of repression of great strength. I have the impression that in men, this yang drive tends to be pre-dominant over the complementary yin drive, and that the opposite is true in women. But cultural conditioning and the various ways in which it is internalised, both 'positive' and 'negative', interfere so drastically (and often complexly) with the play of the original drives that it is sometimes difficult to detect them behind sporadic, furtive and often degraded manifestations.

*Our own death*, like a "birth in reverse", returning us to our mother's bosom. (\*\*)

But it also means transgressing *two taboos* of considerable power: the *incest* taboo, which excludes 'The Mother' as the object of amorous desire, and the taboo which (in our culture at least) separates and opposes, like irreconcilable enemies, *life and death, being born and dying*. And yet I was already well aware that the act of love is *both a death*, achieved in the orgasmic spasm, and a *birth*, a renewal of being, *emerging from* this death... like a new shoot delicately sprouting from the nourishing earth, itself formed from the creative decomposition of the myriads of beings that have sunk into it... .

It was during this reflection on the meaning of the act of love, five years ago, that I finally understood that 'death' and 'life' were the wife and husband of the same closely entwined couple(\*), that life eternally springs from death, to be eternally abyssed in it. Or to put it better, that life eternally abysses in Death, to be eternally reborn from Her, the Mother, fertile and nourishing - She herself nourished and renewed ceaselessly by the eternal return to Her of the innumerable bodies of Her children.

And the human couple of wife and husband, lover and lover, when they live to the full the impulse that draws one into the other, is like a *parable* of these endless marriages of life and death: at the end of each night of love the lover sinks and dies in the lover, only to be reborn with her from that death in their common embrace. ...

At the beginning of this same reflection, I visualised an essential aspect of the division in

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(\*\*) I am convinced, moreover, that this content of the yang love drive is present in all living species and even beyond; that it corresponds to the same profound dynamic of all things in the Universe.

The idea is that every creative process (or 'act') is an embrace of yin and yang, of 'the Mother' and Eros the Child, re-turning and abyssing in her. From this 'death' (or 'birth in reverse') of the child returning to the Mother, the *fruit of the act*, the 'work', emerges as if from a nourishing womb. It is the appearance of the "child", the *new* thing, through the act of death and renewal of the "*old*" that gives birth to it. In this cosmic dimension, the original drive for sex has always been present, long before the appearance of the human species and even before the appearance of life (in the biological sense) on our planet.

(\*) (24 October) It's strange, then, that among the yin-yang pairs I noted a few weeks ago afterwards, the pair 'death - life' does not appear. Perhaps this is due to confusion with the related pair 'death - birth' (or better still, 'dying - being born'), which does appear, so that the former might seem to duplicate the latter.

the person, as a kind of '*cut*', a '*horizontal*' cut: the one instituted by the incest taboo that 'cuts' the child from the mother, just as it cuts life from its mother Death, and just as it also cuts a generation from the one that preceded it.

If I saw this cut first, it was no doubt because it was the very one from which I was exempt. However, my life, like everyone else's, has been profoundly marked by this other great cut, which I saw later in the course of reflection and which I called the '*vertical cut*': the one that separates the two 'halves' of the feminine and masculine in each being, and sets them against each other, tolerating only one to the exclusion of the other. This is precisely what I've been talking about in this long digression on yin and yang, which I've been engaged in for the last week or two.

It now seems to me that this division ('vertical') is even more crucial than the other ('horizontal'), that in a certain sense it implies or 'contains' it. After all, to *separate* the child from the mother, and life from death; to associate with death, as with the impulse that links the child to the mother, a feeling of *defilement, repulsion* or *shame* - is also to *cut off* from each other, to set them in opposition to each other, the husband and wife in those two indissoluble and primordial cosmic couples: mother - child, death - life(\*)).

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(\*) I've written the pairs here in the 'natural' yin-yang order, starting with the yin term, the 'original' term.

On the subject of the 'mother-child' couple, we should note that the term 'mother' also appears in a second important archetypal couple, mentioned earlier, the primitive couple of all 'mother-father', giving its name to the group it describes. (The 'mother-child' pair is a different group, the one I call the 'cause-effect' pair).

Moreover, the yang term 'child', in this same 'mother-child' pair, is also part of another archetypal pair 'old man-child', which is close to the very interesting pair 'maturity- innocence'. These two pairs form part of the group I call 'high-low', which is the richest (if only numerically) of all those I've detected so far. It contains many other re-markable pairs, such as *declinessor, dying - being born, destruction - creation, forgetting - learning, end - beginning...* In listing these few pairs, I had to go to great lengths to name them in the yin-yang order, going against ingrained habits. On the face of it, the new order looked a little zany, even bizarre - the world turned upside down, in short! On closer inspection, however, we realise that this unusual order reveals *another* aspect of the relationship between the two terms, an aspect that complements the usual aspect where (for example) 'to be born' precedes 'to die' - whereas we've just seen that 'to be born' precedes 'to die'. and although 'to die', in a deeper sense, precedes 'to be born'.

The same applies to the overall name of my reflection, 'Harvesting and sowing', which is undoubtedly a yin-yang pairing (which I'm discovering just now!). It is named in the opposite order to the usual yang-yin order, the harvest being supposed to *follow* the sowing, and not the other way round. However, the name

Interestingly, these last two pairings are not among those that I identified in the 'In Praise'. The 'death-birth' pairing(\*\*), on the other hand, which is more directly linked to my experience of love, does appear. The 'mother-child' and 'death-life' pairs only came to light in the course of my reflections over the last few days, among many others that had previously escaped my attention. One of the most interesting of these is 'evil - good'. This is one of the pairs (such as 'death-life') that can be called 'difficult', in the sense that powerful conditioning makes us see the two terms as antagonistic 'opposites', rather than as complementary; social. Clearly, this conditioning was stronger in me five years ago when I wrote *Éloge* than it is today. Yet in the Praise there were already a good number of 'difficult couples', including 'chaos-order' and 'destruction-creation'...

In retrospect, a somewhat deeper understanding(\*) of the nature of the different yin-yang couples, as forming a harmonious entity of inseparable complements, now seems to me like so many 'thresholds' to be crossed in our journey of discovery of the world and ourselves. Such a 'threshold' is all the more notable when the couple in question is more 'difficult'; in other words, when its apprehension as a 'couple' comes up against stronger inner resistance, an expression of cultural conditioning.

(<sup>114</sup>) (26 October)

Yesterday's reflection(\*\*) was a bit difficult to get started. This was no doubt due to the numerous interruptions over the last few days. However, since the day before, there has been one thing

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imposed itself on me without any ambiguity whatsoever, and without at any time even the idea that this name might have been the opposite, 'Sowing and Harvesting'. It was being confronted with unwelcome harvests that each time drew my attention back to the sowing from which they had sprung; as if the profound meaning and function of the harvest had been to lead me stubbornly back to the long-forgotten sowing of my own hand...

(\*\*) Please note that in this "death-birth" couple, the term "death" does not have the same meaning. The first refers to an *act* (synonymous with "death"), the second to a *state*. In German, there are two different words, 'Sterben' (without the rather cavalier connotation of 'trépas') and 'Todt'. In French, it seems to me preferable to refer to the couple as "*mourir-naître*", which eliminates the ambiguity over the meaning of the term "mort".

(\*) By this I mean an understanding that is not purely intellectual, but which manifests itself concretely through a changed relationship with others, with the world or with ourselves, through changed ways of being.

(\*\*) This is the reflection in yesterday's note (n° 116) which I have placed *after* today's note.

that I couldn't wait to put down on paper, if only in a few lines. Afterwards, I was very embarrassed to realise that it had been lost along the way, ousted by everything that came along! Today I couldn't bring myself to part with it prematurely, as if by misunderstanding, before I'd even really got to know it.

I had leafed through the recently republished "Zupfgeigenhansl"(\*\*), that classic of old German folk songs, compiled and published around the turn of the century. Apparently it had become impossible to find, but some German friends who were visiting me brought me a copy. That day (the day before yesterday) I had a quick look at it - before getting down to work, a bit like shaking hands with an old friend. I came across the song 'Wohl heute noch und morgen', which I skimmed through without really stopping, in a hurry to get back to my work. But something clicked. I could feel that these simple, seemingly naïve words were delicately touching something deep inside me.

- something more, very close to what I had tried so hard to evoke three days before. I was just about to rewrite my notes on the subject. Perhaps I had a vague feeling that the stanzas I had just gone through were more faithful and convincing messengers of what I would have liked to communicate, than my notes of peremptory brevity, written in the rush towards something else, as if in passing, while the emotion of an immediate experience remained absent.

When I got up this morning, I tried to translate into French these stanzas, the tune of which I didn't know, but which had been singing inside me for two days. Surely it was a way of rediscovering them, of letting their flavour and melody penetrate me. To my surprise, I didn't have too much trouble finding some of the rhythm and music of the German text in another language, which at first seemed reluctant, while remaining very close to the literal meaning. So here are the seven stanzas, rendered as best I could(\*)).

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(\*\*\*) In Wilhelm Goldmann Verlag (1981).

(\*) (29 October) The version that follows is one that was revised over the next three days. In the evening we sang and I was able to learn the tune of the song. Most of the changes to the initial version were made to take account of the rhythmic and tonal accent requirements in the sung text. Even if it is necessary to divide the syllables appropriately between the notes of the tune, it can be sung with the French text, without at any point having to do violence to the tonic accent (as is unfortunately common in some recent French songs).

"This day and tomorrow I  
will be with you  
but as soon as the third day dawns  
I'll be on my way".

"But when will you come back  
again, my sweet beloved?" "When  
the snow falls  
and when it rains cool wine!"

"No snow for dew and no  
rain for wine  
so, love my sweet beloved,  
you're not coming back either!"

I lay down in my father's  
garden, and as I slept a  
lovely dreamlet came to  
me.  
white snow on me snowing.

And when I awake, here is pure  
emptiness, pure nothingness -  
it was the pretty red rosés on  
top of me blooming...

Come back, boy, and walk softly  
through the beautiful garden  
wears a crown of rosés a  
goblet of wine.

With his foot he stumbled  
softly over the pretty  
monticulet  
fell - and snow rose also

rained fresh wine. ...

There was a joy, a happiness in me, as I groped for a way to render what I was reading, which with each passing moment became like a part of me. There was this bare, gentle beauty, at once calm and poignant, a serious beauty made up of joy and sadness intimately entwined. I don't think there are many people who aren't touched to some degree by a song like this, even though they would prefer not to be - as we often defend ourselves against an unexpected emotion, when something deep inside us that we didn't know existed suddenly resonates and speaks to us in silence about what we would prefer to ignore.

It is the dream, above all else, that has the power to make that resonate in us which must remain hidden, ignored, that which must remain silent. Perhaps only the language of dreams has the power to touch those secret chords within us and make them sing in spite of ourselves. And when, for a moment, you have allowed them to sing, even if it is a song of pain or heavy sorrow, you suddenly feel light and as if new - *washed clean*, as if abundant water had passed through your being and dissolved and carried away all that inside you that is knotted and hard and old...

When the poet is about to strike one of those chords whose song unleashes the inner waters, he instinctively borrows the language of dreams, at once limpid and charged with mystique - a language of images and parables, which baffles reason by its apparent absurdity, and by its secret obviousness goes straight to where it wants to touch!

There is no need here for the word 'death' to be uttered, or anything else that for the awakened mind relates to it. Yet *it* is present, and its misty face is that of the Beloved. The sleeping, distant Beloved whom you left long ago, and at the same time very close - both snow and the rosy pink that falls as snow and is born of snow.... . The force that draws you to Her is like a very deep and very powerful wave, a wave coming from Her who calls and bringing you back to Her. And the call is poignant sadness and the return is joy that sings in a very low voice, and joy and sadness are one and the same wave that carries you into the Beloved, with the unrepeatable strength of childbirth.

And there was no need to evoke, even in a single word, this longing and the surge of desire for you, *the child* - for the "boy" that the Beloved calls within Her. All it took was for a dream to speak of Her sleeping in her father's garden, dreaming of snow and waking up to roses, for that long-forgotten wave to awaken in you too, responding to the longing of Her who dreams and wakes, calls and waits...

(<sup>114</sup><sup>8</sup>) This old Silesian song is one of many love songs, old and not so old, singing of the mysterious and poignant amalgam of the *beloved* and *death*. The one I have just transcribed is perhaps exceptional for the profusion of images charged with meaning, and for the wealth of associations it provokes. It is not my intention here to go through them one by one, after mentioning one or two that struck me most strongly. When, yesterday and the day before, my thoughts returned to these hastily-read stanzas, it was not in the sense of deepening an emotion that remained primarily epidermal. Rather, it reminded me of the extent to which the themes of love and death, or of the beloved and death, appear to be linked, as if by some mysterious spell! And beyond the theme of death on the face of the beloved, they join up with that of birth - of awakening - roses out of sleep - snows, both mysteriously united in the poignant image of dew falling like snow, on She who is both dreaming and awakening, asleep in her father's garden.

The taboo may well inculcate the repulsion of death, its incompatibility with life as with love! You have to believe that it goes against some deeply rooted knowledge, or an impulse as powerful as it is secret, for what must be separated at all costs to seem so tenaciously to want to come together, taking the circuitous routes of symbol and dream, through the songs and myths handed down from generation to generation, from century to century.

No doubt many learned volumes have been written on the subject of these troubling amalgams, in an attempt to exorcise them as best we can. Despite such efforts, surely 'somewhere' within each of us, the deeper meaning of these tenacious associations can be perceived - at least in those moments when we do not deliberately close ourselves off to the emotion within us that welcomes these messengers, speaking to us about ourselves in the elusive and powerful language of dreams.

This 'profound meaning' is revealed to us anew, directly and with elemental force, by the experience of love, provided we dare to live it fully and listen to its obvious message. It speaks to us of the mystery of death and birth, indissolubly linked in the Act that transmits life and renews lovers.

No doubt I'm not the first person in whom this 'deep-rooted knowledge' has risen from the obscure depths where it had long been exiled, to become fully conscious and to impregnate all the more strongly my relationship with death and life, with the world around me.

world and myself. I have the impression, however, that written and published evidence of such knowledge at the conscious level must be rare. The only ones I've come across so far are three or four stanzas from Lao Tzu's Tao Te King(\*)).

On the other hand (and somewhat paradoxically), I also have the impression that the 'love-death' amalgam must, at some point, have become a kind of romantic cliché, a very reliable 'cream pie' to draw a complacent tear from even the most reticent eyes. It's a fact that the process, over time, has come to be discredited - so much so, alas, that even among people with delicate sensibilities, there is sometimes a tendency to confuse pure gold with its crude tin counterfeits. There are those who see an old-fashioned or even ridiculous air, even where there is a keen and delicate perception of a hidden reality, and a delicate expression, foreign to any 'fashion'. A consensus of 'good taste' comes to the aid of all kinds of inner resistance, which automatically blocks the eruption of any lively, authentic emotion, be it joy or sorrow, pleasure or torment, that shakes up the familiar routine.

It's the same mechanism that so often blocks the original power of the game.

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(\*) (30 October) I came across these passages from the Tao Te King towards the end of 1978. It was a striking, entirely unexpected confirmation of things I had been feeling strongly (some for a long time, others only recently...), and which I seemed to be alone in feeling this way. This 'encounter' was experienced as a great joy, a silent exultation. This joy, this exultation, carried the gestation and writing of *Éloge de l'inceste* over the next six or seven months. The conception took place in the days or weeks following this meeting. On a more modest or humble note, I have felt a similar joy over the last few days, in 'recognising' the emotion that had animated an anonymous poet (dead for centuries) when he sang of those dews that fall like snow, born absurdly, miraculously from 'lauter Nichts' - from 'pure emptiness, pure nothingness'; or to put it better, in rediscovering, through my own intimate experience, that *same* emotion, a sign of the *same* knowledge. It's the same knowledge that we also find in the Tao Te King, over more than four millennia - with the difference that in the Chinese text, this knowledge is expressed in the imagery, but by no means symbolic, language of a highly awakened consciousness, and not in the language of dreams (which is also the code-language of the deepest layers of the psyche).

The content that I recognised in these few stanzas from the Tao Te King obviously escaped the translators of the five or six different versions (in French, German and English) that I have had in my hands. I'm not surprised. Such messages, expressions of an understanding that goes against the grain of thousands of years of conditioning, communicate their true meaning (beyond the words and images used to express it) only to those who already know it through what they have been able to assimilate from their own experience, or to those in whom the work of assimilation is ongoing and who are already very close. ...

of love and its orgastic outcome. Fortunately, the mere fact that they remain hidden, banished from the field of consciousness, in no way prevents the archetypes that animate the amorous impulse from being present - from making what must appear vanish and disappear, so that the meaning of the game of love is expressed and fulfilled, and the final act is a creative act, a renewal. But often a secret *fear* stands in the way of the very 'pleasure' we think we are seeking, frightened as we are by the very presence of an unknown and formidable force, which risks (if we are not careful. . . ) sweeping away like chaff the one in us who insists on keeping 'control' at all costs. Such a fear cannot tolerate the fact that pleasure never approaches that threshold of poignant intensity where it is both pleasure and turn, united to each other in a long and intolerable embrace that seeks deliverance, to finally resolve itself and sink into orgastic nothingness...(\*)

(27 October) I think I've understood the secret message of songs and dreams like "Ce jour encore et demain...", in the *essence* they have in common. So the question remains: what is this force that so insistently pushes us to give voice to this 'deeply rooted knowledge', which is undoubtedly older than our species; to express it against all odds, overcoming the vigilance of the surly and narrow-minded *Censor*, taking the key to the field and giving free rein to it in the symbolic language of dreams, with its unlimited resources?

If myths, songs and dreams never tire of telling us the same message with countless faces, it is also true that the prisoner to whom they are addressed never tires of hearing them! He is a willing prisoner, of course, but he never *listens*. He is frustrated by the lack of air, space and light, and yet reassured by the four walls that surround an existence without any great surprises or mysteries, except perhaps death, which is at the end, infinitely distant... His prison protects him from the *Unknown* that lies beyond these walls and which he pretends to ignore. It both frightens and fascinates him. That's because the world beyond its walls frightens him,

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(\*) (28 October) It is this same fear, manifesting itself as a kind of *refusal* of pleasure, which at the same time pushes us to *isolate* pleasure from the whole of the experience of love, to reduce it to it and make it the finality (sometimes tacit, sometimes clearly expressed). "Love" is thus reduced to a 'search for pleasure' - an exchange of courtesies, in short, between two partners, like inviting each other to dine in four-star restaurants, if not the Folies Bergère. This 'pleasure', fearfully kept on a leash, is just as foreign to the original impulse as dry paint chips scraped off a painting by the hand of the Master would be to the painting; or as a hairdryer is foreign to the great sea breeze, laden with the scents of the sea and the land....

that his prison refuge is dearer to him than life itself. And yet it fascinates and attracts him, unwillingly, just as it attracts and fascinates him the messengers who come from far and wide to tell him about it. And sometimes he gives in to this unusual attraction, as long as it's in secret from the Censor - Supervisor General: while he pays lip service to it, he is nonetheless an "inch".

- he didn't hear anything, and above all, he didn't listen!

The question I was asking myself just now seems to have disappeared, swallowed up by a convincing image. It reappears as soon as I remember the *effect of* the message - the *emotion* that comes before the message, and the *benefit of* that emotion.

But in truth, *any* emotion that strikes a deep chord is a messenger from beyond the four walls, a messenger from the Deep. Even though we might try to erase every trace of it the next moment, it is beneficial, it has already left its mark, like a delicate perfume - as if those gloomy walls had parted ever so slightly; or as if, through some unsuspected opening in the aseptic air, some whiff, however tiny, of the scents of bowls and fields had reached us.

(28 October) It's been a bit reluctantly that, for the last fortnight or so, my thoughts have been going in a direction I hadn't planned, with no apparent link to the theme of the Funeral, or even (it might seem) to myself. I know deep down that this is not the case, that I continue to be involved in these notes as much and more than ever. That doesn't stop me from being torn between the desire to 'get it over with', and the desire to delve into what is glimpsed from day to day, to follow the most compelling associations - a desire that is matched by the concern, too, not to let anything slip that might shed light on my 'investigation' into the Burial. What seems most distant is sometimes also most intimately close...

The fact remains that for the past fortnight, if not ever since I resumed writing after the illness, I've had the impression (a little painful at times) that I'm doing things 'in a hurry', as if each new note were another parenthesis that I was opening (in front of an imaginary reader who would cry out in thanks) and that I had to close as quickly as possible! I'm sure it's this attitude, perhaps even more so than the unusual number of friends I've had over the last few weeks, that's responsible for my writing being so rushed and a bit jumbled at times. I've had to rewrite most of the notes I've written recently as I went along. This has

contributed to slowing down progress, and keeping my impatience to see the work move forward!

It's also true that these themes, which I sometimes pretend to want to deal with straight away, as if they were 'well known' things that I'd take the trouble to explain just for the sake of my conscience and for the benefit of a reader who's just 'arrived' - these themes are both too delicate and too far-reaching to tolerate such flippant attitudes. I couldn't help noticing this as the pages went by, and 'correcting my aim', by which I mean readjusting my inner attitude, under the weight, so to speak, of what I claimed to be able to tackle on the sly!

It reminds me that this long reflection on yin and yang, in which I have been engaged for nearly four weeks and which is by no means over yet, is in fact merely *the clarification of an instantaneous intuition*, which seemed to me quite simple, not to say obvious; an intuition that came 'in flash' the day after 12 May, when I had just written the first note on a certain 'Funeral Eulogy'. When I took up the rest of this note a month ago (\*), willing myself to follow this association of ideas, in preference to others that seemed to me of lesser interest, I foresaw that it would commit me to five or six more pages, at the very least. Now I'm over sixty...

Yesterday I considered the question of the meaning of the symbolic evocation of the links between love and death, or between death and birth, or life and death - and the meaning, too, of the emotion that such an evocation arouses in us. What is the force at work in the myth, the song or the dream, that drives them to "breathe into us without tiring of the same message with countless faces", - and what is the force in *us*, willing prisoners of reassuring prisons, that so often responds to them with this emotion, going ahead of the evocation and showing that it has "hit the nail on the head", that it has touched where it wanted to touch? And also: where does this strange power of dream language come from - language that evokes without naming, that communicates what no other language knows how to communicate?

Pursuing these questions also means probing more deeply the role of the love drive and the dream, and the profound links between them; each feeding the other and being fed by the other, each expressing itself and communicating with the other in a language that is common to them and that escapes the censor. It also means probing more deeply into the role of archetypes and

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(\*) In the note "Le muscle et la tripe (yang enterre yin (1))", n° 106.

of symbols in the love drive, and that of 'symbolic' satisfactions of the love drive.

All this is taking me far beyond the limits of what I can reasonably hope to 'fit' into this 'digression' on yin and yang, continuing (it's about time I remembered) right in the middle of a certain Funeral Ceremony! I think it's time to leave this new 'thread' there, and return to another 'thread' left hanging three days ago(\*), which brought me back to myself.

(<sup>115</sup>) (30 October) A few lines from a poem I wrote three years ago have been running through my head for a day or two now. I wrote it first in German, and the next day took it up again in French. It was the first two stanzas that went back up - the third and last seemed to have been erased from memory, apart from the first line "Ein Kreis schllesst sich".

- A circle is perfected". (And apart from the last line, which repeated that of the first stanza). When I woke up last night, my thoughts returned to it again, and I ended up getting up to look through my papers. I found the poem with no trouble at all - every cloud has a silver lining! And here it is.

Dense, ripe,  
heavy fruit  
my life leans  
towards the  
return to Elle

The sweet, thick juices  
soak into me  
have blossomed  
fragile milk flowers  
become fruit and wine

A perfect circle - in my  
lap  
gentle rise

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(\*) In the note "Le paradis perdu" (n° 116), placed *after* the present note n° 114).

describes its orbs  
and bends down to turn  
over  
in Her...

This is, I think, the only poem I have ever written in which the thought of death(\*) is clearly present. Here it appears under the name "She". In the original version of the day before, it was evoked by the German word "Erde", earth. The 'translation' of the three stanzas into German is far from literal; the first came as follows:

Voll und schwer  
reife Frucht  
neigt sich mein Leben  
gen Ende  
Der Erde zu

Die süßen Säfte  
die mich durchtränken  
haben geblüht  
weiche Blüten  
und wurden Frucht und Wein

Ein Kreis schliesst sich  
aus meinem Schoss  
steigt Süsse  
kreist  
und neigt sich  
gen Ende  
der Erde zu...

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(\*) I should rather write: the thought of *my* death. Two poems (each a few lines long) written in 1957, the year my mother died, are imbued with the presentiment of that death.

Finally, rewriting the original version in German just now, I couldn't stop myself from writing it all the way through, so much so that the next two stanzas seemed to flow spontaneously from the first! For me, these three stanzas are a love poem (in fact, I've hardly written any poems other than love poems). If this one is addressed to anyone other than myself, it is to *Her* - to the One who waits in silence, ready to welcome me...

On the same day, I wrote two other poems, one before and one after. They were addressed to a flesh-and-blood 'beloved', Angela, 'the Angel' - a tall, slender, blonde girl, very much alive, whom I'd met the week before, on the hot summer road where she was hitchhiking. In the space of an hour or two we'd had time to say a lot to each other, and we'd said goodbye on that note. I would have liked to give her the poems she'd inspired, including another one written on the evening of the day I'd met her, and yet another (again in German, our common language), which came the day after the 'three (almost) at once'. And I wish we'd loved each other too... But I lost track of her, just as she must have lost mine.

What the poems inspired by this encounter have in common is that each one is either very strongly 'yang' or very strongly 'yin'. They are some of the most intense I have ever written, and each came in one go, almost without retouching - as if they had been there ready-made and had only been waiting for the signal of this encounter to take shape in tangible words. At first glance, it may seem strange to find among these poems charged with intense erotic tension, another poem in autumnal tones, preparing to enter the long sleep of winter. But it would surprise anyone who does not sense the profound link between erotic impulse and the feeling of death. In those days of solitude, there was an intense perception of life, amplified by erotic emotion and the profusion of archetypal images that underlie it - and *at the same time*, the serene detachment of a life fully lived. nearing its end, ready to "return to Her".

Such a state of communion with death, our silent Mother, felt as a friend and very close, is surely favoured by a state of great fatigue of the body, bringing us back to simple and essential things: our body, love, death... I was just coming out of a 'long period of mathematical frenzy', which I mentioned in the introduction to *Récoltes et Semailles*(\*). I was just beginning to recover from a state of

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(\*) See "Dream and Fulfilment", especially page (iii). The "period of frenzy" in question extends from February to June 1981. It was also the period of the "long march through Galois theory" (see section

of physical exhaustion in which this somewhat demented period had left me. It had just ended (as suddenly as it had come) under the impact of a dream-parable of lapidary force, whose message I was willing to listen to (\*\*). Those were days of availability, of listening - a 'sensitive period' between two waves: behind me a long, broad 'mathematical' wave, and in front of me an equally broad 'mediation' wave that was already taking shape... It was to gain momentum ten days later, with another dream, the account of which opens the introduction to *Récoltes et Semailles*, this vision of myself 'as I am'.

These were weeks of intense inner work, of silent gestation, of change. And these love poems, different in tone from anything I'd written before, are the fruit and testimony of that intensity, that fulfilment.

They are also the last love poems I ever wrote. Perhaps there was a prescience in me that this was the last time I would be in love, and that the great fireworks of songs for the beloved would unfold! A prescience that these poems, addressed to an unknown girl whose beauty I could feel intensely without ever having met her, were at the same time a *farewell* to the songs of love and to the women I had loved - a farewell to my passion for love, which was about to be consumed in this sparkling spray, and which was about to leave me. And, even more secretly and profoundly, it was a farewell (or a goodbye, perhaps...) to *all the* women, merging and becoming *One* under a new face. A more distant face perhaps, drowned in mist, at the other end of the road - but at the same time very close, and very sweet...

(<sup>116</sup>) (25 October)(\*) Once again three days have passed without me finding the time to pour-

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"L'héritage de Galois", n° 7). This led to a long period of meditation on my relationship with mathematics (see the sections "Le patron trouble-fête - ou le marmite à pression" and "Le Guru-pas-Guru - ou le chevale à trois pattes", n° s 43 and 45). This runs from 19 July to December 1981. The poems to Angela (and the poem to "Her") are dated 8 and 9 July (except for the very first, dated 1 July).

(\*\*) See the beginning of footnote no.° 45, cited in the previous footnote.

(\*) (1 November) This note predates the two preceding ones, written between 26 and 30 October, which form a direct continuation and a deepening of the one that immediately precedes them, "L'Acte" (n° 113, dated 21 October). The present note is more closely related to the end of the note of 17 October (no.° 112) which precedes it, namely "La moitié et le tout - ou la fêlure" (The half and the whole - or the crack). From this point onwards, the reflection had split into two parallel paths: one (on the feeling of death and its link to the love drive) continuing in the three Notes (presented as consecutive) 113, 114, 115, and the other begun with the present Note n°

to keep up the momentum. The first day, Monday, was mainly taken up by a visit from Pierre and his daughter (aged two) Nathalie, whom I took home late in the evening to catch the night train to Orange. In a few days' time, it will be time to take stock of what this visit has brought me - a visit I wasn't counting on any more. . . For the moment, I'd rather continue my rambling reflections on yin and yang.

This reflection may seem like a philosophical digression, suddenly bursting into a certain *investigation* where it would have no place - except that it emerged unannounced from some vague associations of ideas around a certain Funeral Eulogy... However, I have a strong feeling that it is precisely with this 'digression' that I am beginning to go beyond the stage of uncovering all the '*raw facts*' that make up L'Enterrement (\*\*), to get closer at last, if only a little, to the *forces* at work behind acts and behaviour that seem strangely aberrant... It's surely no coincidence that it was precisely through this 'digression' that I was also led, without having planned it, to involve myself in a more profound way than at any other time in Harvest and Sowing. This is one of the unexpected fruits of the recent episode of illness, which occurred at a time when I was preparing to bring the investigation of the past seven weeks to a swift conclusion...

This 'digression', then, in which some will see a kind of intimate confession, and others a metaphysical speculation, is for me (more than any other part of Harvest and Sowing) at the very *heart* of Burial, at the heart of the conflict. It is only the optics that have changed, the 'point of view' from which the thing is viewed - but changed so drastically that the thing we had just been examining suddenly seems to have disappeared! It won't be long, I think, before we rediscover the contact that might have seemed lost along the way, with the 'news item' The Burial.

But we can also forget about the news item, whose main merit will then have been to provoke a 'digression'...

Part of yesterday was spent retyping the draft of the previous note, written four days ago, which I finally named 'Our Mother Death - or the Act'. A

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116.

(\*\*) (14 November) This statement made 'in the heat of the moment' is not carefully considered, and is only partially founded. For a more detailed and nuanced overview, see the note "Retrospective of a meditation".  
- or the three panels of a painting", n° 127.

A good part of this draft was quite heavily crossed out, a sign that the formulation had remained a little confused, while certain important and delicate themes had crept into the reflection a little 'by the by', in the wake of something else. To tell the truth, when I wrote this note I was mainly intending to pick up the thread of the previous note, entitled 'The half and the whole - or the crack', written just a week ago. But in the end this thread remains unfinished, and it's about time I picked it up again.

For this note too, I had to retype a large part of the text, essentially for the same reasons, rectifying clumsiness and obscurities along the way. This is the beginning of a reflection on the *division in the couple*, intimately linked to the *division in the person*, and more precisely to what I called (in the 'Act' note of four days ago) the 'vertical cut': that which 'cuts off', or subtracts, one of the yin or yang 'halves' of the original 'whole' within us.

At a level which at present remains that of an intuitive, non-verbalized understanding, I 'understand', it is 'clear' to me, that it is the division within the person himself (a division created from scratch, it seems, by conditioning) which is the root cause of the omnipresent conflict in human society; be it conflict within the couple or the family, or conflict within larger groups or between such groups, right up to the armed confrontation of peoples and nations against each other. The conflict within a couple, which pits two antagonist-types against each other, distinct and easily recognisable as such, could not without reason appear as *the* fundamental parable, as *the* elementary, irreducible case of conflict in human society. The 'point' of the reflection 'The Crack' was above all to bring the case of the conflict in the couple back to this other more fundamental, even more 'elementary' case: that of the conflict in each person himself, which opposes a 'part' of himself to another part.

In the light of this reflection seven days ago, it was natural to think first of the conflict between the yin and yang 'parts' in us - one of the two being accepted and duly brought forward and inflated, the other more or less completely rejected and repressed. I was aware, however, that there were other antagonisms in the person linked to taboos other than that of *the univocity of sex*. It's true that this last taboo, just as strong as that of incest, is even more insidious because of the obviousness with which it is revealed, which seems to obviate the need even to formulate or name it, so much so does it seem to go without saying! Although I haven't yet taken the trouble to check it out step by step, I have the impression (since the

It is a taboo that is the most crucial of all; that the division or 'cut' it institutes in the person is the ultimate root of each of the multiple aspects of inveterate division in the human person. Carefully clarifying the extent to which this is the case would surely be a most attractive starting point for a 'journey of discovery of conflict'. However, this is not the place to launch into it - not to mention the fact that, as far as the journeys ahead of me are concerned, I can think of more burning starting points than this... .

In retyping the text of this note 'The half and the whole - or the crack', I realised that when I wrote it I didn't think to explain *why* I saw the conflict within the person as the root cause of the conflict within the couple, and of the conflict within society. As I said earlier, this is one of those things that I have 'understood' (without ever having had to 'explain' them to myself), that have been taught to me and confirmed by the silent and eloquent language of a thousand little everyday facts, over the course of days and years(\*). I'm not saying that there's no point in spelling out or 'explaining' the 'why' and the 'how' here, whether in a few pages, or in imposing volumes perhaps. And no doubt a few pages on the subject here would be no more or less 'out of place' than any other page on yin and yang and conflict, which has already found its place in these notes. I'm sure I'd learn a lot there, just as I'd learn a lot by pursuing this other theme of reflection, on the conflict instituted in us between yin and yang as the ultimate cause of the division within us.

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(\*) This "understanding" or conviction is not really contradicted, it seems to me, by the observation I have made many times, that the division in the couple formed by mother and father, and the antagonistic attitudes which express it, leave a deep mark on the child, and often dominate the attitudes and behaviour of the adult. It is surely fair to say that, to a large extent at least, the division within us is the mark and legacy of the division that, in the days of our childhood, pitted our mother against our father. So the question of deciding whether the division in the person is more fundamental or 'elementary' than that in the couple, or vice versa, may seem a bit like deciding whether the chicken comes out of the egg or the egg out of the chicken!

I am convinced, however, that in a couple where one of the spouses is 'one', not in conflict with himself or herself, and even if his or her spouse maintains an antagonistic attitude towards him or her, the conflict would *not* be transmitted to the couple's children. The reason for this conviction, I believe, is that the child in this case would be totally *accepted* by one of his parents. The appearance of division in the young child seems to me to be no more and no less than the effect of the *rejection* of part of his being by those around him, and first and foremost by *both* parents.

One of these themes is clearly an extension of the other, which makes both even more appealing! However, that's not the direction I want to follow right now, if at all. That's not the 'thread' I've been wanting to pick up for a week now, and which is still hanging in the balance.

When I finished the reflection in this note (\*) a week ago, I suddenly felt very happy and rejuvenated: the reflection had unexpectedly reconnected with something important that I had somewhat lost sight of in the previous days: *acceptance*. It was through the negative that this contact was re-established, by virtue of the word that ends this reflection like an unexpected climax - the word '*unacceptable*'. It is because a whole 'side' of us is rejected as '*unacceptable*' by those around us, and first and foremost by our parents who set the tone (or by those who take their place, when parents fail) - it is through this *non-acceptance* that conflict sets in within us. The conflict and division within us is nothing other than our *abdication* of a repudiated part of ourselves - the abdication of our undivided nature. This abdication is the price we pay, that we must pay, in order to be '*accepted*' as best we can by those around us.

This '*acceptance*' is not acceptance in the full sense of the word, acceptance of who we really are. It is, rather, the *reward* for our submission to certain *norms*, for conforming and moulding ourselves according to them - the reward, in short, for a *deformation*, a *mutilation* of our being, just like that suffered from an early age by those around us.

In the reflections in the previous notes, acceptance was mentioned twice, and both times it appeared to be crucial. The first time was in the note "Innocence (the marriage of yin and yang)" (n° 107), where I take up an observation that goes back to a meditation I did four years ago: that the blossoming and full development of an undivided force within me took place in the context of a family torn apart by conflict and latent hatred, *simply because I was fully accepted by my parents* and those around me. The conflict did not take root in my being until later, after the age of five, in a much more '*peaceful*' environment than my birth family. Conflict between close relatives was certainly far from reaching (in my time at least) such exacerbated intensity (even if veiled) as in my family of origin. However, in

this time my own person had remained *outside the conflit*. Even though I sometimes took sides, it wasn't a heartbreak, it was the spontaneous expression of an undirected being, who had never known the bite of rejection by his own kind, and the fear of rejection.

I realise now, with half a century's hindsight, that even in my new environment, this force of innocence within me exerted a radiance, a kind of fascination I would say; like that of a *lost paradise*, infinitely distant, for which you might be nostalgic for a lifetime and which, suddenly, calls out to you through the voice and eyes of a child. It won me strong and lasting affections, which followed me into my adult life and right up to the death of those who loved me in this way(\*). But at the *same time*, it went without saying that this kind of strength *could not be tolerated* - any more than you would tolerate it in a tidy pleasure garden, in a vigorous, exuberant tree or bush that you think you love while stubbornly pruning it into the shape of a cube, cone or sphere...

According to my reconstruction of events(\*\*), this force held out for perhaps two, two and a half years, before plunging deep, relegated to the underground, after I had finally decided to be and do like everyone else: all muscle, all brains, you guessed it, and so much the worse for the gut - and to have peace! I ended up following suit, *rejecting* and denying (while ignoring) everything that needed to be rejected and ignored, thanks to the unwavering consensus of all the adults around me. And also because of the consensus of my parents themselves, who had ended up almost giving up, living their true love as far away from their children as possible...

(<sup>116</sup>) (1 November) I'm picking up where I left off exactly a week ago, when I unexpectedly (on 26 October) launched into a kind of 'poetic digression' on the feeling of death in love and in love songs.

I have just reread the previous pages from 25 October and retyped the last one. It seems to me that a circle is closing, the outline of which began a fortnight ago with the note 'The flowering of strength - or the wedding' (n° 107). This outline ends with the preceding pages, which take up and amplify the final 'climax' of the note of 17 October, 'The half and the whole - or the crack' (no.° 112). This climax, or 'final word', which brings that day's reflections to a close, can be summed up in the categorical imperative of the final word, the

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(\*) I can think of seven people who gave me their affection in this way, only one of whom is still alive today. (\*\*\*) I made this reconstruction of the key events of my childhood in March 1980.

word "*unacceptable*".

This fine word seems to me to perfectly encapsulate, among the bewildering multitude of conditions of all kinds that have shaped our lives, *the determining cause of the division within us*: it is the *non-acceptance, the rejection* of our person, in the first years of our lives(\*). It takes the form of the non-acceptance and rejection of certain forces and impulses within us, which are an essential part of our being, of our power to know and to create. Their repression, taken over on our own account by a worried and implacable Inner *Censor*, is a mutilation of this power within us. Often the effect is to paralyse our creative faculties (\*\*). This unacceptable power, or these 'faculties', are none other than the humble ability to be ourselves. In other words, to live our own lives, through the humble and full use of our own faculties, rather than a stereotyped, programmed life, driven above all (and often exclusively) by reflexes of *repetition* and *imitation*. These reflexes enclose and isolate us like a heavy, rigid, impermeable shell from which we can never remove ourselves (\*).

The shell is built up from our earliest years, growing thicker as the years go by. Its initial function was undoubtedly to protect us from aggression (often well-intentioned) from those closest to us, and to ensure that they would tolerate us in a more or less benevolent way. But this shell doesn't just protect us from the outside world - it also has, perhaps more profoundly and essentially, the function of isolating us, of protecting us *from ourselves*: from this knowledge and this force within us, declared '*unacceptable*', having no place, by the silent consensus that rules around us. It was in our childhood, and has become more and more over the years, a shell with *two sides*, one 'outer', the other 'inner'. They protect the 'I', the 'Boss', on the one hand from the aggressions he fears from the outside world (and he tends to become more fearful with each passing year!), and on the other hand and *above all*, from the disturbing and inadmissible fantasies and incongruities of the 'Worker'; the *brat*, to put it better, unpredictable to the possible, worrying even though he is kept at a distance by a triple layer of horn.

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(\*) My own case was exceptional in this respect, as I was only exposed to such attitudes from my immediate circle from the age of six.

(\*\*) (2 November) Often, and more ostentatiously, it also manifests itself in the form of "flocking" effects. the inability both to 'function' in the situation in which we find ourselves, *and* to disengage from this dead-end situation... .

(\*) Apart from the hours of sleep and dreaming, when the shell becomes lighter and sometimes even disappears...

thick, guaranteed fire and water resistant. ...

(2 November) After the note 'Innocence' (n° 107), which highlighted the role played by my acceptance by those around me in my early years, there was a second moment when 'acceptance' and 'non-acceptance' were at the centre of the reflection. This was in 'L'acceptation ou le yang dans le yin' (note n° 110), where I take partial stock of the changes that have taken place in me since the day of my 'reunion' with my inner child. They point in the direction of a gradual 'return' to a 'state of childhood'.

This return is by no means a 'regression' to a previous state, which would have the virtue of erasing the traces in me, the traveller, of the path that was mine. It is only through *maturing*, the fruit of inner work, that we can regain contact with an innocence that seemed to have disappeared, with a child within us that seemed long dead and buried. And there is no maturing that is not also, to some extent, a return to the child, and to the simplicity and innocence of the child. This is how a life fully lived is like a circle that is still being 'perfected'; it is old age returning to childhood, maturity returning to innocence - and ending in a death, perhaps, that prepares a new birth, like a winter preparing a new spring...

In this sort of 'assessment' of a return journey that is not completed, it became clear that the 'final word' was *acceptance*, just as the final word of my path of rupture, of the path of departure, was that of *non-acceptance*, of rejection, of refusal. My maturation was nothing other than the process, the inner work, by which I gradually accepted, welcomed, the things in me that for a long time I had refused, eliminated as best I could, ignored.

This is by no means a 'backtracking', a path travelled once and then retraced again in the opposite direction; a 'regression' therefore, to use the expression from earlier. It's more like the upper arc of a cycle, extending and continuing the lower line already traced, *growing out* of it, becoming like its nourishing foundation, and the springboard for a new impetus. ...

(3 November) Yesterday's notes ended with an unexpected image, springing from my thoughts without my having called for it. I greeted it with some reluctance at first, out of concern that the vision of reality that the image in turn immediately suggested might be artificial.

the image doesn't 'force my hand' and make me say things that would be 'far-fetched'.

hair'. But once the last lines had been written and I had stopped to think about them for a few moments, I knew that I had just put my finger on an unexpected and important aspect of a certain reality; an aspect that is perhaps familiar to me, but not fully assimilated, an aspect that I tend to neglect or forget.

For many years (<sup>118</sup>) I've tended to value what goes in the direction of 'acceptance', and on the contrary to see in a mainly negative light what goes in the direction of 'rejection'. Perhaps without always expressing it clearly, I felt that these two types of attitude, acceptance and rejection, were 'opposites', one of which would be 'good' for myself and for everyone, and the other 'bad'.

In this informal way of looking at things, I remained a prisoner (without realising it, of course) of the perennial 'dualistic' vision of things, the one I had also previously called the 'warrior' vision, which opposes as antagonists things that a deeper vision reveals to us as *complementary* and inseparable *aspects* of the same reality. When I began (on 25 October, ten days ago) the present reflection on acceptance and refusal, I had just realised that these are the wife and husband of one of those famous yin-yang or 'cosmic' couples we've been talking about for the last month - since the beginning of this 'digression' on yin and yang. So I anticipated that this aspect of things would be the focus of our reflections. Over the last couple of days, it seemed to be moving away from it. But now the lines that conclude yesterday's reflection, with the image of the two arcs of the same cycle continuing each other, have unexpectedly brought me back to this initial intuition, which had remained unexpressed. I've tended to see the *rejections* that dominated my life from my eighth to my forty-eighth year in a predominantly (if not exclusively) *negative* light: as a sometimes crushing *weight* that I dragged around for forty years of my life, and which I finally got rid of (or rather, *started to get rid of*) over the past eight years. That 'day' began to reveal itself to me after the discovery of meditation and the 'reunion' with the 'child' in me. It was the very moment when I began to discover the process of refusal in my life, expressed in a kind of 'superyang conformism'. This aspect of things is by no means imaginary. To perceive it where before there had been a kind of 'blank', a total emptiness, was one of the fruits of the maturation that has continued over these eight years. But there is another aspect of the same reality, no less real and important, the 'positive' aspect of the '*powerful principle of action*'.

This aspect appears for

the first time (and very discreetly) in the meditation of 5 October "Yang buries yin - or the Superpère" (n° 108), when I write :

"The "I'll be like them" (and not "like me") also meant: I'm going to "bet" on "the head", no worse in me than in anyone else after all, and "beat" them with their own weapons ;'

It was this motivation that was the driving force behind my excessive investment in mathematics from 1945 to 1969 - the force that fuelled a quarter of a century of discovery (\*). Whether one chooses to see such investment in a 'positive' or 'negative' light, what is clear is that there was indeed *momentum*, intense *action*. On the learning side of life, there was this 'sometimes crushing weight', never examined, not to say total stagnation - and yet this same 'weight' at the same time fuelled a surge of knowledge, gave it its living force.

Since my 'departure' in 1970, I have tended to play down, and sometimes deny, the 'value' that should be attached to such an impulse towards discovery and a so-called 'scientific' understanding of the outside world. I have tried several times in the course of Harvest and Sowing to identify the common aspects between such a discovery and self-discovery, and also how they differ (\*\*). It is certainly true to say that the drive for discovery in a scientific direction (be it biology, or 'psychology' . . . ) distances us from ourselves and from an understanding of ourselves. When the role of such an understanding is fully understood, we might therefore be tempted to see in the impulse of scientific discovery (and in any other that would 'take us away from ourselves') an 'evil', or at the very least, an 'obstacle' to maturation, and hence to the full development of ourselves (at least in the case, which was mine for a long time, where this impulse mobilises most, if not all, of the psychic energy). However, it is also true that everything we experience is raw material for learning about life and about ourselves. It's a *material that it's up* to us to allow to be transformed into knowledge, by allowing a process of maturation to begin and continue within us. That's also why I don't regret anything I've experienced, seeing in the end that "it's all good, and there's nothing to throw away"; including the deserts of long periods of stagnation.

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(\*) It was, more precisely, the *egotic* component of this impulse, the egotic 'factor' of this 'living force'. (\*\*) See in particular the sections "Desire and meditation", "The forbidden fruit", "The solitary adventure", n° s 36,  
46, 47.

I was paying a high price (with my eyes closed...) for my inordinate investment in an all-consuming passion. Now I see that these very deserts had something to teach me, something that perhaps only they could teach. I couldn't have done without them - at the very most I might have been able, after a few years, to begin this 'second arc' of the cycle that I've been putting off for several decades.

It was also on this day that it became clear that the acceptance of myself and of others that was born and developed in the years of my maturity was 'nourished' by the refusals that had marked the longest part of my life - this 'lower arc' of the cycle mentioned yesterday, and its 'nourishing foundation'. It's true that in the first six years of my life, there was a total acceptance of myself, which in no way needed previous 'rejections' in order to be, to unfold and to assert itself. On the contrary, it was able to blossom precisely because it was *not* countered, not cut by the scissors of a certain refusal. But this 'acceptance' that was in me as a child is not '*the same*' as that of my mature years. It lacked a dimension that the mere acceptance of me, by those who had surrounded my childhood, could not have given it. It was a knowledge of *rejection*, of the rejection of myself (or part of myself) by others, or by myself. This knowledge came to me through the experience of rejection, and also through the experience of contempt, which is one of its many faces.

Perhaps some people are born with a knowledge, an understanding of rejection, that enables them to remain *one*, innocent and knowing, despite the rejection to which their childhood is exposed. I am well aware that this was not my case. I could not avoid the experience of rejection and contempt by others and by myself, as a breeding ground for an understanding (however imperfect) of rejection and contempt.

(<sup>117</sup>) I have just probed an unexpected aspect of the relationship between refusal and acceptance in my own life, which had appeared unexpectedly in yesterday's reflection. The 'refusal' in question here is not, however, a refusal in the full sense of the word; by which I mean a refusal that is fully accepted.

— that's as far as it goes. This refusal was also a long *flight* from the thing refused. It consisted in *not seeing it, in ignoring it*, and thus, to a certain extent, in making it disappear from the field of my conscious apprehension and also from the field visible to others. It has been the cause and the source of a state of disharmony, of imbalance - in this case, a 'superyang' imbalance, which has

my adulthood, and certain crucial mechanisms of which are still in action today. This 'refusal', then, in no way appears here in a role of symmetry, or even yang-yin complementarity, in the face of the 'acceptance' (of myself and of others) mentioned earlier. On the contrary, it is part of a process of getting to know myself, and of restoring a disturbed harmony. In other words, it's acceptance 'with full knowledge of the facts', acceptance in the full sense of the word.

— and not of another flight, in the opposite direction to the flight so often called "refusal".

There is, however, a more obvious relationship between 'refusal' and 'acceptance' than the one explored earlier. It appears when both are taken "in the full sense of the word". They are then *simultaneous* and complementary aspects of the same harmony, of the same fully assumed attitude (whereas earlier they were two *consecutive* aspects of a journey or progression, passing through a state of imbalance, of disharmony, on the way to a renewed equilibrium). From this point of view, there is no such thing as 'true' acceptance, which would exclude refusal and close itself off from it. And there is no 'true' refusal that is not born of acceptance, that is not a tangible manifestation of it; that is not one of the two 'sides' - the 'yang' side and the 'yang' side - of acceptance.

— of the same indivisible thing which comprises two, and whose "yin" or "mother" side is acceptance (\*).

An 'acceptance' that excludes refusal is not an acceptance, but an indulgence (to others or to oneself, or both), or complicity or connivance (in the case of the 'acceptance' of others). Total acceptance of a being, whether oneself or another, in no way implies unconditional approval of one's actions, habits and inclinations. Such unconditional approval is in itself an *escape*, a refusal to take cognisance of an (often eloquent) reality, and in no way an acceptance. Far from creating a 'force field' conducive to renewal, to getting back in touch with yourself, it is a form of resistance.

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(\*) It's interesting to note that this 'natural' distribution of yinyang roles in the acceptance-rejection couple (expressed in French by the feminine and masculine genders of each term of the couple) is *reversed* in the image that had spontaneously presented itself to me at the end of the previous day's reflection. That there can be such reversals is hardly surprising - just as in a lover-lover couple, where the love relationship is not set in stone, there are bound to be moments when the roles in the love game are reversed, to give free rein to the 'yang' erotic impulses that live in the lover, and the 'yin' erotic impulses that live in the lover. I talk about the importance of such occasional role reversals in the Note on Acceptance (the yang in the yin) (n° 110, last paragraph of the first part of this Note).

with a forgotten unity, it reinforces inertia and helps to keep us in a rut. A refusal that is not at the same time an opening, that is not also like a hand (or 'a perch') extended to others, or like a leap that marks a point of rupture and renewal in our relationship with ourselves - such a 'refusal' is truly a cut, which 'cuts' and isolates both the person who refuses, and the person who is refused. It is yet another flight from a reality that is felt to be unpleasant, even disturbing, fraught with threats to our well-established lives and conveniences - a reality from which we believe we can escape with a slap on the wrist: "there's no point" . . . And yet it *is*! And our imperative 'refusal' in no way prevents things from being what they are, even at the risk of displeasing us. On the contrary, just like the complacency of an automatic approval, such a refusal reinforces the inertia against creative change; it is like a *verdict*:

unacceptable you are, and such you will remain...

I don't claim to have achieved in myself the harmony of full acceptance and rejection. On the contrary, I know that this is not the case - and I'm not sure I've ever met anyone who could achieve this harmony. To achieve it is also to have resolved, in one's own person, the great enigma of 'evil': of iniquity, of lies, of wickedness, of spinelessness, of contempt - and of the suffering of those who are struck down and left speechless. It is also, surely, to have fully understood the 'good' that lies in what an inner awakening so often designates as 'evil'.

To reject war, while seeing and accepting that it is everywhere and in everyone; that the very people I love carry it within them and propagate it, just as I myself have taken it up, carried it, propagated it and passed it on. To reject war, while accepting that it exists, while loving its countless blind soldiers. That and nothing else, surely, is what it also means: to have come out of the war, to have emerged from the conflict - to have stopped propagating the war.

(<sup>118</sup>) (4 November) (\*) This 'trend' (\*\*) emerged in the early 1970s, in other words in the years following my 'departure' from the mathematical scene. Under the influence of an environment and friends quite different from those before me, there was a drastic change in the set of 'values' I claimed to hold. With hindsight, I can describe this shift as a transition from one 'superyang' or 'patriarchal' value system to another.

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(\*) This note is taken from a footnote to the "Cycle" note (n° 116). See the reference at the beginning of the notes of 3 November.

(\*\*) The tendency to value "acceptance" as opposed to "refusal".

almost opposite, with a strong 'yin' predominance - a 'matriarchal' system. Among the influences that played a part in this reversal, there were also some sporadic readings of Krishnamurti - see on this subject the note "Krishnamurti - or liberation become hindrance" (n° 41). If I then allowed these influences to play a part, which were to lead me towards such an 'ideological' turn, it was undoubtedly (without realising it at the time) that there was a deep and urgent need for renewal within me, and first and foremost, the need for liberation from the weight of inveterate 'superyang' attitudes. This same need had surely already come into play in 1969, when in the midst of intense and fruitful mathematical activity, I suddenly 'dropped out' of maths to take an interest in biology (\*\*\*) ; and then the following year, when I left the mathematical scene and even scientific research (with no desire to return). There was then a sudden and drastic change of environment and activities, to which I have alluded on several occasions. times during "Fatuity and Renewal" (the first part of Harvest and Sowing).

However, it would be inaccurate, or only partially true, to consider these spectacular changes in environment, activities and finally 'values', as a 'renewal', a 'liberation'. I've already made my views on this quite clear in the section entitled "Meeting Claude Chevalley - or freedom and good feelings" (n° 11). In the more penetrating light of the present reflection on yin and yang, I can say that the change that probably appears to be the most significant of all, that of yang values being evacuated (even before they had been spotted in myself, let alone examined) in favour of yin values - this change in no way altered the structure (superyang) of the 'self', and at most tempered somewhat the attitudes and behaviour that resulted from it. It's true that my understanding of the outside world had been considerably transformed, in the sense of a sudden enlargement - but this transformation remained fragmentary, limited almost exclusively to the intellectual level, that of 'options'. It could not have been otherwise, precisely as long as this transformation was limited to my vision of the 'outside world', in which my own person did not figure, or figured only incidentally or superficially, above all through my 'social role' and its ambiguities and contradictions. No more than in the past did I have the slightest suspicion that there might be ambiguities and contradictions in *my own person!* On the contrary, I was driven by an unshakeable conviction that my person was free of all contradictions (whereas

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(\*\*\*) I first became interested in molecular biology under the influence of my biologist friend Mircea Dumitrescu, who introduced me to this fascinating world.

I was beginning to discern contradictions in others, all around me); and in particular, that there was perfect agreement between my conscious desires and my conscious understanding of things on the one hand, and my unconscious (if there was one in my case, if it wasn't just a carbon copy of my conscious...).

The first crack in this conviction only appeared in the spring of 1974, when I finally understood that something must be wrong with *me* too, and not just with other people, as the cause of this inexorable deterioration in my relationships with everyone close to me (to which my life then seemed to have been reduced throughout my adult life). The effects of this salutary fissure remain limited, in the absence of any real *curiosity* about myself, which would have been a feast for the eyes, to look behind it, and see a heavy edifice crumble in the process, made up of abracadabra illusions that have never been examined...

This stubborn blockage of a natural curiosity probably stemmed above all from the fact that I had never before encountered such curiosity in others, which could have made me suspect that in life as in maths, every time a problem arises, there is something to look at and, in the process, learn a lot of unexpected and very useful things - in other words, that there was such a thing as *self-discovery*.

I had read Krishnamurti at the time, and had come to realise that some of the things he said were true, profound and important. So I tended to take him at face value on everything. I had more or less tacitly adopted the Krishnamurtian (\*) world view. At the time I'm talking about, this baggage did indeed act as an 'obstacle' to a real liberation, to renewal in the full sense of the word. I explain myself on this subject in the above-mentioned note (which I've just reread) v where I try to identify the role of the 'Teachings' (of Krishnamurti) in my own journey.

The first 'awakening' in the full sense of the word took place just two and a half years later,

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(\*) (5 November) The effect in my life of this 'adoption' of a vision, becoming a kind of cultural baggage, has been very limited. My attention was drawn to certain aspects of reality that had previously escaped me completely, but without any in-depth work of sorting and assimilation being set in motion, with the power to renew. If Krishnamurti was important on my itinerary between 1970 and 1976 (between my 'departure' from the mathematical scene and the discovery of meditation), it was not so much because of the 'baggage' I borrowed from him, but because he had become (unbeknownst to me, of course) a tacit *model*, to which I conformed without wanting to appear to do so - the model, in short, of the 'Guru-not-Guru', of the Master who denies being one.

with the discovery of meditation. It was also the discovery of self-discovery; that there is an *unknown thing* that is 'me', and that I have the power to penetrate this thing, to know it. This crucial discovery was made at a time when all teaching (with or without a capital letter) had been forgotten. It was also the moment when, for the first time, the 'edifice', built of received ideas and 'teachings' of all kinds, held together by an immense inertia, collapsed - and the moment when an active curiosity appeared, often mischievous, and always benevolent.

It was after this turning point, with the blossoming within me of a curiosity about myself first and foremost, and about 'life' in addition and as a natural fruit, that I was able to see both Krishnamurti and his message with new eyes. With hindsight, I was able to appreciate the richness of the message, and at the same time to discern its limitations and shortcomings, as well as certain fundamental contradictions in the Master ('the Teacher', for his disciples and followers). The most serious of these shortcomings and contradictions seems to me to be the one I have just touched on again: the absence of any curiosity in the Master himself. There is nothing in his writings to suggest that in days gone by, this vision was *born* in a *person* - a person caught, like you and me, in the net of ready-made ideas and contradictions that have never been spotted; that the vision was *decanted from the heart* in the course of intense, sometimes painful *work*, against the current of immense forces of inertia; that the stages of this work, or the 'thresholds' crossed in the course of these labours, were so many unexpected discoveries, each overturning a whole set of inveterate ideas, perpetuated by the universal mechanisms of imitation and repetition (\*).

All these things, the child one day knew them, and even knew them, having lived them intensely. But the Master has forgotten them, and never remembers them. Rather than being a child, passionately discovering and *learning*, and transforming himself in the process, he wanted to be the unchanging *Master* who *knows*, with unchanging infused knowledge, and who devotes his life to spreading his *Teachings*, for the benefit of ordinary mortals. He became what his followers and disciples, those who believed in him, wanted him to be: the embodiment of a static message,

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(\*) (5 November) These mechanisms are clearly part of the basic mechanisms of the psyche, in both humans and animals. They pre-exist all conditioning, all learning (such as that of language by the young child, and that of almost all the acts of daily life), which could not be established or carried out without them. They were no less present and no less effective in the young future Master than in anyone else.

repetitive and therefore reassuring, the apostle of a new ideology. A *Guru-not-Guru*, in short, like myself (emulating his example, perhaps (\*\*)) once was.... .

(November 15) I named the preceding note (from November 4) "Yang plays the yin - or the Master". As befits a meditation on myself, the main name of the note concerns myself, referring to a certain 'game' I played for a few years after I left the world of science in 1970 (\*\*\*)). As for the second name, 'The Master', it can be interpreted either as referring to myself, through a designation of the role or pose I held in this game of 'yang playing yin', or to that of Krishnamurti, who served as my tacit model.

In fact, the values that emerge from Krishnamurti's books are almost exclusively Yin values. When I first read Krishnamurti (in 1970 or 1971), it was the first time I had seen such values put forward, and the limits and flaws of my (and, with variations, 'everyone else's') yang vision of the world identified with penetration. This must have been the reason for the very strong impression this reading of a few chapters made on me. Six or seven years later I also had the opportunity to read the fine biography of Krishnamurti by Mme Luytens. It confirmed a certain impression of him that had already emerged from his books (notwithstanding the fact that he never appeared in person). Today I would express it by saying that the basic tone of his temperament is strongly *yin*. What's more, throughout all his writings, we see, like a constant leitmotif, the highlighting of *yin* qualities, attitudes and values, and the devaluation (explicit or by omission) of yang qualities, attitudes and values.

Krishnamurti's life and teachings thus embody the quite exceptional attitude of '*yin buries yang*', which is the opposite of the by far more common attitude of '*yang buries yin*', of which my own life (until my forty-eighth year at least) offers an equally extreme illustration. Krishnamurti's '*superyin*' options (\*) have

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(\*\*) (5 November) The dubious nuance of this "maybe" is definitely out of place! See the penultimate footnote written today.

(\*\*\*) The moment of the discovery of meditation, in October 1976, marked a sharp decline. This game continued, albeit more discreetly, until 1981, when it was finally detected and defused. On this subject, see the section already quoted "Le Guru-pas-Guru - ou le cheval à trois pattes", n° 45.

the great merit of going against the grain of the basic values of the surrounding culture. That doesn't change the fact that they seem to me to be no less repressive (of one part of the person by another part) than mine have been.

There is, however, a very pronounced and striking "yang" aspect to Krishnamurti's life, which was no doubt initially imposed on him by the role of figurehead, of (future) "spiritual master", decided upon by his prestigious theosophist tutors when he was still a child. Subsequently, after the great turning point in his life marked by discoveries that radically altered his vision of things (discoveries that later became "The Teachings"), this role of "master" or "guide" was (it seems) entirely internalised, taken over by the propagation of a doctrine that was personal to him, and not taken over from his theosophical masters. This propagation represents an intense, even exhausting activity. It hardly seems to go in the direction of a *balance of* yin and yang, but rather appears to me as a *constraint* imposed on an eminently contemplative temperament, by an 'T' as strong and invasive in the master as in anyone else. Seen in this light, the present note "Yang plays yin", which deals mainly with Krishnamurti, could also be called "*Yin plays yang*".

So, on two occasions and in two different ways, I have played 'games' in my life that are like an *inversion of* the attitudes that dominated the life of the man who, at a certain point in my life, was to become the tacit model for my Brand Image (also tacit), and for certain attitudes and poses. But through styles of expression that are the opposite of each other, I now recognise an obvious kinship. One is in the presence of *repression* (unconscious, it goes without saying), generating a disruption in the natural balance of yin and yang (\*). The other is to be found in the choice of a *role*, and in the *weight of this role*, its braking or even blocking effect on development, on maturation, on the progress of understanding or knowledge. This role (or this pose) was the same for me as it was for the person who served as my model, from whom I may have simply borrowed it as it was. This is the *role of the Master*.

(<sup>119</sup>) (5 November) I've been wanting to talk about yin and yang in mathematics for a while now. The two aspects, yin and yang, in mathematical work, or in a mathematical discipline.

(\*) These 'options' undoubtedly go back to his childhood, and more precisely to his first contacts with his theosophist tutors.

(\*) We're certainly in very good company in this family!

approach to mathematics, only became apparent to me in the course of my reflections on yin and yang over the last few weeks. I foresaw that probing this dual aspect to some extent in these notes would be the most natural way of 'getting back to basics', in these notes that are supposed to be a retrospective on 'a mathematician's past'.

What has been clear to me from my first thoughts on yin and yang (five years ago) is that 'doing maths' is perhaps the *most yang*, the most 'masculine' of all human activities known to date. In fact, any activity that is entirely intellectual, such as scientific research in particular and, more generally, any activity commonly described as 'research', is a very strongly yang-dominated activity. I was going to write: "marked by a strong yang imbalance", and this is indeed the case when this activity absorbs almost all a person's energy. This yang predominance (or imbalance) can be seen in a good number of yin-yang pairs, where it is clear that it is the yang term in particular, not to say exclusively, which is 'present' in intellectual work. I'll just mention a few, which all belong to the same 'group' (or the same 'door to the world'), which I call the 'vague - precise' group. (NB in this last couple and those that follow, it is the term yin that appears first).

sensitivity - reason (or intellect)

instinct - reflection

intuition - logic

inspiration - method

vision - coherence

concrete - abstract

complex - simple

vague - precise dream

- reality

the indefinite - the

definite the unexpressed

- the expressed the

formless - the formed

the infinite - the finite

the unlimited - the limited

the whole - the part

the global - the local (or the parcel-based).

I've just gone through my yin-yang repertoire, and found a good many other pairs that give a sense of the superyang character of pure intellectual activity. I'll just mention the first of all those I thought of earlier: the *mind-body* pair.

Having said this, it seems to me that among the various types of intellectual activity, it is mathematical work that represents the "ultimate extreme-yang". This is undoubtedly due above all to its character of extreme abstraction, to the fact that it is, to a very large extent, independent of any 'support' by sensory experience and reasoned observation of the external world, by which I mean the world in which we live and in which our bodies move. This extreme degree of abstraction distinguishes mathematics from all other sciences, and mathematical work from all other intellectual work, making it a science or work of 'pure reason'. In contrast to the experimental sciences and the sciences of observation, it is also the only science whose results are established by *demonstrations* in the most rigorous sense of the term, proceeding according to a rigorously codified and in principle infallible *method*, the so-called '*logical*' method, to arrive at *certainties* that leave no room for doubt or reservation, or for the possibility of exceptions that would have escaped the cases observed so far. These are the extreme-yang features of mathematics, and of mathematics alone.

These were certainly traits that attracted me as a child, as someone who had opted for the 'head' and the extreme yang! (\*) Especially after the experience of the war and the concentration camp, faced with discrimination and prejudice that seemed to defy even the most rudimentary reason, what fascinated me most about mathematics (from the little I knew of it in my secondary school years), was the *power* it gave me, by virtue of a simple demonstration, to win over even the most reluctant adherents, to *force* the assent of others in short, whether they were well-disposed or not - provided only that they agreed with me to the mathematical 'rules of the game'. When I first came into contact with school mathematics, in 1940 at the lycée in Mende (where I was able to go, even though I was interned at the Rieucros camp five or six kilometres away), I seemed to know these rules, to have been able to understand them, to be able to understand them, to be able to accept them.

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(\*) Apart from the military and warlike variant, with parades, uniforms, standing to attention, and impeccably organised massacres and mass graves...

I felt them instinctively, as if I'd always known them (\*). I certainly had a better sense of them than the teacher himself, who recited without conviction the commonplaces in use at the time on the difference between a 'postulate' (in this case, Euclid's, the only one he and we had ever had the good fortune to hear of . . .) and an 'axiom', or 'the demonstration' of the three 'cases of equality of triangles', following the example of the three 'cases of equality of triangles'. ) and an 'axiom', or '*the* demonstration' of the three 'cases of equality of the triangles', by following the textbook as a first communion pupil would follow his breviary.

Five years later, seduced by the sudden prestige of atomic physics, it was nevertheless for physics studies that I first enrolled at the University of Montpellier, with the idea of initiating myself into the mysteries of the structure of matter and the nature of energy. But I soon realised that if I wanted to learn about mysteries, I wouldn't be able to do it by following courses at university, but by working on my own, on my own, with or without books. Since I didn't have the flair or the equipment to learn physics that way, I put it off until a more propitious time. So I started doing maths, following a few courses 'from afar', none of which could satisfy me or give me anything beyond what I could find in the current textbooks. But I still had to pass my exams...

(<sup>120</sup>) (6 November) Looking over yesterday's notes again just now, I was able to make sure that I had not fallen into a certain confusion between mathematical *work*, a very strongly yang-dominant activity, and 'mathematics'. It is surely no coincidence that in both French and German, the word for mathematics is feminine, as is '*science*', which encompasses it, or the even broader term '*knowledge*' (\*), or even '*substance*'. For the mathematician in the true sense of the term, by which I mean the person who 'does mathematics' (as he would 'make love'), there is in fact no ambiguity about the distribution of roles in his relationship to mathematics, to the unknown substance of which he becomes aware, which he knows by penetrating it. Mathematics is then as much a 'woman' as any woman he has ever known or even desired - whose mysterious power he has ever felt, drawing him into her with a force that is both gentle and unrelenting.

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(\*) These first contacts took place shortly after my childhood reflections on squaring the circle, referred to in note no.° 69.

(\*) On the other hand, "knowledge" is masculine, and it is "the husband" in fact in the yin-yang couple "knowledge".

- knowledge". The German is less clear-cut here, since both "Kennen" and "Wissen" are *neuter* (as substantivised verbs).

I first became aware of the profound identity between the impulse that drew me to 'women' and the one that drew me to 'mathematics', a few months before my encounter with the stanzas of the Tao Te King that were to set me off on the *Éloge de l'Inceste* (and, along the way, on my first systematic reflection on the 'feminine' and the 'masculine', whose Chinese names 'yin' and 'yang' I didn't yet know). That was six years ago, when I wrote a two-page text entitled 'By way of programme', by which I meant: for the (C 4) 'Introduction to Research' course, of which this text constituted an introduction, or more exactly a declaration of intent about the spirit of this 'course'. After I had written this text, which came to me most spontaneously, I was struck by the abundance of Images that sprang from one another, charged with erotic connotations. I realised that this was neither a coincidence nor the result of a simple literary intention - that it was an unequivocal sign of a profound kinship between the two passions that had dominated my adult life. Without thinking at the time of delving any deeper into the matter by means of a systematic reflexion (which came to light only a few months later, when I was writing the *Éloge*), or even (I think) of formulating clearly for myself what was suddenly perceived, I think I can say that at that moment I learnt, without any fanfare, something important

- I had 'discovered' something (\*\*), something that had completely escaped me before. Of course, like everyone else, I'd heard about Freud and libido sublimation and all that, but that's beside the point. Even tons of books on psychoanalysis and everything else can't avoid moments like these, when all theory and 'baggage' is forgotten, and suddenly something 'clicks'. It's at moments like these that our knowledge of things is renewed. It's got nothing to do with reading books, listening to music... presentations, i.e. increasing knowledge (\*).

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(\*\*) At the time, it was a 'discovery' in the 'yin', 'feminine' mode - which is achieved by welcoming new knowledge into ourselves, in a state of silent openness to what comes to us. Such moments have been rare in my life, I think. In any case, the moments of discovery that I remember are almost all of a yang, 'masculine' tone.

(\*\*) This observation is not contradicted by the fact that it is quite possible, and even probable, that this "The 'realisation' (the passage to the conscious level of something perceived in the unconscious) was facilitated by the existence of the Freudian consensus, which I had heard of without it really making me feel either hot or cold. Knowledge can encourage the emergence of knowledge, but it's much more common, it seems to me, for it to nip in the bud any hint of emergence - in the same way that ready-made 'answers' nip in the bud the emergence of a (good) question...

When I think of 'mathematics', I certainly don't mean all the *knowledge* that can be described as 'mathematical', recorded from antiquity to the present day, in publications, preprints or manuscripts and correspondence. Even if you eliminate the repetitions, that's probably a few million pages of compact text; a dozen tonnes of books perhaps, or even a few thousand thick volumes, enough to fill a spacious library: nothing to get a hard-on about, quite the contrary! Talking about 'mathematics' only makes sense in the context of a *vision, an understanding, a vision, a vision.*

- and these are essentially personal things, not collective ones. There is as much 'mathematics' as there are mathematicians, each of whom has a certain personal experience of it, more or less vast or limited, one of the fruits of which is his own understanding, his own vision of 'mathematics' (the one he has known), always more or less par-cellular. It's a bit like 'woman', which may appear to some as a simple abstraction, or as a hollow formula, but which nevertheless has a deep, powerful, irrefutable 'reality' (for me at least), of which every woman I meet or know is an incarnation and represents one aspect, and the same woman in the experience of another undoubtedly represents yet another incarnation, yet another aspect.

My aim here is in no way to confront the difficulty of 'integrating' this vast multiplicity of experiences, understandings and visions of 'mathematics' into a totality, a unity - and this, moreover, at a time when we are witnessing (it seems to me) a kind of relentless 'divergence' in mathematical production, and when no mathematician can flatter himself that he knows, even if only in broad outline, the totality or the essence of what has been accomplished in our science. My aim was rather

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It's remarkable that, while 'everyone has heard' a little about the role of the erotic impulse in creativity (artistic or scientific, let's say), there was no trace of it in the consensus that prevailed in the circles to which I belonged at one time or another. And yet, there was no shortage of striking facts that should have alerted me to the problem a long time ago. Up until three years ago, periods of intense creativity in my life, and especially periods of inner renewal, were also marked by a powerful influx of erotic energy. Nevertheless, my mathematical activity has never been accompanied by conscious erotic images or associations. But I remember being a little disconcerted, in the '50s, during a working session of the Bourbaki group, by a colleague and friend who mentioned to me, as the most common thing in the world, a peculiarity in his mathematical work: when he had reached the end of a difficult task, he felt an imperious desire to make love (with or without a partner) - and this all the more strongly because he was more satisfied with what he had just done.

to examine to some extent the interplay of yin and yang in mathematical *work*, that is to say, in the relationship of the mathematician (or of such and such a mathematician, starting with myself) to "mathematics". The thing under scrutiny, then, is 'the mathematician' or 'that mathematician' (in his relationship to mathematics), rather than 'mathematics' itself.

(<sup>121</sup>) (November 7) At the level of our intellectual faculties, of reason, to 'know' something is, above all else, to '*understand*' it. And in a work of discovery that takes place in this register of our faculties, the impulse to know that drives the child in us (independently of the motivations specific to the 'T', the 'Boss') is the *desire to understand*. This is perhaps the main difference that distinguishes the intellectual drive for knowledge from its elder sister, the love drive. This desire to understand pre-exists any 'method', scientific or otherwise. The latter is a tool, fashioned by desire to serve its purpose: to penetrate the unknown accessible to reason, for the purposes of understanding. Knowledge is born of the desire to know, and therefore of the desire to understand, when it is reason that wants to know. The *method*, the instrument of desire, is in itself powerless to give birth to knowledge - any more than the forceps of a doctor, or even the expert hands of a midwife, give birth. But they can sometimes usefully assist the birth of a newborn, when the time is ripe and they know how to come at the right moment...

Many, if not all, secondary school and university students must feel that the *rigour* of mathematics, which has been preached to them by sullen teachers, is a kind of a priori entirely external to their humble selves, incomprehensible and arbitrary, dictated by a peremptory and merciless God to a Euclid promoted to Chief Censor, with the task of making countless generations of schoolchildren pale at the task, swallowing culture with a capital C as best they could. I must have been one of the rare people not to have gone through this stage in my relationship with school mathematics - to have felt instinctively, from the very first encounter and within the narrow confines of a sixth-form maths book, the original function and meaning of rigour: that it was a flexible and astonishingly effective instrument for understanding things called 'mathematics' - things that reason alone can fully know. This 'rigour' is also like the soul and nerve of what I called, in the reflections of the day before yesterday, 'the rules of the mathematical game', and what I used to call 'the method'. Having only glimpsed them, it was as if I had always known them  
- as if it were my *own* desire that had delicately, lovingly shaped them,

like a key that had the power to open up an unknown, mysterious world for me... a world whose riches I sensed would prove inexhaustible... And it was indeed my own desire that continued to refine this tool throughout my years at lycée and university, before any encounter could make me suspect that somewhere there were *fellow human beings* - people who, like me, found pleasure in probing the unknown that this key, apparently unknown to everyone (including my teachers), alone had the power to open up (\*).

(<sup>122</sup>) (8 November) It's been three days since I started thinking, in principle, about 'yin and yang in mathematics', and I have the impression that it's still going on, while I'm partially absorbed in other occupations and tasks. After so many preliminaries, I still haven't got to the point I wanted to make from the start: that in my own mathematical work, it's the '*feminine*' yin note that dominates! that dominates!

I realised this a few weeks ago, on the fringes of the present reflection on yin and yang, and in relation to this 'association of ideas aroused by the three-part Funeral Eulogy', which was the starting point for this long digression. (See the beginning of the note "Yang buries yin (1) - or the muscle and the gut"). To tell the truth, this association of ideas (which I'll come back to later) was more or less based on the intuition that my approach to mathematics was strongly yang-dominant. This intuition was quite natural, since it was my superyang options that motivated my long-term investment in mathematics. All the same, this intuition, or more precisely this Idea, was wrong - all I had to do was take the time to examine it a little to realise that the opposite was true.

For a surprise, it was a surprise! I didn't mention it 'on the spot' in my notes, so as not to cut off the train of thought when I was trying to work out how I perceived yin and yang and the philosophy that emerged for me. But we

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(\*) However, the little maths I had learnt at lycée and at university might have been enough to make me understand that in the past at least, there must have been people like me, those in fact who were called 'mathematicians'. Mr Soûla (one of my professors at university) told me about Lebesgue, who would have solved the last open problems in mathematics, including the theory of measurement (which I had been working on since I left lycée in 1945). But in those years (1945-48), my desire to use *my own* means to clear up the questions *I* had *been* asking myself was so exclusive that it excluded any kind of curiosity about the existence, the work or the person of past or present mathematicians.

Here we are at last!

This misconception about the nature of my approach to mathematics must have crept into me, unexamined and as a matter of course, from the time I started paying attention to the yin-yang aspect of things, five or six years ago. It must be a residue of my yang, masculine Brand Image - a residue that has continued to linger there out of sheer inertia, because I haven't bothered to sweep it up. ...

Perhaps the reader will have the impression that I'm leading him on, given that only three days ago I explained at length that mathematical work was the most superyang of superyang activities - that in the relationship with mathematics, the mathematician was 'the woman' and the mathematician the enterprising lover - and suddenly I raise the question of whether, in my modest case, my work or 'approach' is yin or yang, and the mathematician as an enterprising lover - and now all of a sudden I'm raising the question of whether, in the case of my modest person, my work or my 'approach' is yin or yang, and concluding (as the most natural thing in the world) that it's yin, who would have thought!

If there is any apparent confusion, it stems from a lack of understanding of this universal fact: that in everything, even the most yin or yang thing in the world, the dynamics of yin and yang are at play, through the marriage of the two original forces. Thus fire, the most yang of all things and the very symbol of yang, is yin in some of its aspects (it's the 'yin in the yang'); and conversely water, which is the very symbol of wine, is yang in some of its aspects and functions (it's the 'yang in the yin'). There is no need to develop these two particularly instructive examples here - surely, the reader intrigued by these observations (which may seem peremptory or sibylline) will only have to follow the associations of ideas with fire and water to discover for himself the reality of yin in yang and yang in yin in these two cases. And if he's a mathematician, or if he's just familiar with intellectual work (even if he's not a mathematician, or even a scientist), he'll have no trouble discerning the existence of complementary yin and yang modes of approach to any kind of intellectual work, however 'yang' it may be in comparison with other less fragmentary types of activity.

A possible starting point would be to go back to the fifteen or so yin-yang pairs I mentioned at the beginning of my reflections three days ago (\*), when I noted that for each of these pairs, it was the predominance of the yang term that took place in intellectual work (and this was particularly true in the case of mathematical work), when we compare such a yin-yang pair with a yin-yang pair.

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(\*) See "The most macho of the arts", note no.° 119.

It's the same with other types of activity, such as making love, singing, painting (a picture or a wall), gardening and so on. That doesn't mean that if we stay within a given activity such as doing maths, let's say (everything yang, it's understood), we can distinguish a balance (or sometimes an imbalance) of either yin or yang traits, varying from one mathematician to another and sometimes, within the same mathematician, from one job to another.

For example, in some works it is the *logical* structure of the theory developed that is emphasised, in others it will be the *intuitive* aspects. There is an imbalance, manifested in the reader or listener by a familiar feeling of *unease* (and sometimes in the author too), when one of these indispensable aspects is grossly neglected, to the 'benefit' of the other. (When both are grossly neglected, you throw the book in the bin, or leave the room with the door slammed shut!) When each of the two aspects is strongly present, whether explicitly or between the lines, it manifests itself in an equally familiar feeling of harmony, beauty, balance and satisfaction. This is the case regardless of the 'basic tone' which dominates the approach followed, whether this tone is in the 'logical' or 'intuitive' direction (or also 'structure' or 'substance'). There's no need to elaborate on this instructive example, to describe, for example, where the problem lies (i.e. to identify the 'malaise' mentioned earlier), when one or other of the two aspects is neglected; the reader already knows this from his own experience! Similar observations are bound to emerge for most of the yin-yang couples considered three days ago. Perhaps even for all of them, even if some are more delicate and will undoubtedly require more in-depth examination to be fully understood than the intuition-logic pairing. What I need to do now is to try and make this fact a little more explicit - or rather, to 'get it across' - that in my way of doing maths, it's my 'feminine' yin traits, more than my 'masculine' ones, that are running the show. If the idea here was to go all the way with this impression, by testing it from as many angles as possible, the natural idea (which did indeed occur to me yesterday) would be to review, among the yin-yang pairs known to me, those that might represent (among others) an aspect or mode of apprehension of intellectual work (there must be about fifty of them, I suppose), and see for each of them which of the two 'spouses' of the pair predominates in me. I expect that in all In all cases, there will be one of the two which, on examination, proves to be predominant.

So, in the intuition-logic pairing, I see at first sight that the two aspects

are strongly present in my mathematical work. So this is a sign of equilibrium, of harmony, among other signs pointing in the same direction. As befits a yin-yang couple, for me (in my work, I mean), the two are truly inseparable - the logical structure of a theory develops step by step and jointly with the deepening of an *understanding* of the things it deals with, that is to say, jointly with the development of an ever finer and more complete *intuition* of them. Perhaps in my published works, in accordance with the canons of the mathematician's craft, it is the yang aspect, the 'structure' or 'logic' or 'method' aspect, that is most apparent, most obvious to the reader. However, I am well aware that what drives and dominates my work, what is its soul and *raison d'être*, are the Mental Images that are formed in the course of the work to apprehend the reality of mathematical things.

Of course, I have never spared any effort to use mathematical language to define these images and the understanding they convey as meticulously as possible. It is in this continual effort to formulate the unformulated, to specify what is still vague, that perhaps lies the particular dynamic of mathematical work (and perhaps also of all creative intellectual work) - in a continual dialectic between *the* more or less unformulated *image*, and the *language* that gives it form and, in the process, gives rise to new images that are more or less blurred, that deepen the previous one, and that also call for formulation to give them form in their turn... In fact, it is this perpetual effort to use language to define, as precisely and as perfectly as possible, what at first appears as an indefinable and unformed 'presentiment', as an informal 'feeling', as an image shrouded in mist... it is this work that, since my childhood and still today, fascinates me the most in the work of mathematical discovery. But if the 'effort' here always seems to be on the 'language' side, i.e. on the formulation, structure and logic side, which are the key ingredients of the mathematical *method*; and if (by force of circumstance) this is where the visible aspect of a mathematical *text* supposed to render mathematical work (or at least its fruits) is to be found, all this does not prevent the fact that (for me at least) it is not in this aspect that the soul of an understanding of mathematical things is to be found, nor the living force or motivation at work in mathematics. I believe that very few of my works must have reversed this relationship, where I would have developed a 'formalism' by allowing myself to be guided solely, or above all, by its internal logic, by the desiderata of coherence, or by other aspects of the formalism.

I have always been unable to read a mathematical text, no matter how trivial or simplistic, if I cannot make sense of it in terms of my own experience. In any case, all my life I have been unable to read a mathematical text, however trivial or simplistic, when I am unable to give that text a 'meaning' in terms of my experience of mathematical things, that is to say, when that text does not arouse in me mental images, intuitions that would give it life, just as living flesh made up of muscles and organs gives life to a body that would otherwise be reduced to a skeleton. This inability sets me apart from most of my mathematician colleagues, and (as I have already mentioned) it is what often made it difficult for me to fit into the group work within the Bourbaki group, particularly during the joint readings, where I was often left behind for hours on end while everyone else followed along at ease.

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I've just followed a few associations of ideas about my mathematical work, linked to the 'intuition-logic' pair, and to a few neighbouring pairs that have introduced themselves in the wake of this one: the formless - the formed, the indefinite - the definite, the informal - the formed, the vague - the precise, inspiration - method, vision - coherence... It would certainly be instructive to review one by one (as I had thought of doing) all the possible and imaginable 'couples' in relation to intellectual work and to sound out for each of them in what way and to what extent one or other of the two spouses is present in my mathematical work, and whether or not one of the two seems to 'set the tone', and if so which. Over and above a more delicate apprehension of the particular nature of *my* mathematical work, such 'work on parts' will surely also deepen my understanding of the nature of mathematical work in general, and also my apprehension of each of the couples thus reviewed. But such systematic work would obviously take me too far, and would go beyond the reasonable limits of the present reflection. It seems more natural to me to try to find here, and to 'pass on' if I can, the associations of ideas and images that have convinced me (without having to go any further) that in my mathematical work, it is indeed the 'feminine' traits of my being that tend surreptitiously to set the tone, and thus to find a kind of unexpected 'revenge' (where one would least have expected it).  
) for the repression they had to endure in other areas of my life.

Take, for example, the task of proving a theorem that remains hypothetical (to which, for some, mathematical work seems to be reduced). I see two extreme approaches to this. One is that of the *hammer and chisel*, when the problem posed is seen as a large, hard, smooth nut, whose interior needs to be reached, the nourishing flesh protected by the shell. The principle is simple: you place the cutting edge of the chisel against the shell and tap hard. If necessary, you repeat the process in several different places, until the shell breaks - and you're happy. This approach is especially tempting when the hull has asperities or protuberances where you can 'pick it up'. In some cases, it's easy to spot such 'bits', but in other cases, you have to turn the shell over carefully in all directions, prospecting carefully, before finding a point of attack. The most difficult case is when the shell is perfectly round, hard and uniform in shape. No matter how hard you strike, the chisel edge slips and barely scratches the surface - you end up getting bored with the task. Sometimes, though, you manage to do it, by dint of muscle and endurance.

I could illustrate the second approach by keeping the image of the walnut that has to be opened. The first parable that came to mind earlier is that you immerse the nut in a moving liquid, why not just water? From time to time you rub it so that it penetrates better, and the rest you leave to time. The shell will soften over the weeks and months - when the time is ripe, just squeeze it with your hand and it will open like a ripe avocado! Alternatively, the nut can be left to ripen in the sun and rain, and perhaps even in the winter frosts. When the time is ripe, a delicate sprout emerges from the flesh and pierces the shell, as if playing with itself - or to put it another way, the shell opens up on its own, allowing it to pass through.

The image that came to me a few weeks ago was different again. The unfamiliar thing that we need to get to know reappeared as a compact expanse of earth or marl, reluctant to be penetrated. You can go at it with pickaxes or crowbars or even jackhammers: that's the first approach, the 'chisel' approach (with or without a hammer). The other is the *sea* approach. The sea creeps in imperceptibly and noiselessly, nothing seems to happen, nothing moves, the water is so far away you can hardly hear it... Yet it eventually surrounds the resistant substance, which gradually becomes a peninsula, then an island, then an islet, which is eventually submerged in its turn, as if it had finally dissolved into the ocean stretching as far as the eye can see...

The reader who is at all familiar with some of my work will have no difficulty in recognising which of these two modes of approach is 'mine' - and I have already had occasion in the first part of *Récoltes et Semailles* to explain myself on this subject, in a somewhat different context (\*). It's the 'approach of the sea', by submersion, absorption, dissolution - the one where, if you're not very attentive, nothing seems to happen at any moment: each thing at each moment is so obvious, and above all, so natural, that you'd almost scruple to write it down in black and white, for fear of looking like you're bombing, instead of tapping a chisel like everyone else... And yet that's the approach I've been practising instinctively since I was young, without ever really having had to learn it.

This was also, in essence, Bourbaki's approach, and my encounter with the Bourbaki group was providential in this respect, confirming and encouraging me in this 'style' which was spontaneously mine, and in which otherwise I risked finding myself more or less alone of my kind (\*). It's true that this situation (being the only one of my kind) had been familiar to me for a long time, and didn't bother me that much. As for knowing whether my instinctive approach to mathematical work was going to be 'efficient', that is to say above all (according to the criteria in force, and especially for judging a beginner mathematician) whether I was going to be able to solve 'open questions' that nobody had yet been able to answer, I couldn't know that in advance, and I didn't worry too much about it. My natural inclination was to ask my own questions, rather than trying to solve those that others had asked. And it is indeed through the discovery of new questions and new *concepts*, new *points of view* and even new '*worlds*' that my mathematical work has proved fruitful, even more so than through the 'solutions' I have been able to provide to questions that have already been asked. This very strong impulse to discover the right questions rather than the right answers, and to discover the right concepts and the right statements much more than the right demonstrations, are all very strong 'yin' traits in my approach to mathematics (\*\*). This is undoubtedly why I'm par-

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(\*) See the "Dream and demonstration" section, n° 8.

(\*) In this extreme-yin approach, I tended to go further even than most of my friends in Bourbaki were prepared to go, which is probably one of the reasons why I ended up leaving the group towards the end of the 50s.

(\*\*) I have the impression that it's no different for any other research work at for me, and in particular for what I call 'meditation'.

I'm particularly touched when I see the best that I've contributed to mathematics being treated casually or with disdain by some of my students, in other words by the very people who benefited from it in the first place.

In any case, it was only in retrospect that I was able to realise that my natural approach to mathematics also 'worked' when I felt attracted, in-spirited by a question that others had asked - when, in short, it had 'clicked' and the question had at the same time become 'mine'. If I tried to make a more or less exhaustive list of such cases, I suspect it would be quite long. On the face of it, there are four such situations that seem to me to "stand out" because of their scope (\*\*\*) . In all four cases, the hypothetical theorem has ended up being proved, essentially, by the 'rising sea' approach, submerged and dissolved by some more or less vast theory, going far beyond the results it was initially intended to establish. What's more, I've noticed that the ideas, notions, formulas and methods I developed in these situations (and in others too) have long since entered the realm of 'well-known' mathematics, which 'everyone' knows and uses to their heart's content, regardless of their origin (\*).

(<sup>123</sup>) (9 November) There is another point in common with the four cases mentioned yesterday, of open questions that were resolved (or rather, 'dissolved') by the 'approach of the rising sea'. This is the role played by J. P. *Serre* in each of these four cases. This was before

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(\*\*\*) The questions I have in mind here are, in chronological order of their solution, the following:

- 1) Validity of the Riemann-Roch-Hirzebruch formula in any characteristic.
- 2) Structure of the fundamental "prime to characteristic" group of an algebraic curve over an algebraically closed field of any characteristic.
- 3) Rationality of *L-functions* of finite type over a finite field (part of the "Weil conjectures", and an important step towards the proof of these conjectures, completed by Deligne).
- 4) Semi-stable reduction of abelian varieties defined over the field of fractions of a discrete valuation ring.

(\*) I myself have often been careless about the origin of the 'well-known' I used, except for in those cases, however, where I had first-hand knowledge of this origin, having been more or less present at the birth, or when I myself was the father. As I have been able to observe many times over the years, and especially during my reflections on the Burial, this elementary delicacy has often been lacking in some of my students or close friends in the mathematical world, even when it has been a question of things they have learned from none other than me, and whose origin they know beyond any possibility of doubt. On this subject, see the reflection in the note "Le Fossoyeur - ou la Congrégation toute entière", n° 97.

Serre played the role of 'detonator', to get me 'started' on these questions, to use the expressions of a footnote in the introduction mentioning this role (see 'The end of a secret', section 8 of the introduction). In fact (as I then noticed) it appears that Serre played such a role in the genesis of the main ideas and major tasks that I developed between 1955 and 1970, i.e. between the time when I left functional analysis for geometry, and the time when I left the mathematical world.

I could say, with a slight exaggeration, that between the beginning of the 1950s and around 1966, in other words for about fifteen years, everything I learnt in 'geometry' (in a very broad sense, encompassing algebraic or analytic geometry, topology and arithmetic), I learnt from Serre, when I didn't learn it on my own in my mathematical work. I think it was in 1952, when Serre came to Nancy (where I stayed until 1953), that he started to become a privileged interlocutor for me - and for years he was even my *only* interlocutor for subjects outside functional analysis. I think the first thing he talked to me about was Tor and Ext, which I was making a world of, and yet, look, it was as easy as pie..., and the magic of injective and projective resolutions and derived and satellite functors, at a time when Cartan-Eilenberg's 'diplodocus' had not yet been published. What attracted me to cohomology at that time were the 'A and B theorems' that he and Cartan had just developed on Stein's analytic spaces - I think I'd heard of them before, but it was during one or two tête-à-têtes with Serre that I realised the full power and geometric richness of these very simple cohomological statements. At first they had completely gone over my head, before he told me about them, at a time when I didn't yet 'feel' the geometric substance in the beam cohomology of a space. I was so enchanted that for years I'd been intending to work on analytic spaces, as soon as I'd finished the work I was still doing on functional analysis, where I definitely wasn't going to linger! If I didn't really follow these intentions, it was because Serre had in the meantime turned to algebraic geometry and had written his famous fundamental article 'FAC', which made understandable and highly seductive what had previously seemed to me to be extremely boring - so seductive, in fact, that I couldn't resist these charms, and so turned to algebraic geometry, rather than to analytic spaces.

If I hadn't held back, I'd have gone from one thing to another, telling the story of my relationship with

Serre, which would also be little more than the history of my mathematical interests from 1952 to 1970. This is not the place. I would only add that, as is only natural, it was from Serre that I was introduced to the four questions mentioned above. Of course, the point was not to point out the precise wording of the question, full stop. The essential thing was that each time Serre had a strong sense of the rich substance behind a statement which, offhand, would probably not have made me feel either hot or cold - and that he managed to 'convey' this perception of a rich, tangible, mysterious substance - a perception which is at the same time a *desire* to know this substance, to penetrate it. This is perhaps the most crucial moment of all in a work of discovery, the moment when 'it clicks', even though you have no idea, however vague, of where to take the unknown, where to enter it. This is truly the moment of 'conception' - the moment at which the work of gestation can and does take place, given the right circumstances...

If Serre has played an important role in my work and in my mathematical work, it is even more, it seems to me, in the appearance of those crucial moments, when the spark passes and obscure and invisible work begins, than through the technical means unknown to me that he sometimes provided me with at the right moment or through the ideas that I borrowed from him in the later stages of my work.

One of the reasons, no doubt, for the special role played by Serre is that I don't like to read up on current mathematical events, or even to learn the ABCs of a 'well-known' theory by reading the books or dissertations that deal with it. As far as possible, I like to get my information from people who are 'in the know'. From the time I first came into contact with a mathematical environment (in 1948) until I left in 1970, I was lucky enough never to run out of competent and willing people to tell me about things that might be of interest to me. This may have made me dependent on them, but I never felt that way (\*). In fact, the question of 'dependence' could hardly arise, as long as the person I was talking to and I

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(\*) The first and only exception was in 1981, long after my 'departure' from the world of mathematics. It was when I turned to Deligne as the designated interlocutor for my Anabelian reflections, after my "Long walk through Galois theory". I then clearly sensed the intention to take advantage of this situation of being the only interlocutor, to 'turn me on my head' - and I then ceased all relations on the mathematical level, until today. On this episode, see the note "Two turning points", n° 66.

were equally interested in what he was teaching me. Teaching those who are eager to learn is beneficial for both, and is an opportunity for the 'teacher' to learn, as well as for the person being taught.

The 'reason' given earlier does explain the importance of other people in my past as a mathematician, but not the exceptional role played by Serre, which seems to me to far exceed that of all my other 'people' put together! What is certain is that Serre and I complemented each other wonderfully. We had many strong common interests, and I sensed in him the same high standards and rigour that I put into my work. Apart from that, we worked in very different 'styles'. I have the impression that our approaches to mathematics and our work *complemented each other*, without ever really encroaching on each other. The kind of work I did (and the way I did it) was very different from the kind of work Serre did. He might lay the first foundations of a theory in a text of fifty pages or so, or even spend a year writing a medium-sized book elegantly and concisely setting out some subject that inspired him - but he certainly didn't spend the best part of five years of his life, or even ten years or more, developing at length and in volumes a whole new language (which we'd done quite well without until then), to found a new and fertile approach to algebraic geometry, let's say. He introduced a good number of new and fertile ideas and notions without letting himself be drawn into 'carrying' them through to the end. On more than one occasion, on the other hand, these ideas and notions served as a starting point for a work of vast dimensions which suited me perfectly, and for which there would have been no question of Serre himself embarking on it.

An association comes irresistibly to me here. In the light of the reflections of the last few days, I see my relationship to mathematical work and to my 'works' more as '*maternal*' than '*paternal*'. The moment of conception, crucial though it is, represents for me a tiny part of the 'work' during which the thing in gestation, the 'child' to come, grows and develops. This work is very much like that of a pregnant woman's pregnancy, a work that begins when the child is conceived and continues for nine long months... the time it takes to carry what was a foetus to term and to *give birth* - in other words, to bring a *child into* the world, a living, *complete* child, not just a head or a torso or a baby's skeleton or whatever. This role of mother, obviously, is very different from that of the father (even the best father in the world...), who is more or less content to be a mother.

to throw a seed, then goes off to do other things.

Clearly, Serre's mathematical work, his approach to mathematics, is strongly yang, 'masculine'. His approach to a difficulty is more like that of the chisel and the hammer, very rarely that of the sea that rises and submerges, or that of the water that soaks and dissolves. And he seems content to cast a seed, without worrying too much about where it will fall, or whether it will trigger conception and labour, or even whether the child that might be born from it will be in his likeness or bear his name.

An image can help us to grasp an important aspect of a certain reality, but it does not exhaust reality. Reality is always more complex and richer than any image that tries to express it, and so it is with the images that have come to me, without having sought them out, to express two different approaches to mathematics - Serre's and mine. Serre sometimes brought to fruition work that needed breathing space, just as I sometimes sowed ideas, some of which germinated and were brought to fruition by others. No more than I lack 'virility' in my approach to mathematics (whereas the background note is 'feminine'), any more than Serre lacks 'femininity' in his, balancing his 'virile' background note.

It cannot be otherwise in a creative approach to an unknown substance, whether mathematical or otherwise: there is no discovery, no knowledge, no renewal, except through the joint and inseparable action of the original yin and yang energies and impulses in the same being. It is in the intimate fusion of the two that the *beauty* of a being, or of a work, lies - that delicate, elusive quality that signals itself to us through that particular feeling of harmony, of satisfaction. This quality is present in all the work of Serre that I have known, whether in person or through the texts he has written. I have known few mathematicians where it is so consistently present, and with such force.

(<sup>124</sup>) (10 November) Yesterday's and the day before's reflections are far from exhausting the set of characters strongly marked in my mathematical work, which are of a yin nature. To explore it further, following on from the present reflection on yin and yang in mathematics, would also be an excellent opportunity for me to deepen my understanding of the nature of mathematical work in general. This theme of yin and yang in mathematics, which I thought I'd get round to in a day's reflection, and on which I've already spent five consecutive days feeling as though I'd only just begun, has just revealed itself as one of the most important issues of my life.

these many seemingly innocuous themes, which become broader and deeper the closer you get to them and the deeper you get into them. There's no way I'm going to rush through this juicy theme (or even just 'run around' it) in the middle of a Funeral Ceremony that I don't want to drag on beyond all measure!

I'd just like to point out two more of these 'strongly marked characteristics' in my mathematical work (without comment, I promise!), which go in the 'yin', feminine direction. One is a predilection for the *general*, rather than the particular (which makes a 'pair' or 'couple' with it). The other trait seems to me to be even stronger, or to put it better, more essential, more neuralgic, and also more vast (in the sense that it contains the first). If there is one 'quest' that has run through my entire life as a mathematician, from the age of seventeen (fresh out of high school) right up to the present day, an incessant quest that has marked all my work (published or unpublished) since its beginnings, it is that of *unity*, through the infinite multiplicity of mathematical things and possible approaches to these things. Discovering and uncovering this unity beyond the often bewildering richness of diversity (without taking anything away from this richness), recognising common features beyond differences and dissimilarities, and going right to the root of analogies and similarities to discover the profound kinship between them.

- that has been my passion all my life. The very differences, the expression of an unlimited and elusive diversity, have ended up appearing like the branches and twigs, branching out infinitely, of the same tree with its vast branches, where each, and every branch and twig, show me the way towards the trunk that is common to them all. By instinct and by nature, my path has been that of *water*, which always tends to *descend*, the path towards this trunk, towards these roots. And if I liked to linger along the way, it was rarely at the ridge to explore the leaves and delicate twigs, but above all at the large branches, the trunk and the main roots, to get to know their texture and feel through the bark the rising flow of the nourishing sap. (\*)

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(\*) I think I can discern in this quest for unity through diversity, a distinct trait if not common to the three passions that have marked my life, including passion for love and meditation. Perhaps even, apart from any passion, this is a way of *apprehending* reality in which I tend to see above all, and to pay attention to and give weight to, common traits and kinships, rather than differences (without being tempted to overlook the latter). I've noticed that the most common tendency of many people is the opposite tendency, the yang tendency, which often goes so far as to ignore or deny deep-rooted kinship. (Superyang tendency, characteristic of our culture. It is often accompanied by the reflex to

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To tell the truth, I'm still not sure what to make of this recently discovered fact, how to situate it - that in my approach to mathematics, in my way of 'doing maths', the basic tone in me is strongly yin, 'feminine'. This is in line with a certain intuition I've already alluded to - that the basic tone of my deepest being, by which I mean the 'child' in me or the 'Worker', i.e. that which is creative and beyond conditioning (i.e. beyond the 'I', the 'Boss') - that this basic tone is also 'feminine' rather than virile. Perhaps I now have everything I need to clarify what this really is, by carefully examining all the signs that point in one direction or the other (\*), to recognise the significance of each, and what emerges from them as a whole. And if by such work I do not arrive at the tangible result of a 'yes' or a 'no', surely it will not have been in vain for all that, to arrive at a better definition of my ignorance, which at the moment remains blurred, unsettled, for want of having meditated on it. Perhaps I'll do this work once I've finished the Harvesting and Sowing project, and ... on the momentum of that one. But then again, this is not the place.

But if I've been led to this reflection on yin and yang, it's been in the course of a reflection in which I've tried above all to understand certain relationships, between myself and others (among those who were my students, in particular). It is therefore to the possible repercussions of the 'fact

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the desire to level out differences, to align everything on the same supposedly 'perfect' or 'superior' model, for the sake of a false 'unity', which is both excessively impoverishing and violent). These differences of accent between a speaker and me have often been the cause of dialogues of the deaf, where two parallel monologues are developed that never meet... .

(\*) Several of my strongly marked yang traits seem to me to be *acquired* traits, stemming from the conditioning, and more specifically, of the superyang brand image dating back to my childhood. These traits include an inordinate investment in action; a very strong projection towards the future, i.e. towards the accomplishment of my tasks; a predilection for a work of discovery that is above all intellectual and the invasive role of thought; a closed attitude towards anything that doesn't appear to be directly linked to my tasks at the time, and in particular my inattention to landscapes, seasons, etc. There is, however, one yang trait that seems to me to be innate and not acquired, and that's my very strong affinity with *fire*, unlike my relationship with water, which is decidedly not 'my element'. In fact, it seems that my astrological chart is marked by a very strong yang imbalance, with all the signs that enter it being 'fire signs', to the exclusion of all water signs.

I'm mainly interested here in the 'new' thing that has just emerged, about my relationship to others and others' relationship to me. And therein lies my embarrassment in 'placing', in exploiting this fact. Perhaps it has something to do with the fact that probably nobody apart from me has ever noticed such a thing - not on a conscious level, at least on a formulated level. In any case, I've never received any echo that I could interpret in this sense, as far as I can remember - any more, in fact, (with one exception) than I can remember any echo that would send me back a 'yin' image of myself, whereas the character I've played since my ce (if not early childhood) has been strongly yang; so much so that even now, this 'virile' character seems like a second (?) nature, which continues to dominate my life in many ways.

It is true that the mere fact that a trait in someone (me in this case) is not perceived at a conscious level does not necessarily prevent it from having an effect on the relationship with others. And I have no doubt that this trait is indeed perceived in the mathematical world, among mathematicians who are more or less familiar with my work, and that this perception has 'spread' among a much wider mathematical public. When I wrote in "L'Éloge Funèbre (1) - ou les compliments" that "the anonymous pen that has taken care here of my eulogy has gratified me abundantly with that which today is scorned", I would not have known at the time what exactly was "scorned today" by mathematical fashion, among the things to which I attach value. But from the very next day, through this 'association of ideas' to which I must return (\*), I had sensed (without perhaps having formulated it, and without it yet appearing as clearly as it does now) that 'this something' was none other than everything that was recognised (at an often informal level) as being a 'yin' or 'feminine' way of doing mathematics, "feminine" way of doing mathematics - a way that was tacitly equated with 'bombing', 'nonsense' (to use the compliment paid by my pupil and friend Pierre Deligne to the text that forms the basis of all his work), 'cranking', 'ease', etc. - and which, in his view, was a 'feminine' way of doing mathematics.

Certainly, in the Eloge Funèbre (delivered by this same friend Pierre), including in the passage where I am quoted in one breath with him (\*\*), compliments were in order! There was no mention of nonsense or bombast, but rather of the 't i *tanesque* aspect', of 'twenty volumes',

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(\*) See the beginning of the note "Le muscle et la tripe" (n° 106), where this association is mentioned for the first time

s. the first time (\*\*) See the note "L'Éloge Funèbre (2) - ou la force et d'auréole", n° 105.

he "cleared up the *essential* problems", "achieved greater *natural generality*" (sic), a school "nourished by the *generosity* with which he communicated his ideas", "theories of *legendary depth*", "renewed *foundations*", "opened up new applications", concepts "so *natural* that it is difficult for us to imagine the effort they cost" (not to say that they were "easy").

- but I took care to specify that myself (\*\*\*)", "great attention to termi- nology" (not to say "bombardment"), "ancestors of algebraic K-theory", "topos intro- duced... on a *general* basic body", "analogies suggested by Grothendieck", "conjectures... ... as unapproachable as ever...", "such as Grothendieck had *dreamed of*". . .

I've underlined the key words in these quotes - they're all words that denote a yin approach to things. The 'perfect dexterity' in this burial by 'well-dosed compliment' consisted in the systematic use of hyperbole with regard to those qualities which, on the one hand, are 'given over to disdain', and on the other hand, are real and of great value to me; and this while passing a complete and radical eraser stroke on the complementary aspects, which today have the exclusive right to the honours, the 'virile' aspects, as strongly present however in my work as in anyone else's, with very few exceptions.

Moreover, it is these 'virile' aspects and values, to the exclusion of the slightest 'feminine' note, that are highlighted in the text on Pierre Deligne, both by the choice of a few epithets ("proverbial *difficulty*", "surprising result", "makes A-adic cohomology a *powerful tool*", "first step", "astonishingly useful", "rapidity", "penetration", "enlightening and constructive reactions to each question", "brilliant discoveries"), than by the detailed enumeration of tangible results (whereas not a single result of mine is mentioned in my portrait-minute, nor is it suggested that these results may have played a role in those of Deligne).

I don't regret having taken the trouble to make this rapid compilation of epithets - the effect is truly striking! If, at the level of structured knowledge, there are still very few people who have any notion of yin and yang, we have to believe that in the unconscious of my friend Pierre, as in the unconscious that served as his scribe, there is a perception of unfailing certainty. It is used here to serve a certain cause: to show disdain for someone who should be shown disdain, and to designate a hero for the admiration of the crowd.

I doubt, moreover, that these three short texts I have just looked at had very many readers. But whether or not there were many seems to me to be an incidental question. For

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(\*\*) See the note "The trap - or ease and exhaustion" n° 99.

For me, these texts were addressed, not to hypothetical potential patrons (after all, it's not my friend Pierre's concern to find patrons to finance his institution), but to the 'Congregation as a whole', which came to mind in the course of the note of the same name (alias 'Le Fossoyeur' n° 97). The message they carry is like a striking and masterly shortcut to innumerable messages along the same lines, from my friend Pierre and others among those who were my friends or my pupils, and from others too perhaps, messages captured and approved by this same Congregation. If there is a collective unconscious (and I'd be inclined to think so now), there is no doubt that in the unconscious of this Congregation (aka the 'mathematical community'), just as in that of the Grand Officiant at my solemn funeral, there is the same flawless perception of what is yin (fed up!) and what is yang (hats off to you!).!).

And all of a sudden these Funerals appear to me in a new, unexpected light, in which my person itself has become accessory, in which it becomes a *symbol of* that which must be 'handed over to disdain'. It is no longer the funeral of a person, nor of a work, nor even of an inadmissible dissidence, but the funeral of the 'mathematical feminine' - and even more profoundly, perhaps, in each of the many participants applauding the Eloge Funèbre, *the funeral of the disowned woman who lives within himself.*

(<sup>125</sup>) (11 November) Exceptionally (for once it's not usual...) I woke up early this morning, having slept barely four or five hours. The unexpected outcome of yesterday's reflection immediately triggered off a flurry of intense work to 'place' and assimilate this new fact that had just emerged, just enough time to warm up a hearty soup and have a snack before going to bed at 3am. And early in the morning, this same work pulled me out of sleep, then out of bed... .

If I speak of an 'unexpected' outcome and a 'new' fact, I must add that from the very beginning of this Endless 'digression' on yin and yang, there was in me a kind of contained expectation of a 'denouement', or at least the expectation of a 'jouc-tion' that was to take place with a certain procession, which had assembled in a Funeral Ceremony. It might have seemed that I was drifting further and further away from the scene of the funeral, or even that it had been definitively forgotten - and yet no, it was always there, as if on the mute or in the background. I had never really left them. Their silent presence manifested itself in this discreet, constant expectation, this feeling of tension,

I could sense the approximate location of this junction. I could sense the approximate location of this junction point - it was around a certain 'association of ideas' (mentioned more than once, but still not formulated) that had been the starting point, the initial motivation for this unforeseen journey through yin and yang and through my life. In short, this journey was to be like another great cycle, returning (more or less...) to its starting point; or rather like a turn in a downward spiral, taking me a notch deeper into the thing probed, 'to the very heart' (if my premonition wasn't deceiving me) of these Funerals.

But just as I'm getting ready to 'land', and at the turn of the last paragraph of a 'note' that's still all 'digression' and even 'resassage', I suddenly find myself in the middle of a funeral ceremony and right at the heart of it, a bit like an extraterrestrial who's catapulted himself right in front of the priest in his chasuble and the congregation of the faithful ; Or worse still, like a deceased person, believed dead and (almost) already buried, who suddenly lifts the lid (and wreaths and touching epitaphs come tumbling out!) and there he is in person, in a white shroud and a twinkle in his eye, like a living imp emerging from his box when you least expect it!

Thus, the culmination of yesterday's reflection was at the same time the denouement of the suspense I mentioned, a very particular suspense that is very familiar to me in work 'like the spreading sea', whether it be mathematical work or any other. But in the very wake of this relaxation of a long suspense, a *perplexity* immediately appeared. I think it is this perplexity above all that has absorbed me ever since, and which, at odd hours, has drawn me from bed to the typewriter. The fact that I was perplexed should come as no surprise - it happens, more or less, every time a situation suddenly appears in a new light, which at first sight would seem to contradict an old vision. The very first thing to do, then, is to probe these contradictions carefully, to examine to what extent they are real, or only apparent, that is to say expressions of an inertia of the mind that is reluctant to recognise the 'same' thing under two different lights. This essential work is completed when all the dissonances have been resolved into a new harmony (albeit a provisional one), into a vision that encompasses and brings together the previous partial visions, correcting or adjusting them if necessary, and eliminating those that prove to be fundamentally false. In such a renewed vision, the 'old' that gave rise to it, i.e. the more fragmentary visions that are united within it, itself acquires a new 'newness'.

new meaning (\*).

To return to my 'perplexity', here it is. The 'denouement' or 'new day' consisted of an Image that suddenly appeared - that of the Burial with great pomp of the 'symbol' of the 'mathematical feminine', incarnated in my person, and at the same time the projection of the 'disowned woman' in each of the participants in the Funeral; or to put it another way, it is the image of the symbolic Burial of a kind of *Super-Mother*, as an expiatory victim in short and in place of the woman-but-rarely-mother who vegetates in the obscure underground of each of the participants who have come to applaud at the Funeral. This image seems to contradict *another, opposite*, still vague, one that had gradually taken shape in the course of the pre-June reflection (culminating in the note 'The Gravedigger - or the entire congregation'): that of a *Super-Father* both admired and feared, both attractive and hated, 'massacred' by his children, whose mutilated remains are delivered up for mockery during the 'same' ob-sèques. Placed side by side (if that were even necessary), these vividly coloured images would seem to border on the zany and delirious, and I can easily imagine the scalp dance that these psychoanalytical fantasies are bound to provoke - assuming there are any readers who have had the breath to follow me this far!

I'll happily leave them to their dance, which will add an exotic note of the best effect to this unusual funeral, and in the meantime I'll follow up on an association that came up last night, which I believe will reconcile, even make love and marriage possible, these two images or facets that were supposedly antagonistic, even irreconcilable.

(<sup>126</sup>) (12 November) I had thought of continuing in my notes the association mentioned at the end of yesterday's notes, which would 'reconcile' and 'bring together' the two seemingly antagonistic images that had emerged from my funeral. As I was about to start the notes along these lines, I sensed a reluctance that I wouldn't want to ignore.

The association concerned my mother's relationship with my father, and the meaning of the destruction of the family that took place in 1933, as a result of my mother's will overcoming my father's acquiescence (reluctant and embarrassed at first, then eager and total). This crucial episode marked a kind of reversal in the couple formed by my parents, in which my father had been seen as

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(\*) Compare with the reflections in the two sections "L'Enfant et le bon Dieu" and "Erreur et découverte", n° s 1 and 2.

of heroic incarnation, ostentatiously adulated, of virile values, and where my mother (a willful and domineering character if ever there was one) strutted in the colours of the subjugated and happy woman, over a daily life marked by continuous confrontations. Acquiescence to the sacrifice of the children marked the moment when the God and Hero *collapsed*, followed by a veritable orgy of triumphant contempt for the woman who, just the day before, had played the role of swooning adulteress, and who now took the place of the fallen hero, emasculated and happy to be so, reduced to the despised role of 'woman', from which she herself was relieved at the same moment... .

The little I have said is so schematic, so quintessential I'm afraid, that it is more likely to give rise to innumerable misunderstandings than to help us understand the hidden motives behind a certain burial. However, I feel that this is not the place to expand on what I have just outlined in a few words. To render with a minimum of finesse a complex reality, blurred at will by the two protagonists, would require a new and lengthy digression, on a scale that the context does not justify. I don't feel inclined to delve into it now, and even less so as this is a situation that involves others than myself, and where my own responsibility (as co-actor) doesn't really seem to be engaged. I, and my sister, are there not as actors, but as *instruments* in my mother's hands to bring down the ardently admired and envied Hero, in order to take his place and make him an object of derision.

Although this scenario, which I patiently uncovered five years ago (\*), is the most extreme and violent of its kind that I've experienced, I've nevertheless had ample opportunity since then to detect very similar scenarios in other couples. The work I've done on my parents' lives has really helped me to open my eyes to things that previously escaped me entirely. I was speechless at the time, and with good reason! Today I'd tend to think that, apart from the particular violence of the colours, the kind of antagonistic relationship I uncovered in my parents' couple is more or less typical of couples, or at least extremely common. So readers who, like me, have ended up using their faculties to plumb the hidden depths of couple antagonisms, or of female-male antagonism, will not be otherwise surprised (or even shocked) by what little I have said here.

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(\*) See on this subject the two notes "La surface et la profondeur" and "Éloge de l'écriture", n° s 101 and 102.

If I try to put aside the particularities of each case, and identify the common points in the antagonisms between men and women that I have seen at close quarters and in which I have understood something, I come up with the following.

1) In women, admiration and envy of men, due to the (often overrated) prestige they enjoy because of their position (as a male, in particular) and the qualities (real or supposed) that justify it.

2) Often there is an element of resentment, even hatred, due to an (unscientific, as it happens) association between the man (lover or husband, for example) and the father. The antagonistic relationship between mother and father is taken over by the daughter, who identifies (more or less completely) with the mother. More direct reasons for resentment (towards the father) are often added (his tyrannical attitudes, lack of affection, attention or concern etc). Subsequently, these feelings of antagonism (and others) j "ready to use", are projected as they are onto the partner (actual or potential), whether or not that partner has "the head for the job".

So when I wrote earlier (in 1° ) that a woman's dispositions (of admiration and envy in particular) towards a man were "due to prestige etc", this is only partially true. It seems to me that, more often than not, the *driving force* behind these dispositions *comes from the relationship with the father* (even if he's been dead and buried for a long time), and that its entry into action depends only to a limited extent on the particular personality of the partner.

3) To compensate for her feelings of inferiority (entirely subjective, needless to say) and veiled antagonism, even animosity or hatred, there is a fear of exercising power over her partner (even though it is he who, by more or less tacit general consensus, is supposed to have authority). The woman exercises power by every means at her disposal (the most powerful being her body and, above all, her children (\*)), and it is almost always hidden. The gratification that accompanies it is therefore unconscious most of the time, but it is no less real and important. Often the power game becomes all-consuming, it becomes the main content of a woman's life, the one that absorbs almost all her energy, and to which everything else (including the love drive and children) is subordinated, even sacrificed, without hesitation.

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(\*) The main common 'means', however, is not mentioned here, being of a more subtle nature, difficult to describe in a few words. It consists of a certain all-purpose 'tactic', examined in the later section 'The claw in the velvet' (notes n° s 137-140) of the reflections on yin and yang.

4) The most extreme case, the most torn, is when admiration and envy for the male, whom you have to dominate while appearing to submit to him, is accompanied by contempt, even disgust and hatred, for what is feminine - for your own condition as a woman. Yet it is only by playing on her "femininity" that she can hope to subdue the man, or at least manipulate him to her will! So, in order to satisfy her strongest egotic impulse, that of 'making her partner work' (or even subjugating him, or breaking him. . . ), she is forced to play a role that is hated, felt as contemptible, as unworthy of her. It is in this extreme case of refusal of her own condition and nature, that of a superyang and anti-yin option, that she will seek an illusory escape from the conflict she carries within her, using all her strength to achieve a *role reversal*: herself replacing the man, the hero and master, once admired and envied and now fallen, reduced to the role she had long worn as an abject livery, the despised role from which she would finally be delivered.... .

The sketch I have just made is also schematic, capable at most of *evoking* a certain reality for those who have already perceived it for themselves here and there, without perhaps having yet tried to pin it down as best I could through a summary description like this one. If I wanted to give it some relief, I should at least try to specify the different *levels* (almost all unconscious) on which this set of mutually antagonistic feelings and desires are played out. In addition, in this tangle of inexorable egotistical me- canisms, from which the love drive seems to be rigorously absent, I should also try to situate it; to see to what extent and in what way it contributes to the never-ending round-about (like the force of the wind perhaps, captured by the wings of an ingenious mill to make a heavy millstone turn forever...), and to what extent it also happens that the cogs sometimes stop and fall silent, to give free rein to *something else*.

And finally, I've left out entirely what's going on inside *him*, the 'partner' or protagonist, as if he existed only in relation to her, as the *object of* attraction and repulsion, admiration and envy for the woman facing him. One of the reasons for this omission is undoubtedly that it is *she* who plays the active role in the couple's merry-go-round, investing herself in it to the hilt, often finding in it her true *raison d'être* (for want of a better word), while *he* sees nothing but fire in it, busy as he is elsewhere and, what's more, as naive as can be (\*), reacting with a knee-jerk reaction.

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(\*) (23 November) Of course, if the merry-go-round is spinning, it's because (however 'naive' he may be) *he's* enjoying it just as much as she is - and she's making it her job to see to it! It seemed to me that the two main 'hooks' by

without trying to understand, and (what's more) without understanding in fact, not even (it seems to me) on an unconscious level. At least that's the impression I've always had, ever since I started paying attention to the carousel of the couple! But it's also true that I know a lot less about the man's role, since I've only been able to observe it up close in the case of my modest self, whereas I've had the opportunity more than once, on the other hand, to experience the woman's role from the very front row.

In any case, even if I were to take great care, over ten pages or a whole volume, to flesh out my rather schematic description, it would still be a wasted effort for a reader who has not yet 'used his faculties' in this matter and who has never seen or smelt anything of the kind. As for the reader who is a little 'in the know', surely the little I have said about it, notwithstanding the blunders and obscurities, will be enough to put him back in the bath of things he had already perceived for himself, and to arouse in him images and associations no less rich than those that were present in the background when I wrote my lapidary description.

It doesn't take much more, it seems to me, to see the 'missing link' between antagonism to the 'Superfather' (finding expression in the symbolic burial of said Superfather), and contempt, rejection of the 'feminine', and more profoundly, the denial of 'the woman' in oneself (which may find expression in the symbolic 'Burial' of a 'Su- permère', under a plethora of dithyrambic epithets of double use...) (\*\*).

(<sup>127</sup>) (November 13) The time seems ripe now to try to outline a vision of the Burial that is both clearer and more nuanced, one that (as I wrote the day before yesterday) 'encompasses and brings together the previous partial visions, correcting or adjusting them as necessary...'. I can see three such earlier visions, which need to be recognised as partial aspects of a *whole*.

The first aspect to emerge, the most obvious and also the most simplistic, is the "*retaliation for dissent*", which was the aspect highlighted in particular in the note "Le Fos-

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The reasons why she 'holds' him (and why she too is held...) are vanity, and a need for emotional security and love, guaranteed by a stable partner. And then there are the children...

(\*\*) (23 November) This "nothing more is needed" proved to be somewhat hasty, to the extent that a week later later, this conclusion and this "missing link" were entirely forgotten! For the "missing step" in arriving at a more convincing "missing link", see yesterday's note "The reversal of yin and yang (2) - or revolt" (n° 132).

soyeur - ou la Congrégation tout entière" (97) - the last note before the episode maladie. It is also the note, among those in Cortèges *I to X* (those before the incident), that seems to me to capture the *collective motivations* most deeply, those of the "Fossoyeur" alias "La Congrégation (quasiment) toute".

I've just gone through this note again. The second aspect, which I could call "*massacre*" (more than just symbolic) and *burial* (symbolic) of the *Superpère*", does not appear. This is perhaps because this component in the motivations for a burial does not really concern 'the Congregation as a whole', which was the focus of my attention at the time, but above all (if not exclusively) 'those who were my pupils'. It is true that, even leaving aside their undisputed leader, my friend Pierre, they played a leading role in the implementation of the Burial, which would not have been possible without the active contribution of some and the support of all. (On this subject, see the note "Le si- lence", (84).) It is therefore through their intermediary, above all, that the 'Superpère' aspect seems to me to be crucial to an understanding of the Burial.

The first aspect, the 'reprisal' aspect, came to my attention after Yves Ladegaillerie's setbacks in 1976 (\*); since then I have tended to forget this aspect, but periodically it has come back to my attention over the following years. It eventually transcended the shapeless stage of what is 'felt' without more, and became the substance of a clear and nuanced understanding, in the note quoted on the 'Gravedigger'. The second aspect, or 'Superpere' aspect, only began to appear in the course of the reflection in Harvest and Sowing (\*), and at first (\*\*) without any connection with the Burial as such, which I was only to cover in the following months. This aspect gradually emerges from the mists of time throughout the reflection on the Burial, to finally take striking form in the notes "Le massacre", "La dépouille...", "... and the body" ( , , ). These notes are dated 12, 16 and 17 May, the "Gravedigger" note is dated 24 May; the illness episode appeared on 10 June, and put an end to the notes for more than three months, which resumed on 22 September. It is probable, to say the least, that if this episode (more than unwelcome I) had not appeared, at some time in the future, the notes would have been lost.

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(\*) See the two notes "On n'arrête pas le progrès!" and "Cercueil 2: les découpages tronçonnées", n° s 50 and

94.

(\*) (November 29) In fact, this aspect had already been present in the form of an epidermal intuition since number of years in my dealings with Deligne, but I never stopped to think about it before the Harvest and Sowing reflection.

(\*\*) In the two sections "The Enemy Father (1)(2)", n° s 29, 30.

when I was about to take stock of the whole thing and draw a final line, my vision of L'Enterrement would have stopped\* at the one that had emerged in the two weeks between 12 and 24 May - at a vision in 'two parts', each of which remained in its own corner, without the idea coming to me of trying to put them together.

Yet there was a vague feeling, like a barely perceptible drizzle, that the final word had still not really been grasped; the feeling of someone 'groping in the shadows' (the expression must have appeared once or twice in the course of my notes on Burial). The Gravedigger's final note must have had something of the effect of a light gust of wind in the fog, which can give the illusion that the fog has dissipated, when in fact it has only shifted a little. Or to put it another way : the aspect taken up in this note appeared in such clarity and with such relief, that the impression (by no means illusory) of a tangible, penetrating understanding of that aspect, and the feeling of satisfaction that accompanied it (a feeling that was certainly quite apparent at the end of the note) - that impression and that feeling created a kind of euphoria, of one who feels close to reaching the goal, and made me more or less forget the other aspect, albeit a significant one, the 'Superpere' aspect, which had remained 'on the back burner'!

The third part appeared just three days ago (five months to the day after the unfortunate illness episode). It's the *'Funeral (symbolic) and Burial (very real) of the 'feminine' aspect*, which 'feminine' is visualised as a kind of '*Super-mother*', She herself incarnated by my modest person! This aspect came to light at the end of a long and entirely unforeseen 'digression' on yin and yang, in which an effort had finally been made to express in an intelligible way a certain 'association of ideas' from a certain 'Funeral Eulogy', which was supposed to close the Funeral ceremony. This famous 'association' or 'intuition' (to which I first alluded at the very beginning of the note 'Le muscle et la tripe' (yang enterre yin (1)),<sup>106</sup>) has still not been explained - but everything is ready to go, and I've been promising for a while that I'll get to it! The fact remains that along the way a whole host of facts and intuitions have come to light, some of them new and unexpected for me, and all of them have helped me to get back in touch with important aspects of my life, and of existence in general. One of these facts - that the 'basic tone' of my mathematical work is 'feminine' - also seems to contradict one of the intuitions at the root of this association, which is still waiting for its time: the intuition that as a mathematician (as with everything else), I was a 'feminine' person.

And this same fact, which seems to contradict this association (from which the whole reflexion on yin and *yang* stems!) also brings up in a flash the third part, which had eluded me until now. And this same fact, which seems to contradict this association (from which the whole reflexion on yin and *yang* stems!) also brings up in a flash the third aspect that had eluded me until then, the 'Supermother' aspect. At the same time (at the end of the endings) the link is made with a 'Burial' that seemed to have been forgotten for nearly a hundred pages!

For 'rising seas', it's rising seas - let's hope that the end result, by which I mean this promised 'vision' that I'm about to bring out of limbo, will be equal to the means, namely a whole sea of philosophical-freudian digressions on yin and *yang*... The tide began to turn (with the kick-off note 'Le muscle et la tripe') on 2 October, and the crucial 'new fact' made its appearance in the days that followed (\*), as I prepared any day now to finally put this famous 'association' in black and white (published five months earlier, on 12 or 13 May, after the reflections in the note 'L'Éloge Funèbre' (1)).

- or compliments", from the same day as the crucial note "The massacre"). But this fact was not 'revealed' in the notes until five days ago, on 8 November, after three preliminary notes on yin and *yang* in maths (written over the previous three days). It's the note 'The rising sea...' (122). The very next day, 10 November, with the note "Les obsèques du yin (*yang* enterre yin (4))" (124)), the "Supermère" made her appearance (but the word was not used until the following day's note, "Supermaman ou Superpapa?" (125)). And so here we have the 'third part' of L'Enterrement!

It was without any deliberate intention that I undertook, on the spur of the moment, this retrospective of the reflection on Burial, from the perspective of the successive appearance of its three main aspects (as I see things at present). Occasional retrospectives of this kind, in the course of a long-term meditation, have always proved most useful, giving an overall view of the process of reflection, and at the same time a new perspective on some of its main 'results' (\*). Perhaps the most striking thing for the hypothetical reader of this retrospective is that I have made the

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(\*) I seem to remember that the day after tomorrow, in the note "Innocence (the marriage of yin and *yang*)" (no.° 107), the fact in question had appeared, and was one of the "various signs" referred to in that note (without any further details about them), which "have made me suspect more than once that... it is the 'feminine' qualities that dominate my being... ...".".

(\*) This kind of retrospective seems to me to be very rare in mathematical work, and I don't practise it myself.

This is also the case since the writing of 'Pursuing Stacks' (which began in the spring of last year). A common working practice, on the other hand, and one which has a similar effect, from the point of view of a 'fresh perspective' on ideas and rea-

diversions through such a long digression, rather than coming straight to this famous 'association' (still to come) and saying no more about it, to come at last to the famous 'final line' under the Burial; a line that I was in such a hurry to draw in the note 'L'Éloge Funèbre

(2)' of 29 September, when I was just getting back into the harness of the thoughts left in abeyance in June I was also in this frame of mind when I began the following note three days later, 'Le muscle et la tripe', which begins with an allusion to this association, without giving any details about it.

If I didn't do it then, and put it off from day to day and week to week for a month and ten days already, it was by no means a deliberate intention, which would have appeared at some point. If I try to fathom the cause, I would say that I must have felt instinctively, without even having to tell myself, that at the point I had reached, writing the association in question out of the blue would have made no sense; that it would have been like a simple 'statement', purely formal or verbal, while the rich substance covered by words that would have come to me by a pure effect of memorisation, would remain ignored, unperceived. Readers who are mathematicians (or scientists, if they are not mathematicians) have surely experienced this situation many times, and the discomfort it arouses, when we are confronted with a statement that we can easily see is perfectly precise, where we also know the meaning of each of the terms used, and yet we feel that the 'meaning' and the substance totally escape us. The situation is perhaps even more common with non-technical texts which nevertheless express a tangible substance, strongly perceived by the author; with the difference that it is much rarer for the reader to realise with any clarity that the meaning of what he is reading escapes him. In this case, there was even more to it than that - even for *myself*, who had not been 'in the bath' of Éloge Funèbre for months.

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Often, such work, which may appear to be purely routine, leads to a substantial deepening of understanding, for example by bringing to light, through the demands of internal coherence of the new ordering, notions, properties, relations, etc. which are also 'natural' and which had not been seen previously. Sometimes, too, by revealing the fortuitous or artificial nature of certain hypotheses, or the narrowness of an entire initial context, the work of 'rastatement' leads to an unsuspected broadening of the initial purpose, giving the theory developed initially a new dimension and scope.

and the associations associated with it, and which for years had not really been 'immersed' in the reality of yin and yang (even though it brushed up against it at every step. . . )

- Even for *me*, what I might have written then to 'say' this association would have been a verbal thing, not really felt or perceived. Resolving to do so, or to put it more accurately, forcing myself to do so, would have been a purely formal way of discharging a kind of obligation, out of a sense of conscience, 'completing' a pensum while taking care to 'give it good weight', not to lose along the way such an 'association' which (I remembered well 1) had been juicy and smouldering, and which had long since had time to cool and molder in a corner of the memory!

If what I remembered was indeed to serve to deepen an understanding that remained fragmentary, it is quite clear to me that I could not then do without these hundred pages of 'digressions'. They form the most profound part of the whole reflection pursued throughout Harvest and Sowing. I cannot yet predict whether the vision of Burial that I am about to unravel in their wake will leave me with a feeling of complete satisfaction, or whether there will remain obscure corners or dissonances that I may give up trying to illuminate or resolve, at least for the time being, or in Harvest and Sowing. But whatever the case, just as in my mathematical work, I know that each of these one hundred pages, like each of the six hundred (give or take a few) pages of the text of Harvest and Sowing that I am writing now, has its own unique place, its own message and its own function, and that I could not have done without any of them (whether or not there are any readers to follow me this far!). While the goal was far away (if not totally forgotten...), each of these pages has brought me its own harvest, which only it could bring me.

(<sup>127</sup>) (17 November) I've just been through four rather difficult days, with a lot of commotion around me. There was no way I could keep up the momentum, so my work on the notes was confined to a bit of housekeeping: rereading the part of the text that is to be entrusted to the typesetter, correcting the part that is done. Between the 'first draft' of the text for each note, reread before I start on the next note, and the final net text, ready for duplication, I do at least three careful readings, making adjustments to expression during the first two at least. I'm going to get to know the text of Récoltes et semaines very well! But above all, I'm doing what's necessary to make sure that the text I'm going to duplicate is really the best I have to offer, and that it's the best I've got.

including its form. With the exception of one of the notes in Burial, for all the sections and notes in Harvest and Sowing that I wrote and reread, I had a feeling of complete satisfaction at the last reading. I felt that each time I had managed to say what I had to say as clearly and as nuanced as I was capable of doing, without hiding anything that was clear, understood or known to me at the time of writing, nor anything that remained obscure, vague, misunderstood or even entirely mysterious or unknown...

The only exception is the note 'The half and the whole - or the crack' of 17 October, from which the 'thread' of the meditation split into two, on the two themes I called (under the sub-headings in the rest of the notes 'the key to yin and yang') 'Our Mother Death' and 'Refusal and Acceptance' (\*). This is the last part of this note, the two or three pages where I talk about division within the person as the ultimate root of division and conflict in the couple, in the family and in human society. This is an intuition that first appeared to me in the early years after my 'departure' from the world of science, and which has developed, confirmed and deepened over the years, right up to the present day. It has become so 'obvious' to me (although I have never taken the trouble to examine it carefully from every angle), that it has crept into my thinking rather as a matter of course, without any effort to present it in such a way as to make this 'obviousness' even slightly apparent. But if reading these pages leaves me with an impression of vagueness and dissatisfaction, it's surely not simply a question of clumsy 'presentation'. On the contrary, I feel that I wanted to jump in with both feet over a substantial reflection on this complex theme, a reflection for which I feel I have all the elements in hand to make it, but which is not yet done! In the note of 25 October ('Paradise Lost' ()), which is directly linked to the note of 17 October (to develop the theme of 'Refusal and Acceptance' from there), I first try as best I can to 'make up for' the gaps I had noticed in the earlier note - but without in the end saying much more than simply this: that as far as a possible 'journey to discover conflict' is concerned, 'that's not the direction I want to take

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(\*) The need to group the notes that make up the 'digression' on yin and yang under sub-headings was felt only a few days ago. This also led me to readjust the names I had given to these notes, which are therefore quoted in certain places under names that are slightly different from their definitive names (but with the right number, nonetheless). At the same time, I also came up with a name for this set of notes: 'The Key to Yin and Yang'.

If you don't want to go ahead with it now, that's fine, we'll do it another time!

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In the previous note of four days ago, I outlined three aspects, or 'vo-lets', of the Burial picture that have emerged so far. Afterwards, I remembered that at two points already in the course of thinking about the Burial, I had felt, and written, that I was touching the 'knot' of the conflict. These were in the notes 'Le nœud' and 'L'Éloge Funèbre (2) - ou la force et l'aurore' (, <sup>65105</sup>). These notes echoed the (apparently 'very general') reflections in one of the first sections of Récoltes et Semailles, 'Infaillibilité (des autres) et mépris (de soi)' (section n° 4). It is *self-contempt*, the recognition of the strength that lies within us and gives us the power to know and create, that is also the source of *contempt for others*, of the endless reflex-compensation of 'proving' one's worth by putting oneself above others, by using (for example) the derisory power to demean or crush, or simply to cause pain or harm.

As I was writing this note, I certainly had no shortage of examples. The one most vividly in my mind at the time was Pierre Deligne, whom I had seen use his power to discourage and even humiliate in ways that often seemed inexplicable. It was only two months after writing this note that I began to discover "L'Enterrement in all its splendour", as can be seen from the notes of 19 April ("Souvenir d'un rêve - ou la naissance des motifs", and "L'Enterrement - ou le Nouveau Père" (<sup>51</sup>)(<sup>52</sup>)). Gradually, too, I discovered the role of my friend Pierre as Grand Officier at my funeral and burial. Most of the pre-June notes on the funeral (Cortèges I to X) focus on him. It is "also the one about which I have incomparably richer and more personal material than for any of the other numerous participants. So, the two moments when I had the feeling of 'touching the heart of the conflict', it was he again, the only one with whom regular contact has been maintained to this very day, who was at the centre of my attention.

(<sup>128</sup>) (18 November) Twelve hours of sleep last night - I needed it after several rather short nights! I feel like I've regained some of the energy that was starting to fray a bit - I'm more up to the task than I was yesterday, to get back on track.

where I'd left it.

In the two moments I was talking about yesterday, there was a kind of 'flash' in me that was so clear and so strong that I wouldn't dream of questioning it - I mean, of questioning that it was revealing something real to me, something outside my person in this case; that it wasn't something purely subjective, the product (let's say) of a simple deliberate intention to see some psychological 'theory' that I held dear applied - that it was, in short, the 'butterfly' providentially caught in his net by the butterfly hunter (\*)! To doubt such signs, whether in meditation or maths or elsewhere, would simply be to abdicate my power to know and discover. I'm lucky enough to know what that power is, and if there's one thing I have every confidence in, it's that power.

I could think of seeing in this 'flash', in what it taught me, a fourth 'part' of the Burial picture, added to the other three (reviewed in the note of 13 November). But straight away I see it as intimately linked to the two aspects 'Superpère' and 'Supermère' - and this obvious link goes far beyond the person of my friend. This lack of awareness of the 'power to know and create' within us, which I mentioned again yesterday, is nothing other than a lack of awareness of our fundamental unity, the fruit of the marriage in our being of 'yin' and 'yang', 'feminine' and 'masculine' qualities, energies and forces. For what is 'man' in us, on its own, does not make us capable of knowing or creating, any more than what is 'woman' in us, on its own, gives us this power. It is not a factitious and derisory *half* of our being that has the power to know and create, but it is the *whole*, the *totality* of our being, that has this power. It has it, not as the result of a quest, of a long journey, of a becoming, which we would go through in a state of temporary powerlessness that would gradually accumulate "power" along the way; but this power is ours by nature, we have received it as a free gift, from the day we were born (\*\*).

And this 'self-contempt', or 'self-unawareness', is nothing other than the *refusal* of this gift, the refusal of this fundamental unity, and of the power that is its inseparable companion. Or rather, it is like the inseparable shadow of this refusal, it is the *knowledge of a powerlessness* (\*), established by this refusal; a knowledge that is certainly timid, blurred, not as- sumptuous, that takes great care to stop at the known (well badly known...), afraid as it is to plunge deeper, to take cognisance of the unknown power hidden, and blocked

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(\*) For this image, see the note "The child and the sea - or faith and doubt" n° 103. (\*\* And probably even long before we were born...

by this deliberate, cultivated impotence.

The most common form that this denial of our unity takes, in our superyang society, is the burial day after day, hour after hour of the 'yin', the 'feminine' in us. This was precisely the 'Supermere' section, aka 'Funeral and burial of the feminine', and more particularly and *above all*, of the feminine within *ourselves*.

But I have a strong feeling that there is also a direct and profound link between self-contempt and the 'Superpère component', aka 'massacre and burial of the father'. It is this strongly presaged link that I would now like to try to identify. To put this 'presentiment', this intuition, in another way: there must be a direct and profound link between the division within us and antagonism to the father.

It goes without saying that this 'antagonism' finds expression in relation to the biological father, to the person who took his place in childhood, or to any other person who, at one time or another and for one reason or another, takes the place of a more or less symbolic 'spare father' onto whom the original antagonistic impulses are projected. My aim, then, is to identify the root *cause of* these antagonistic impulses and attitudes, so common that we might sometimes be tempted to regard them as universal; a cause that goes deeper than a simple set of concrete grievances, often quite tangible, that we may have against the author of our days. More than once, I've found that these grievances are often more in the nature of a plausible and welcome *rationalisation* for an antagonism whose real root, the cause of its vehemence and tenacity, lies elsewhere.

I could formulate this intuition that I'm trying to pin down in another way, in the form in which it spontaneously presents itself to me: it is that I have the intimate conviction that in the person who is '*one*', undivided, in the person who accepts himself in the totality of his being - in him, the conflict with the father, or with the mother, is resolved. He is *autonomous, 'free'* from either parent. The umbilical cord that continues to link us to our parents, long after childhood

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(\*) As I point out a line further on, this knowledge is "blurred", in its essential content it remains unconscious. Often, however, we see a small piece of it emerge (like the tip of an iceberg whose base remains carefully submerged...), through some sort of *profession of faith of powerlessness*, which more than once has left me speechless. They are made in the tone of a peremptory and unanswerable *observation*, behind which one senses a kind of vehement, fierce closure - as if this impotence which is thus claimed as an intangible and sacred 'fact' were the most precious asset, which we would not relinquish at any price... .

and adolescence (and more often, throughout adulthood and until death) - in him this link is broken. The moorings are broken, which until recently held us back from truly setting off on *our own journey to discover our Mother the World* (\*).

This intimate conviction is not just wishful thinking, it's not the projection of a wish (renamed 'conviction' for the occasion). It certainly has its origins in my own experience, and first and foremost in my relationship with my own parents. I'm thinking here of the profound transformation that took place in my relationship with my parents in the years following the turning point eight years ago, marked by this 'awakening of the yin' in me, then by the discovery of meditation in the months that followed, and finally by the 'reunion' with my childhood two days later (\*). I realise that this turning point was marked by an immediate *autonomy*, in contrast to a previous dependence on received and adopted ideas. The most profound of all these dependencies was the dependency on my parents, whose values and options had shaped mine and my own vision of the world, and from whom I had also taken 'in

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(\*) It's a strange thing that in French, "le monde", "l'univers" and "le cosmos" are all masculine. The equivalent words in German, "die Welt", "das All", "der Kosmos", are feminine, neuter (which is often a kind of "super-feminine" in German), and masculine. This seems to me to correspond better to the nature of the things designated by these terms. When we speak of the 'cosmos', the connotation (apart from space cells and extraterrestrials, a recent invention) is that of an *order* governed by laws.

- ideas that correspond well to the masculine (in which the two languages agree). On the other hand, 'the world' and 'the universe' suggest the idea of a *whole* of which we and everything else are a *part*; of something, moreover, that it is up to us to *discover*, to *penetrate*, to *know*. By these aspects, which seem essential to me, these two terms designate things that are 'yin', 'feminine' in nature, and particularly in relation to us. I would be hard pressed to understand why the French language nevertheless attributes the masculine gender to them.

I'd like to point out another 'anomaly'. (?) anomaly, this time apparently in German, where "le soleil" and "la lune" are called "die Sonne" and "der Mond". Their genders are reversed from those used in French, which would seem to be the most 'natural'. Thus, the sun is immediately associated with the idea of heat and fire, which are typically yang in nature. Perhaps this 'anomaly' is common in Nordic languages, because in cold countries, where the sun's heat is never felt as scorching, burning, but is expected as a blessing, a source of life, the sun is felt (along with the earth) as a kind of nurturing mother, providing creatures with the warmth they 'feed on' as much as the food they receive from the earth....

(\*) I talk about these crucial episodes in my life in the notes "The reunion (the awakening of yin (1)" and "The awakening of yin (2)".

"Acceptance (the awakening of yin (2))", n° s 109 and 110, and in the section "Desire and meditation", n° 36.

I had been 'functioning' since childhood on this set of values, options and images, which were in no way the fruit of my own life experience and the work of assimilating it. Ever since I was a child, I'd 'functioned' on the basis of this set of values, options and images, which were in no way the fruit of experience of my own life and the work of assimilating it, but simply 'baggage'. A lot of this baggage was made up of clichés and self-indulgent illusions, which I had taken over 'with confidence' from my parents, and which very often in my life replaced a direct and living perception, a creative perception of the things around me.

It's true that this 'autonomy' I'm talking about appeared immediately with the discovery of the power of meditation. It was *total* (I think) in everything I took care to examine. That doesn't alter the fact that many preconceived ideas, particularly and above all those that came to me from my parents, initially remained in place purely through inertia, because they had not yet been examined. There was so much to look at, there was no question of looking at everything at once! Not to mention that, after a few months of intense work, I allowed myself to be distracted by 'life going on' - especially love affairs, as you can imagine (\*\*). For nearly two years after that, my meditations were confined to a few occasional reflections of very limited scope, when I found myself confronted with some situation of acute conflict, and when I urgently felt the need to see things clearly, It wasn't until August 1979 (almost three years after discovering meditation) that I began the 'great cleansing' of the preconceived ideas about my parents and myself in particular, which continued to clutter me up and block my view of this fascinating world in which I live. Working on my parents' lives absorbed me for seven months, until March of the following year. I was then on the eve of my fifty-second birthday. It was through this work that the autonomy I've been talking about, which in a sense had remained only 'potential' for three years, became fully present, complete and irreversible. It was also through this work, and through

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(\*\*) My love life in the years following my discovery of meditation in 1976 was more intense, and also more eventful, than at any other time in my life. It certainly represented a dispersion, a diversion from the initial impetus of meditation, which was not to be resumed (with the breadth to which it was entitled) until August 1979, with the long-term meditation on the lives of my parents. (On this subject, see the notes 'La surface et la profondeur' and 'Éloge de l'écriture', n°s 101 and 102.) Yet, with hindsight, I realise that I could not yet 'spare' this dispersion - a certain passion, a certain hunger within me had to be consumed, and along the way I had to continue to learn, through the women I loved, what I had learned only imperfectly in the course of my past life. At this point, I doubt that meditating on the past alone could have taught me this.

It was only thanks to him that I was able *to love* my parents in the full sense of the word, that is to say: *to accept* what they were, or had been, with all that that had implied (and that I was beginning to glimpse at the time), and in particular, implied for me, their son.

If I felt the need to do this work (<sup>128</sup>) and if I was able to do it, it was because three years before, I had been able to accept the gift of life I had received at birth, and had refused for forty years - the gift of my unity. Or to put it another way, it was because I had been able to accept *my own nature*. It was through accepting and loving myself that I was able to accept and love my parents (\*).

I can also say that it was through this work alone that the *conflict* with *my parents* was "resolved". - a conflict I hadn't even realised existed a few years earlier, when both my parents had been dead for more than twenty years. It's true that the basic note in my attitude towards my parents since my early childhood had been one of admiring respect, appreciation, unreserved identification, and after their death, a kind of tacit cult of their person and their memory. It wasn't the kind of relationship we usually refer to as 'conflict', suggesting a basic note of antagonism, of enmity. They thought it was all very well and in the right order - and there can't be many parents who wouldn't like to be in their place, or who don't congratulate themselves when they are i It was only after this work on my parents, and even more so after the work on my childhood that followed, that I was able to realise fully, with full knowledge of the facts, the extent to which the idyllic relationship I had had with my parents had been *false*, fake, not '*real*'. It could only have survived by stubbornly *erasing* from a touching blackboard a whole host of things that didn't 'fit', including painful periods (of acute antagonism, often felt as a wrench), or chronic 'blunders', which recurred in the relationship between my mother and me with the same implacable regularity (even if less frequently) as had once been the case between her and my father. Not to mention things that had escaped my conscious awareness entirely, like the 'big cross' I had drawn over my parents at the age of eight, after two years spent in a foreign environment, with a hasty letter from my mother three or four times a year as any sign of life from either of them. ...

But the deeper reason, the *real* reason, why I call the relationship with

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(\*) This ties in with the thoughts at the end of the note "Acceptance (the awakening of yin (2))", no. 110.

When I think of my relationship with my parents between the summer of 1933 (when I was five years old) and the winter of 1979/80 (when I was fifty-one), it's *not* that during those forty-six years there were conflicts that pitted me against one or the other or both of them jointly - whether these conflicts were frequent or rare, violent or latent, conscious or unconscious. It's rather that this relationship wasn't *accepted* and *couldn't* be accepted (as it was, I mean, without undergoing a profound transformation). It could only be lived and seen as I lived and saw it, through the effect of a constant, tenacious *repression* of my faculties of knowledge and understanding; through a stubborn *refusal* to become aware of the true nature of this relationship, or at least of certain essential aspects of this relationship, involving in an essential way each of my parents as much as myself, and the image I had of us. To put it another way, the form that this relationship had taken was perpetuated by a stubborn, incessant *flight* from a reality that was all too tangible; a reality that was just as stubborn in making itself known to me again and again, without me ever really learning anything from it while my parents were still alive. The sometimes harrowing episodes of clear and undeniable conflict between me and one or other of them were just some of the more or less eloquent signs of the 'conflictual' nature of the relationship with my parents, in other words of the repression and escape that took place *within me*.

To put it another way, a 'conflictual' relationship with another person, in the deepest sense of the term, is a relationship that is 'divided', one that perpetuates itself by a process of repression and escape from reality, and which conversely helps to perpetuate these processes within itself. The signs of 'conflict', of 'division' in the relationship, can be as much in the nature of antagonism as in that of allegiance; it can be a deliberate expression of criticism or even disdain, as well as a deliberate expression of approval or admiration.

And here I am, back, without having sought it or planned it, to what might be called my philosophical 'dada': that conflict between people is only the 'sign' of the conflict in each of the protagonists, or again: that the 'source' of conflict in society is the conflict, the division in the person. (The parents in all this ended up disappearing without a trace!).

This view seems to overlook entirely the more simplistic and by far more common view: that the conflict between two people is the result of 'interests' or desires in one and the other that are 'objectively' antagonistic, i.e. such that satisfying the other's 'interests' or desires is not the same as satisfying the other's 'interests' or desires.

This is the universally accepted way of seeing things, whether we are talking about a conflict between two different people, or an internal conflict within the same person. This is the universally accepted way of seeing things, whether we are talking about the conflict between two distinct people, or the internal conflict within the same person. Thus (in the first case) these incompatible 'desires' may be, in both cases, the desire to dominate, to set the tone, to call the shots

- This is certainly one of the most common cases, including between parent and child (and just as much between wife and husband, or lover and lover). I'm not denying that this approach is real and useful, at least in some cases. But I see that it only concerns a superficial reality, while a deeper reality escapes it entirely. To give an example of this, I would point out that the desire to dominate (or to shine, or in general, to put oneself above others) is rooted precisely in this 'self-contempt', in this 'self-discredit' mentioned earlier, which we try to escape by adopting attitudes and behaviour that *blur* and *compensate for* this secret self-discredit. So, beyond the 'objective' conflict of antagonistic desires, we see in this case the conflict within the person, as the creator of desires of such a nature that they can only arouse and fuel antagonism towards others.

Admittedly, with these few comments I'm not going to exhaust the delicate and important question of the relationship between the two aspects of the conflict, which I'd like to describe as 'superficial' and 'deep' - and this is probably not the place to do so. Rather, I feel the need to return to the theme of conflict with the father, or conflict with the parents, from which I was moving away. At one point I may have given the impression (and even let myself be carried away by it for a few moments 1) that conflict with a parent, or with Pierre or Paule, was all the same. I know, however, that this is not the case! I know very well that *the conflit with the father, the conflit with the mother, are at the heart of the conflit within ourselves.*

I spoke earlier, in this sense, of my 'intimate conviction' (which I would also call a *knowledge* within me, a well-understood thing), that in the person who is not divided within himself, the conflict with his parents is resolved. This knowledge, I said, comes first and foremost (I think) from the experience of resolving the conflict in my relationship with my parents (\*). Another way of putting it is *that accepting our parents* (i.e. ending the conflict with our parents) *is part of accepting ourselves*. They are (in relation to us) both our *origins* and our *conditioning* (or a good part of it, at least). The first of these things (our origins) is inseparable from who we are, whatever our path and whatever our conditionings.

(\*) See footnote below,

The other (our conditioning) is deeply rooted in us, and as such is as much a part of who we are as our origins. To deny the true reality of our mother or father, whether the denial is expressed in antagonism or allegiance, is also to deny an essential part of ourselves and of what our life has been, for as long as we can remember...

There is more. It was through our mother and father, before anyone else, that the conflict that was in both of them was transmitted to us. (This is what was expressed a few moments ago by the pithy term "our conditioning"!) This is how they are linked to the conflict within ourselves, more closely than any other person in the world. And the first external projection of this conflict within us, and the oldest and most crucial of all, is the conflict with our mother and father. So it seems to me that the conflict within ourselves, and the conflict with both our parents, are indissolubly linked - they are like one and the same conflict.

Sometimes I've expressed the 'intimate conviction' that when the conflict within us is resolved (or at least, when it's resolved at its root, in the 'yin versus yang' division), then our conflict with our parents is also resolved; or, to put it another way, that the resolution of the conflict within us passes through the resolution of the conflict with our parents. But I'm convinced that the opposite is also true: that as soon as the conflict with our parents is resolved, the conflict within us is resolved at the same time (\*). This is why I see our relationship with our parents as a

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(\*) I can give the impression here of posing as 'the person who has resolved the conflict in himself'. It's true that I say without reservation that the conflict with my parents has been resolved, totally resolved. It's also true that the conflict within myself continues to make itself felt in many ways, it hasn't disappeared, it's something that's certainly very apparent on every page of Harvest and Sowing, and it's also something that I've had occasion to emphasise more than once in one case or another. It would therefore seem to contradict the statement commented on in this footnote, 'that as soon as the conflict with our parents is resolved, the conflict within us is resolved at the same time'. However, in a certain sense (the one I had in mind when writing these lines), it is indeed true that 'the conflict within me is resolved'. At least, something essential in this conflict, at its mimetic root, is well and truly resolved, by this knowledge of my unity, by this acceptance of myself. If the conflict is likened to a tree with strong, deep roots, we can say that when the root is cut or has dried up, the tree is already dead, whereas by virtue of the inertia it has acquired, the trunk and the main branches remain in place, just long enough to dry up and disintegrate little by little. I can feel this gradual 'drying up' of the conflict over the years, like a once strong and lively hold that is gradually loosening. The writing of Récoltes et Semailles seems to me to be one stage in this process, among many others over the past eight years. Another image to try and describe this same reality is that of a deep calm that gradually spreads out, like the calm of a deep sea, unaffected by the upheavals that

*key role* in our spiritual adventure, a unique role that belongs to no one else in our family, whether spouse or child, friend, teacher or pupil.

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(<sup>128</sup> 1) (1 December) (\*) The importance for me of "getting to know my parents" was revealed to me by a dream that came to me on 28 October 1978. It was a dream about my father's agony. It was a dream about my father's agony, stretching out over days and nights of painful struggle, surrounded by the busy indifference of those around him, even though the tacit consensus of everyone was that he was 'already dead' - 'it was like a verdict that would have made his death effective, cutting short all doubt'. When I woke up, I recounted the dream, but for the next three months I avoided thinking about it at all, to the point where it sank into the shadows of semi-forgetfulness. In short, I then 'buried' my father's death, about which this bank spoke to me, just as in this dream (which evoked a crucial aspect of my waking life) I 'buried' my still living father. There was considerable resistance to the clear and penetrating message of this dream, which was so overwhelmingly beautiful. They were resolved at the end of a first night of stubborn meditation on the meaning of the riverbank, on the following 31 January, followed by four more meditations over the next three weeks.

This dream made me realise that my relationship with my father and mother was a frozen, 'dead' relationship, cut off from a living reality whose perception was repressed - just as (in the dream) the perception of an agony declared null and void was repressed, and the spontaneous action that followed from it: assisting the person who, painfully and abandoned by everyone, was struggling to live.

The first thing I did to put an end to my isolation was to get to know my parents. At the time, I had no idea of the scale of the task; I imagined that in just a few hours I'd be able to get to the heart of the matter! The idea of getting to know myself, particularly through my childhood, didn't occur to me at the time. This need

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shake the surface. I explain this in more detail in the two notes "The reunion (the awakening of yin (1))" and "Acceptance (the awakening of yin (2))", n° s 109, 110.

(\*) This note is taken from a b. de p. to the previous note n° 128 "Parents - or the heart of the conflict".

It was to follow spontaneously from the journey I was about to embark on. That journey began only six months later, in August 1979, because of the long digression (though by no means unnecessary in many respects) that constituted the episode 'In Praise of Incest'. (For this, see the note "The Act" (113).)

Along with the dream of 18 October 1976 (which triggered the 'reunion'), this dream about my father's agony is one of the two dreams that had the strongest impact on the course of my life. The resistance to his message was much stronger, it seems to me. The message of the first was received within hours of waking up, whereas that of the second was put off for months. It only began to be fulfilled nine months later, with my departure on a voyage of discovery that continues to this day...

It was only in the last few days that I came to see the connection between the meaning of this dream and the reality of the Burial that I am trying to penetrate in the present reflection. This funeral, in which I appear as the 'principal deceased', appeared to me a short while ago as a 're-rounding of things' (see the note of the same name, (73)). This time, I see a 'return of things' again, but from an entirely unexpected angle. In L'Enterrement, I appear alternately as 'The Father' and 'The Mother'. It never occurred to me that I'd ever been in a similar position as a son, 'burying' alive (whether symbolically, or by tacit consensus) his father or mother - quite the contrary! And indeed I had strong reasons for being convinced of the opposite, reasons that I mention for the first time at the end of the note 'the massacre' (admittedly in the context of the Father's *massacre*, not his burial). (I come back to this in more detail in the note 'Innocence (the marriage of yin and yang)' (107).) In writing these last two paragraphs about my early childhood, in the note 'The Massacre', I must surely have given the impression (and even been under that impression myself at the time) that my relationship with my father had been free of conflict throughout my life. That's what a superficial look at the relationship might also suggest. But already in the note commented on here, "Parents - or the heart of the conflict", where I don't limit myself to such epidermal impressions, it becomes clear that this is not the case, that this view of things (which was indeed mine until 31 January 1979) was one of the illusions that I was happy to maintain for most of my adult life. This illusion became clear to me the moment I finally took the trouble to examine the meaning of the dream about my father's agony - the most *beautiful* of all the dreams that life has given me to date. This dream presents the grip of conflict on my relationship with my father with striking realism - and

He also lets me experience the *resolution* of this conflict. The conflict is resolved by the effect of a *break in* me with the consensus decreeing my father's death, a break that suddenly opens the door to *something else - and* by a gesture of love from my father, signifying that he had heard the cry that my constricted throat could not let out to him. . . .

The deep kinship between the experience of this dream, a striking parable of a frozen relationship with my parents (which suddenly comes back to life. . . ), and the reality of the Burial that I have been exploring for nearly nine months, is now so obvious to me. It's remarkable that throughout this long period of reflection, and right up until the last few days, the thought of this kinship never crossed my mind. I finally 'stumbled across it' by sheer chance, in a footnote where I intended to point out, for all practical purposes, the role that a certain *dream* had played this time too (in triggering a reflection on my parents), among so many others over the last eight years that have been like providential beacons on my path. This comment had the effect of putting me back in touch with the experience and substance of this dream, which I'm still a long way from having exhausted. Once this contact had been re-established, it was hardly possible, given the context, for the relationship with Burial not to become apparent.

It's true that this kinship, for the moment, only concerns a certain '*knot*', whereas in this dream and in the reality it transcribes, there is the knot, *and* its resolution. This resolution, moreover, which the dream had brought me to experience, the flavour and strength of which I knew from that night onwards, it was up to me and no one else to ensure that it became a lived reality in my waking life too, in my relationship with my father and mother. I was free to do it, or not to do it - and for months, I chose the latter! Today - five years after that resolution - the same is surely still true, in this somewhat symmetrical situation in which I'm involved, although I'm the one who appears as the Father buried by a consensus-verdict, whereas I was the son who devoutly buried his father alive in the flesh! And perhaps this time too it is by meditating on the meaning of my experience, in this case, on the meaning of this Burial, that this other knot in which I find myself will be resolved, and perhaps another part of the weight of my past will dissolve.

As to whether this meditation will be of any use to anyone other than me - to some protagonist perhaps of this Funeral where I am not the only one to be buried, and where legion are the mourners who have flocked to the Funeral - that need not be my concern; nor whether it will be of any use to anyone other than me.

the knot I see in someone else will resolve itself or not. That's his job, I've got enough of my own

! But if, by any chance, it should happen while I'm still alive, I'm sure I'll be one of the first to be informed and I'll be happy about that...

(<sup>129</sup>) Decidedly, in the preceding pages (\*), I have barely touched on the theme of *conflict with parents*, and not even that of conflict with the father, which had been my starting point. The associations of ideas that I followed from there, would seem to have led me away from it, rather than delving into it. In what I have just said about conflict with parents, the roles of mother and father are interchangeable, just as it makes no difference whether the 'we' referred to in these pages refers to a man or a woman. However, in our relationship with our parents, mother and father are far from playing a symmetrical role, and the role played by each of them crucially depends on whether 'we' are a boy or a girl (who have since become a man or a woman).

In the case in point, the conflict with the father (expressed by his symbolic burial, or massacre) interests me first and foremost in the case of those I know to have taken an active part in my funeral, who are all *men*. So, in the structuring of the ego, the father is the one with whom we *identify*, on whom we *model ourselves*, in our relationship with others (and more particularly, with women), and in our relationship with ourselves. Rarely does this identification take place without major 'burrs', and antagonism to the father is one of the traces of this, a tenacious one if ever there was one. This is not the place to try to go into all the burrs, all the things that often tend to go wrong, for even the little boy who is best disposed to take his cue from Dad; nor to examine the expression they tend to take in the relationship with the father. My own experience on this subject is so atypical that I would perhaps be less well placed than anyone else to make such an inventory, even though I don't feel intimately, from my own experience, the ins and outs and the particular 'flavour' of any of the main cases (\*). My experience here is mainly indirect, through what I've been able to observe around me, and first and foremost in my children's relationships with me.

Beyond the specific nature of the 'blunders', and the grievances and resentments towards the father that stem from them, there is a common aspect that I have strongly perceived on many occasions, when any deliberate 'explanatory' statement was entirely absent. This is that

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(\*) Those in note no.<sup>o</sup> 128, of which this is an immediate continuation. (\*)

Compare with the reflections at the end of the note 'The Massacre', n° 87

the boy's or man's antagonism towards the father, who has served him as a model to a greater or lesser degree and whom he reproduces, in 'positive' or 'negative' (by imitation, or by opposition), whether he likes it and recognises it or not - this antagonism is nothing other than an aspect, particularly eloquent and crucial, of an antagonism towards *himself*. More specifically, it is the outward sign, through the (more or less clearly expressed) *rejection of the father*, of the *rejection of a part of himself*; of that, surely, by which (unbeknownst to him, or against certain conscious or unconscious options) he resembles his rejected model - his father.

As a result, I'm back on my feet - I can see the link between 'self-contempt' (or 'self-denial') and 'antagonism to the father' becoming clearer - but I'm back on an unexpected side. I was prepared to find a more or less direct link between this antagonism to the father, and the refusal of the self in the form of the refusal (or 'burial') of the *feminine* in one's own person. Instead, I seem to have fallen back (as I should have expected, in 'good logic') on the rejection of the *masculine*. And yet I'm well aware that this rejection, which is less obvious and more hidden in men than the rejection of the feminine within them (which I've mostly had occasion to talk about), is only slightly less rare, and that it weighs on them just as heavily. Often it is superimposed on the other, so that, however else the ego is structured, whether in yin or yang colours, we are sure to be unacceptable to ourselves 1 Or to put it another way, this rejection of the father, or the rejection of what is 'masculine', 'virile' in oneself and makes us resemble the father, often goes *hand in hand* with the unreserved adoption (for want of a 'yin' counterweight, rejected) of a 'yang', 'macho' value system with a touch of zinc! (\*)

The idea comes to me that this contradiction (truly appalling indeed, once said and written down in black and white!) is undoubtedly also the real *nerve* in this merciless *competition*, which is one of the characteristics of our supermacho society (and this just as much in the upper echelons of science, as anywhere else....). For while 'climbing' and 'surpassing' are superyang values par excellence, these values would no doubt not be internalised with such vehemence, nor would they be put into practice with such brutality (however subdued, when it comes to the 'upper echelons') if, in the rival who is in a better position than we are, whom we need to surpass or even oust, we did not at the same time see looming before us the formidable shadow of the Father, at once admired, envied and secretly hated - the one who was there before us, and whose only existence, as far back as we can remember, was *the great*

(\*) (29 November) This is at least by far the most frequent case of which I am aware.

*challenge* in our lives.

(<sup>130</sup>) (19 November) I found myself impatient to continue where I left off. For a week now, in fact (since the note of 12 November, 'L'épouse véhémente (le renversement du yin et du yang)' (<sup>126</sup>)), I've had the feeling day after day that I'm about to get 'to the heart of the matter' - to get to the overall picture of L'Enterrement that I'd promised myself, which would bring together the partial 'strands' that had emerged in the course of reflection - and a week also that the 'point' in question is being pushed back day by day. Every day, as I finish my note (because I have to stop and go to bed as the clock ticks), I feel that I've done something I couldn't possibly have thought of doing, that I've 'moved on' a notch - but at the same time I have the impression that the 'point' I'm trying to get at has slipped back just as much! The obvious temptation here is to carry on in one go until I've reached the famous 'crux of the matter'. But after the 'health incidents' of the last three years, I also know that this is the blunder to avoid.

I know deep down that I'm right in the thick of it. It's just that I'm gnawing at the bitter end. This impatience to get to the end of a task, this drive towards a particular 'point' or 'crux of the matter', intensely perceived in front of me - close by, or far away, it doesn't really matter - this attraction of the 'goal' to me which propels me forward, like an arrow hurtling towards its target - this aspect which seems to me to be the most intensely 'y a n g' of my person, characterises my way of being *outside work time*. It's a striking aspect of the '*boss*', of what is conditioned and acquired in me. Nothing in what I know of my early childhood could have foreshadowed this character, which appeared later in my childhood, and which has so strongly marked my entire adult life right up to the present day.

In the workplace itself, this aspect seems to have all but disappeared. I have the impression that the little that remains here and there is no more and no less than the sign of the boss's occasional interference, discreet it must be said, in the course of the work (where, to tell the truth, he has nothing to do!). The work itself, at the whim of the Worker who, through my hands, works at his own pace, follows a completely different rhythm. The impatient ardour is replaced by a peaceful, stubborn calm. There is no longer an arrow hurrying towards a target, but a wave that stretches out far away and advances who knows where, wherever the moving force that drives it takes it - a wave followed by another wave, followed by yet another... There is no hesitation in this

movement, in every place and at every moment it has a direction of its own that carries it, or draws it forward. In each moment there is a progression, we can't say towards what, there is a 'work' accomplished in a movement that ignores effort - and there is no goal. The very idea of a 'goal' here seems strangely preposterous - where on earth would we put it? The goal has disappeared, just like the arrow. If there is an arrow, it's not *a* vibrating arrow that shoots into the heart of a target, only to sink into it and be destroyed by it - but in *each* place in this moving mass of waves following one another there is an unequivocal movement and force, there is a direction in a progression, as precise and clear as an arrow, invisible and yet imperious, which would mark this direction, this force, this movement.

So it seems to me that in my work, I am as 'yin', as 'sea and motion', as one can be. This has been true, I believe, of all the work of discovery in my life, of all the work I have thrown myself into with passion, and above all, of my mathematical work and my work of meditation. And now that I have unexpectedly described how I feel about this work in a sudden and compelling image, it seems to me that this image also describes the *movement of my life*, from the day of my reunion with myself, and perhaps even before that, from the moment of my 'salutary uprooting' from a cosy cradle (\*). At the very least, it describes the 'how' of my life at the deepest level, that of the 'calm' I spoke of (just a few hours ago) in one of the footnotes to yesterday's note - a calm that is unaffected by the agitation that takes place on the surface. In this deep stillness there is movement and progress, but there is no purpose - the purpose has disappeared.

And I also remember now that it was this same image that came to me in March, when I spoke of the manifestations of my two passions, meditation and mathematics, as "the moving up and down of waves following one another, like the breaths of a vast and peaceful breath... ." (\*\*). Now, eight months later, I think I recognise in these images the spontaneous movement of my being, in what is most spontaneous, in what is truly original in me - in what comes from the child eager to know, before it is touched by the preoccupation with appearances and the frenzy of becoming...

(<sup>131</sup>) (20 November) Yesterday evening was spent almost entirely rereading the notes

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(\*) See note of the same name, n° 42.

(\*\*) See the end of the section "My passions", n° 35, from which these lines are taken.

of the previous day, correcting them on the way, retyping a page that was decidedly too overloaded, writing the footnotes (planned the day before) - and already it was midnight! I was anxious to get on with it that very evening, if only for a little while, and went back to my typewriter to resume the interrupted 'thread' of the previous day. And then something else came to mind - the image of the arrow and the wave. For a long time I had recognised myself in the image of the arrow, whereas the image of the wave seemed to correspond to a temperament quite different from my own. It's one of the surprises that emerged in the course of this reflection on yin and yang that it's the image of the wave that expresses most strikingly, and most accurately, the 'basic tone' that prevails in my being, when 'the boss' is far away, or at least when he gives way to something else. The image took shape, as if it had been there all ready, just waiting for the words that would finally give it form. They came without haste or hesitation, as I simply tried to *describe*, as faithfully as possible, without glossing over or distorting anything, what was still just a vague feeling.

When the description was finished, it was around two in the morning. I reread these two pages that very night, so there were no alterations to be made. The trickiest part was when I tried to describe this intuition of a continuous infinity of 'arrows', forming a kind of 'field' of forces. It was an idea that presented itself forcefully, and which seemed reluctant to let itself be evoked by language. Yet I felt that this was an important aspect of the whole image, the 'yang in the yin' aspect. In the wave there is 'the arrow', there is an *impetus* that carries it forward, following a movement of its own that is not that of *an* arrow, but rather that of a whole multiplicity, a *continuous* multiplicity that smoothly reproduces this movement of the wave. And I also knew that in my work I was *also an* 'arrow'; but I was doing it in a different way to the one I had imagined until now, because I hadn't taken the time to ever look at this work with any attention, to immerse myself in it as if it were someone other than myself, in order to perceive its tonality. If I have not done so sooner, in the eight years that I have been meditating, it is undoubtedly because I have remained the unwitting prisoner of a deliberate and inveterate intention: that of identifying myself with the 'boss' in me, rather than with the Worker-child; that is to say, when I speak of 'me', I think first and foremost (perhaps even exclusively, very often) of the person I am when it is the 'boss' who takes centre stage. More or less, these are also the times when I'm not at work.

The necessities and vicissitudes of teaching (among other things) have nevertheless ended up, since the discovery of meditation, drawing my attention to *certain* features of my work - that is, features which I felt were universal in nature, that they should be present in *all* creative work, in all work of discovery (\*). But before this reflection on yin and yang, I hadn't yet thought of discerning distinctive features in my own work that made it different from that of any other. One of these traits, which seems to me the most crucial of all, is finally identified in the note of 8 November "The rising sea..." .

(<sup>122</sup>). The image first evoked in that note, in the typical context of a conjecture that he is to prove, is taken up again in yesterday's notes, in a different light, out of any particular context.

At last I'm picking up where I left off the day before yesterday. I had set out (\*\*) with the intention of trying to identify the deep-rooted cause of antagonism to the father, over and above the specific grievances we may have against him. Following the associations of ideas that came to the fore, I initially strayed from this aim, being led above all to talk about conflict *with parents*, father or mother indifferently. This 'conflict' can take the form of allegiance (as it did in my case) or antagonism. Since my work on my parents' lives, this 'conflict at the paretits' seems to me to be truly 'at the heart of the conflict' within ourselves. Resolving this conflict, I'm convinced, is no more and no less than resolving the conflict with the parents, in other words: to be free of them, to be fully autonomous spiritually, to pursue *our own* journey...

Returning once again to antagonism to the father, in man, I got back in touch with an intuition that has occurred to me many times over the last few years : it appeared to me that the profound meaning of this antagonism to the father is the refusal of that in us which makes us resemble the father, of the appearance and *virile* traits of our person. I have made this last part of yesterday's reflection (\*) a separate note, with the name "The enemy father (3) - or yang buries yang" - thus also suggesting, by this name, the link with the two sections "The enemy father (1), (2)" (n° s 29, 30), where this theme of the "enemy father" appears for the first time.

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(\*) The first written text, I believe, in which I evoked some of these traits was that of October 1978, "En guise de Programme" (alluded to in the note of 6 November, "La belle inconnue" n° 120). After this text, I won't bother to spell out and expand on my observations on this subject in black and white before this year's Harvest and Sowing reflection. Its first eight sections are essentially devoted to this theme, not to mention numerous other comments throughout the course of this reflection.

(\*\*) In the note "Parents - or the heart of the conflict", n° 128.

Thus, the aspect of the Burial discussed at the beginning of yesterday's reflection, namely the aspect of 'self-contempt', or 'self-unrecognition' or 'self-denial', appears as a kind of hyphen, or better still, a '*charnel house*', between the two preceding sections, the section 'Supermother - or burial of the 'feminine'' and the section 'Superfather - or massacre and burial of the father'. This hinge-like nature becomes apparent as soon as it becomes clear that, in the first of these parts, 'the feminine' is, above all else, 'the feminine *in us*' (as was already clear in the Note of 10 November 'The funeral of yin (yang buries yin (4)', where the 'Supermère' part makes its appearance); and, moreover, that 'the Father' is above all the symbolic substitute for 'the masculine in us'. So the two aspects in question are perfectly symmetrical strands, corresponding to the two obvious 'cases de figure' of the 'refusal of self' - namely, the refusal of 'the woman' (aka the Mother) in us, and the refusal of 'the man' (aka the Father) in us (\*\*). And the theme of conflict with the parents, which is a kind of conjunction or superposition of the two distinct themes of conflict with the mother and the father, also appears as a kind of hinge. Or to put it better, according to what was seen in yesterday's reflection (\*), this theme appears to be inseparable from that of self-denial, the one and the other being two distinct aspects of the same undivided reality, that of the *conflit within ourselves*.

In all this, it would seem that the initial aim of "identifying the root *cause* of antagonism to the father" is still unresolved. I could say that antagonism to the father is one of the *forms* taken by antagonism to oneself, or self-denial. From then on, the initial question seems to split into two. On the one hand, for what 'causes' does self-denial take on this particular form in certain cases? To investigate this is also to enter, in some detail, into a number of different typical situations likely to give rise to such antagonism.

On the other hand, we come back to the deeper and even more crucial question of the '*cause*' of self-denial, that is to say, the cause of the conflict and division within us. I believe that

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(\*) In fact, it's not the previous day's note, but the day before, which I'm about to follow up here. (\*\*) I would remind you that it is by no means rare for the two kinds of 'symmetrical' refusal to be superimposed on each other in the same person. Given the devaluation of yin in our society, it must be quite rare, in any case, for the refusal of yin not to be present in a more or less pronounced form. So I'd be tempted to see in the antagonism to the father a sign (at least presumptive) of a double refusal of yin *and* yang. (\*) See penultimate footnote.

to have grasped at least the common *mechanism* by which the generational conflict is transmitted: the refusal of ourselves in ourselves is nothing other than the internalisation of the refusal of ourselves by our entourage from our earliest years - the refusal at least of certain aspects and certain impulses in ourselves, which form an essential part of our original being, of our creative faculties. I touch on this aspect of things (among others) in the 'Refusal and Acceptance' part of 'The Key to Yin and Yang', and more particularly in the first two notes, 'Paradise Lost' and 'The Cycle' (<sup>116</sup>), (<sup>116</sup><sup>¶</sup>).

Having grasped this common 'mechanism' for the transmission of conflict does not in any way mean having understood the *cause of* conflict in ourselves and (through us) in human society. *Why*, from time immemorial and in all places (according to the unanimous testimonies that have come down to us through the ages), does 'Society' not tolerate those who make it up as *whole* beings? That is to say, beings in full possession of their creative faculties, who do not repress at great cost a part of who they are, considered so shameful (or so fearsome...) that it is better to ignore that it is, and tacitly rule that it *is not*... .

For me, this is one of the great mysteries of existence, perhaps the greatest mystery of all. (\*).

There was a time, just a few years ago, when my attitude towards reality was very different. of repression and conflict, was an attitude of militant *revolt* - revolt against this 'sword', which claimed to cut in two what, by its very nature, should be one, *was* one. That was my attitude when I wrote the Éloge five years ago (\*\*). It is

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(\*) This suggestion is purely subjective; it simply reflects the fact that, of all the 'great mysteries of existence', this is the one that I feel particularly strongly about, in a way that goes beyond mere intellectual curiosity. It's the only one that arouses in me a *desire* - to probe it, to know it, to get to the bottom of it (insofar as it can be known, with the limited faculties that I have). The difference is the same as in mathematics, between open-ended questions that I 'feel right' about (into which I could dive straight away), and those that I 'understand' in the technical sense of the term, whose scope I perceive (at a superficial level), but which 'neither warm nor cool me'. The Riemann hypothesis is one of the latter (no doubt due to my great ignorance of analytic number theory), and Fermat's theorem was another until a few years ago. It's my 'anabelian' reflections that have changed my attitude towards the latter, while my ignorance of the work it has given rise to is still as great as before.

(\*\*) This episode is mentioned several times in Récoltes et Semailles, most recently in the note "L'Acte", n° 113.

It was through the long-term meditation that followed, on my parents' lives, that this attitude changed. Through this work, which day after day brought me back into intimate contact with the manifestations of the conflict in my parents, and which patiently led me back from the manifestations to their meaning and their cause - through this work I finally came to feel the *mystery of* the conflict. The rebellious attitude had disappeared, as if it had never existed. It had been an epidermal reaction, a simple dispersion of energy. A revolt - against whom? Not against one person or a group of people, against the famous "Them...". 1 We're all in the same boat, and we've been here a million or two years.... . Rebellion against "God"? That's all it would have taken.

Deep down, I've known for a long time (I can't even say how long, although for a long time I pretended not to know.... .) that everything in this world has its good reason for being, and even, if you understand the essence of things, surely everything is *good* as it is. Death and the 'beyond' of death (if there is such a thing) is one of those things. It's a mystery, and if there's a 'f o i' in me about it, it doesn't consist in 'articles of faith' about the existence (or non-existence) of an afterlife and its particularities, but simply in this simple assurance: that things are perfect as they are, including everything to do with death, and also everything to do with birth, which is just as mysterious. For a long time, however, I had excluded 'conflict' from these things - I saw it as a kind of 'blunder', an inadmissible blunder, a stubborn and bizarre (even revolting) 'blip' in the concert of Creation. All it took was for me to get to know the conflict a little more intimately, instead of wasting my t i m e pretending to fight with it, for my relationship with it to change profoundly.

The mysteries of death and the "after death", of birth and the "before birth", are not unique to our species. The questions they raise have meaning for all living beings, perhaps even for everything from the electron to the nebula. The mystery of con- flit, on the other hand, seems to me to be unique to man, to the human species (\*). It appears to me as the 1 st great mystery about the particular meaning, the particular destiny of *our species*. The "explica-

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(\*) (December 3) It may be objected (with good reason) that conflict, in the form of aggression and confrontation between individuals or groups of individuals, exists within species other than our own. When I speak of 'conflict' here, I'm thinking of the specific form it takes in human society, and in particular of its profound links with *division* and repression within the individual - repression of the major part of his being, and in particular repression of his means of perceiving reality, and of perception itself. The various

The 'explanations' given by ethnologists and psychologists, at least those I have heard of, are clearly nothing more than *rationalisations* to *justify* the repression suffered and internalised, as essential to the smooth running and very existence of society; just as in a society of penguins or one-legged people, there will be no shortage of eminent theorists to prove (without anyone thinking of contradicting them) that a society in which people had the use of both arms (or both legs) could never function (\*). These are convoluted justifications that try to hide a mystery with explanations that claim to be "scientific". In fact, the question of the origin and meaning of conflict (or repression) in human society remains purely rhetorical, as long as the person pretending to ask it has not gone through an intense and in-depth process of understanding conflict *itself*, and the origins of conflict *within it*. In the absence of such self-knowledge, this question (like questions about the nature of freedom, or of love, or of creativity) is a modern equivalent of the famous medieval question about the 'sex of angels' - an exercise in style without more, to manage to 'fit in' what has to be fitted in anyway. Strictly speaking, this question is not a 'scientific' question, one whose examination does not presuppose *maturity*, but simply a certain preliminary knowledge, and a certain level of intellectual power or agility (\*\*).

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forms of repression seem to me to be rooted in the one that seems to me to be the most crucial of all, so-called 'sexual' repression, which inculcates shame of one's own body and of the body's functions and drives (or at least of some of these functions and drives). These are mechanisms unknown outside the human species, as far as I know. Perhaps I'm wrong in using the terms 'conflict', 'division' and 'repression' almost as synonyms, or at least as terms that designate different aspects of the same reality. I'll explain a little more about the meaning I take from the word 'conflict' in the note "Parents - or the heart of the conflict", n° 128.

(\*) Just as in the days of slavery, for the "best minds" (who were also being It seems that it took Plato's unexpected good fortune to find himself a slave to start seeing things differently. It seems that it took Plato's unexpected good fortune to find himself a slave to start seeing things differently.

(\*\*) (3 December) The fact that the question of the meaning of conflict does not fall within the remit of science could give rise to the following questions in the expectation that we might find some answers in myths and religions. It seems to me, however, that this is not the case. From what I know, it would seem that one of their essential functions, not to say their main function, is to establish a 'law' which, for the most part, consists of a 'package' of prohibitions through which repression materialises in a particular society. This law, presented as

In this case, it's not a question of trying to guess the mechanisms by which repression has been established in human society, i.e. to find an *explanation* for the fact of repression. Even supposing we manage to come up with a plausible, even convincing scenario, I wouldn't feel much further ahead. Perhaps it will shed some light on an interesting aspect of the mystery - the 'mechanical' aspect, in short.

- without penetrating it. Neither the detailed results of palaeontology and molecular biology, nor even Darwin's profound ideas, really penetrate the mystery of the appearance of life and its creative flowering on earth over the last three or four billion years. What interests me in the mystery of conflict is not the mechanical or scientific aspect, an aspect that is as *external* to *me* as Fermat's famous theorem. But it is the question of the *meaning* of conflict. This meaning *concerns me* in an immediate and essential way, just as it concerns each and every one of the countless men and women who have torn each other apart and killed each other over the course of countless generations, and who have passed on to their children the conflict taken up from their parents.

That there must be a *meaning* to the conflict, and that I can know what that meaning is in some small way, is surely part of the 'faith' I was talking about earlier. It's obvious to me - and that familiar 'sense of mystery', that there's something deep to fathom, tells me at the same time that this 'something' is precisely *that meaning*. The 'faith' in question overlaps with faith in my faculties, when they reveal to me, here without the shadow of a doubt, that there is a 'meaning' before me to discover.

Perhaps one day this meaning will become apparent, as if I had always known it! This mystery doesn't seem remote or unapproachable to me. It presents itself to me as something very close at hand, that it's up to me to get to know more intimately. And surely I can already see a way of approaching it, or rather an aspect that already seems to be giving me a friendly sign. After all, conflict has a lot to teach me, and it has already taught me a lot...

(<sup>132</sup>) (22 November) This makes two notes in a row where I see myself embarking on excursions that are completely out of the programme - this time I'm going to make sure I start with what was *planned*, for once. I would like to examine

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of sacred essence, does not have to justify itself, or explain its "meaning", and even less the common meaning of this and other laws that govern other societies.

one of the 'typical situations' mentioned (without further clarification) in the previous note, situations likely to give rise to antagonism to the father, and more profoundly, a (more or less radical) rejection of the virile traits in oneself (which rejection finds its symbolic expression in the rejection of the father). I remembered the situation in question from the reflection of 18 November, ending with the note 'The Father as Enemy (3) - where yang buries yang'. My intention then was to put my finger, in this 'typical situation' at least, on a *direct link between rejection of the masculine and rejection of the feminine*.

The case in point closest to me, and on which I had also worked at length, was that of my mother. All her life, she had indulged in a barely disguised contempt for everything feminine, she had modelled herself on masculine values to excess, and at the same time her relationship with men had been, since her adolescence, a 'viscerally' antagonistic one (\*). I was very fortunate that my mother spoke to me very freely about her life from childhood onwards, and that I had access to very detailed autobiographical notes up to the early years of her life with my father, not to mention a voluminous correspondence. Together with my own experience of her life, this is exceptionally rich material, which I am far from having exhausted. Yet I worked with her enough to feel, without a doubt, that the double rejection in her that I have just mentioned - rejection of the feminine and antagonism towards men - was rooted in a torn relationship with her father. Her father, an endearing man in many respects, generous, honest and affectionate, had become embittered during a long social downfall in post-war Germany (I mean the Germany of 14-18), of which there were so many. To tell the truth, this downward spiral had begun even before, from a well-to-do man on a horse-drawn carriage to a travelling shoeshine boy. Under the spur of worries and disappointments, his short-tempered temper sometimes turned to family tyranny, of which his wife, who was in frail health, bore the brunt. My mother, who was deeply attached to both her father and her mother, was repulsed by these episodes of paternal tyranny, endured in silence by her mother, who sometimes couldn't take it but never complained. The child was passionately identified with her mother, the victim of paternal arbitrariness, and at the same time the role played by her mother (the role of victim, the passive role - "the role of a woman"...) seemed intolerable to her. There was a

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(\*) Unlike his contempt for the feminine, this visceral antagonism, which shows through in a vehement and turbulent emotional life, remained unconscious throughout his life. I only became aware of it during my work from August 1979 to March 1980.

this identification with the mother, expressed by a revolt, a visceral antagonism towards the father, and *at the same time* there was this leap of faith "I'll never be like her" (who suffers without rebelling), a leap that could only mean at the same time "I'll never be like women".

But even more profoundly, there was also the desire for the power of the father, of the man, which allows him to dominate at will. And my mother's life was dominated and devastated by this all-consuming passion to dominate; and above all, to dominate and break *the man* - the very man who aroused in her such a surge of raging revolt, the man who by his very nature was supposed to dominate her - just as her father had dominated her mother, suffering, pale and powerless, his power.

I was going to write here that the reflection now 'joins' that pursued in the note 'The vehement wife (the reversal of yin and yar. g)', of 12 November (<sup>126</sup>). As I didn't have a very clear memory of this note, I've just reread it. Strangely enough, I'd forgotten that this note was prompted (like today's) by my mother's 'specific case'. Ten days ago I felt reluctant to go into this case in any depth. If I've come back to it today, overcoming that reluctance (which I'd also forgotten in the meantime!), it's no doubt because there was an aspect of the situation I was examining that had remained unclear. I had also forgotten that the starting point for today's note, "the intention to put my finger on a direct link between the rejection of the masculine and the rejection of the feminine", had already been the initial motivation for the reflection of ten days ago, following naturally on from the question that ended the previous day's note "Supermaman or Superpapa?" (<sup>125</sup>). In fact, the last sentence of the 12 :

"It doesn't take much to see the "missing link" between.... .", would seem to indicate that I thought I'd accomplished my task for the day (of establishing such a link). If I have entirely forgotten that I had already updated this link, and even that I had been asking myself this question even before the note of four days ago (on which I followed up today's reflection), it is no doubt because I had not yet been fully convinced by the brilliant conclusion I have just quoted, formulated no more than six days before this note "The enemy Father (3) - or yang buries yang". The situation becomes clearer by quoting the whole sentence:

"That's all it takes to reveal the "missing link" between antagonism to the Superpère (finding its symbolic expression in the burial of the aforementioned), and contempt, the rejection of the "feminine", and more profoundly the denial of "the woman" in oneself (which finds-

will perhaps see expression in the symbolic "L'Enterrement" of a "supermère", under a plethora of dithyrambic epithets of double use... )."

In this conclusion, there was one step missing, which made it hasty: it was the link between 'antagonism to the Superfather' and the refusal of the 'masculine', a link that only made its appearance in the reflection with the quoted note of 18 November 'The enemy father (3) - or yang buries yang'. Antagonism to the Father then appeared to me as the symbolic expression of the much more crucial reality of refusing the yang, 'masculine' side of oneself. In the 'symmetrical' case of the rejection of the feminine, this link between the symbolic expression and its deeper meaning had already been perceived when the 'Supermom part' first appeared, in the November 1 note 'The funeral of yin (yang buries yin (4))' (<sup>124</sup>). This is how the two 'opposing' strands that appeared in the note of the 11th 'Supermom or Superdad?', namely the burial of the Father and the burial of the Mother, were seen the day before yesterday as symmetrical manifestations of self-denial (or self-contempt), taking the dual form of the *denial of the masculine and the denial of the feminine in one's own person*.

In the note of 18 November, 'The Enemy Father (3) - or yang buries yang', I confined myself to the case of a *male* 'subject' - although the most extreme case known to me is that of my mother! My mother was completely forgotten in this reflection, and had been for ten days already (if not hidden under the heading 'my parents' in the note of 17 November).

Four days ago, it was my knowledge of my children and their relationship to me that made me sense a link between antagonism towards the father and the rejection of the masculine in oneself. To tell the truth, for each of the four (of my five) children that I've had the opportunity to get to know fairly closely, I've more than once in recent years sensed, behind attitudes of inveterate antagonism towards me, their father, a rejection of the virile side of their being, and above all, of *the impetus* within them that launches them out to meet the world - and that makes them resemble a father rejected 1 I'd never asked myself whether this was a general fact; Or rather, there was a kind of unexpressed presumption in me that it must be so, without my ever feeling the need, before the reflection of four days ago, to formulate the thing clearly to myself, let alone to examine it with any care. To tell the truth, this kind of 'general' question was not at all one of those I asked myself in meditation, whose purpose had been more down-to-earth: to understand myself, and above all through my relationships with others.

- and thereby also, to some extent, understand 'others', that is to say those with whom I came into

contact.

relationship.

Of course, in my reflection four days ago, when I suggested that there must be this link, that the antagonism to the father was the expression of a deeper conflict, namely the rejection of 'the man' within oneself, it was still a simple presumption, suggested by my very limited experience. This link seems at least plausible to me, and more particularly in men, but I don't claim to 'see' this link in general. I don't have this 'intimate conviction' about it, which I so often choose as my very sure guide. In the case of my mother, for example, I can see that antagonism to the father was the source of an occult and virulent antagonism to virile traits *in a man*, but in no way to such traits in a woman, quite the contrary. It's true that the mere fact of placing great value on virile traits, and cultivating them to excess within oneself, may not necessarily mean that one fully accepts the yang side of one's being; after all, that would *also* mean accepting the 'yin within the yang' that is spontaneously found in any 'dominantly' yang trait, which of course was *not* the case with my mother.

But the thinking here is taking a rather dialectical turn, which doesn't inspire me with confidence! I prefer to refer instead to my direct perception of my mother, as refined by my reflection on her life and that of my father. I don't remember ever having the feeling that there was something fundamentally 'manly' about her that *she* didn't want. On the other hand, I strongly sensed in her the contradiction, or rather the *heartbreak*, of a woman who cultivates within herself (like so many *weapons*), and who cherishes more than her life, the very traits that, in men, arouse in her such vehemence, and whose life has been crumbled (and prematurely consumed) by this fever of constantly meeting and confronting and reducing to mercy in others this *same* force on which she has staked her all and which is devastating her own life, as it devastates the lives of all those dear to her.

(<sup>133</sup>) (November 24) The cases mentioned in the reflections of the previous note, from the day before yesterday, are not the only ones that I know of, which confirm this presentiment that a superyang disequilibrium in the father (whether or not this imbalance takes despotic forms), is reflected in the children by a rejection of the yang, which in turn can express itself in many different ways. In boys, in the cases known to me and which are present in my mind at the time of writing, this refusal takes the form of repression (more or less

This refusal will surely follow him throughout his life (unless it is profoundly renewed, which is admittedly extremely rare). My mother's case makes me realise that it's not always the same with a girl - unless my mother also had a certain rejection of the virile side of her being, expressed in a more subtle way and which would have escaped me until now (\*). What is striking in her case, however, is the opposite extreme effect - that of an overdevelopment of virile traits in her (in addition to an aversion to everything feminine). I know of other cases in the same vein, in *men* (my mother's father, for example) - that of a *revolt* against the father, expressed by the development of a strongly virile personality, capable of confronting the father 'on equal terms'. As I haven't had the opportunity to experience such a case up close, I'm inclined to think that it must be rarer. But it doesn't really matter.

If there is one point common to all the cases of which I have had direct or remote knowledge, it would be this: a superyang imbalance in the father has repercussions on the child through a *disequilibrium*, which may be in the yin direction (perhaps the most common case), or in the yang direction (\*). In all the cases I can think of (though I wouldn't dream of making a systematic list of all those I've heard of), this imbalance is accompanied by a *feeling of antagonism towards the father*. I have the impression that it is also accompanied by a visceral antagonistic attitude towards *male* third persons, in whom the yang traits are strongly marked, at least when these are not balanced by the complementary yin traits - that is, towards men in whom a superyang imbalance prevails, reminiscent of that of the father.

Such a superyang imbalance (just like the opposite imbalance) is certainly likely to arouse *unease* in anyone, as I have already had occasion to observe (\*\*). But this uneasiness does not necessarily translate into an automatic antagonistic attitude - it

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(\*) A similar situation is that of a *mother* with a domineering, invasive temperament, a sign of a superyang disequilibrium. In both cases, which I know first-hand, this resulted in the daughter repressing her 'virile' traits to a very great extent.

(\*) When I speak here of an "imbalance in the yin direction", this does not mean a development (perhaps a change in the yin direction). This is not the same thing at all. In the opposite case, described as an 'imbalance in the yang direction', there is indeed an 'excessive development' of yang traits, which often goes hand in hand with a more or less thorough repression of certain yin traits.

(\*\*) In the note "Le Superpère (yang enterre yin (2))", n° 108.

It is not uncommon, for example, for it to be resolved (or at least to disappear from the field of consciousness) by an attitude of submission, of more or less unconditional admiration, or of allegiance.

The association comes to me here that these were the tones that were most common, of course, in relations to my person (haloed by prestige), within the mathematical world - at least among those colleagues (or students) who (as I wrote elsewhere) 'did not feel protected by a comparable renown', or (I would add here) those in whom a certain inner equilibrium, a certain spontaneous knowledge of their own strength, did not exclude such misalignments. But it is undoubtedly in the nature of such a relationship of 'allegiance' that it conceals a hidden antagonism, which manifests itself (openly, or in a way that is still hidden) when a propitious opportunity presents itself...

I've just been following a few associations, which pick up on and complete my thoughts from the day before yesterday (in the previous note, "The reversal of yin and yang (2) - or revolt"), and by the same token those in the note of 18 November, "The enemy father (3) - or yang buries yang". They make me realise that the relationship between a certain state of yin or yang imbalance in one of the parents (in this case, a yang imbalance in the father), and the repercussions it has on the child, is by no means unequivocal, as I hastily suggested. There is no doubt that the form in which the parental imbalance, in this case the father's, is transmitted must depend on many other factors, both the family environment (and more particularly, the mother's person and attitude) and the child's birth temperament (\*).

But to tell the truth, that wasn't the direction I was thinking of taking when I started thinking earlier. Rather, I was thinking of pursuing a completely different association of ideas, which has been present since the reflection of 12 November, when the dynamic of the *reversal* of yin and yang roles was introduced for the first time (in the note of the same name, "- or the vehement wife", (<sup>126</sup>))). Perhaps readers will have made the connection for themselves - but the fact remains that when I raised this question on 12 November, and again the day before yesterday on 22 November, somewhere in the back of my mind was the thought of two other occasions when 'reversal' had already been mentioned in the course of this reflection.

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(\*) So I can see that each of my mother's three brothers (all younger than her) developed in a very different way from my mother (who was a bit like a swan in a brood of ducks), and different from the other brothers too.

ion on the Burial. The first time was in the note of the same name in Cortège V, "Mon ami Pierre" (note <sup>(68)</sup> of 28 April). The second occurrence is in a footnote, in the reflection of 30 September, part of the note "L'Éloge Funèbre (2) - ou l'auréole et la force". There is even a third such occasion, but between the lines, at the beginning of the reflection due the day after, which opened the reflection 'The key to yin and yang'. (This is the note "The muscle and the gut (yang buries yin (1))" <sup>(106)</sup>, dated 30 October). This is the content of the famous 'association of ideas aroused by the three-part Funeral Eulogy' alluded to there - the very one that triggered me off that very day, to embark on this digression on yin and yang that I've been pursuing for nearly two months. Now might be the perfect time to let the cat out of the bag, since I've been talking about it, not to mention thinking about it since the day after 12 May, after the note 'L'Éloge Funèbre (1)'.

- or compliments", over six months ago.

What these three situations have in common is that they involve a 'reversal' of roles between me and my friend and former pupil Pierre. In the two cases that were described in plain language a moment ago, I appear as my ex-pupil's 'collaborator' (if not outright pupil!). The first time, it's as if I had contributed (admittedly in a muddled but sometimes interesting way) to the development of the 'powerful tool' of cohomology -adic by my brilliant predecessor and friend. The second time, when we are quoted in one breath (for having "linked topology, algebraic geometry and number theory by 'interdisciplinary' means . . ."), it is by the astute means of a typographical 'oversight' that the same reversal of reality is suggested, as if by the greatest of coincidences (\*). The meaning of this reversal is more tendentious than a simple question of precedence (within, in this case, an institution that only I, along with Dieudonné, 'started' at the scientific level, but which I had left a long time ago), when one pays attention to the choice of eulogistic epithets ('theories of legendary depth' for one, 'brilliant discoveries' for the other, who is also entitled to the underline, along with everyone else except me). This meaning was "strikingly" clarified in the reflection "Les obsèques du yin (yang enterre yin (4))" <sup>((124))</sup>, 10 November), in which the reflection on yin and yang suddenly "landed" in the middle of a funeral ceremony: to one the accumulation of epithets (dithyrambic at times) yin and superyin,

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(\*) As I realised earlier in the note 'The massacre' (n° 87), things often happen by chance, as long as the typographers and movers get involved!

to the other yang and superyang...

This is what struck me the day after the 'Les compliments' note of 12 May, even before I'd had a chance to explain it in as much detail as I did a fortnight ago. According to the way I felt at the time (which I'll have to revisit here), there was a real *reversal of* reality, or more precisely, a 'reversal', taken to a caricatural extreme, of a basic reality that I felt was nuanced and balanced. I saw myself as a person with a strong 'yang' or super-yang dominance, at least in my most apparent, most obvious traits, and particularly those that are obvious to others (\*). On the other hand, I sensed in my friend Pierre a basic yin temperament, much more balanced than mine had been in the days when we saw each other often and he was my pupil.

I believe that this apprehension of reality was essentially correct. If I have sometimes, in recent years, and even more recently (\*\*), sensed an original 'yin' background note in myself, it seems to me that I was the first and only one to sense it - that it was above all through my yang or 'virile' traits, often quite en- vahancing, that I was constantly apprehended by others (\*\*\*)<sup>134</sup>, both on a conscious and unconscious level - at least as far as personal relationships were concerned. These relationships (apart from romantic ones) mainly, if not exclusively, involve 'the boss' in us, what is conditioned. The new fact that emerged in the course of thinking about yin and yang, that *in my work* my approach to things is predominantly yin, 'feminine', doesn't really contradict what I already knew. He nuanced it, correcting me on a point where I had tacitly put everything 'in the same bag'. And all things considered, it seems to me that the sudden and strong impression I'd had of a caricatural 'reversal' of a reality, or more precisely, of the *intention* of such a deliberate reversal - that this 'intuition' was also essentially correct, albeit sketchy. It is the reality imperfectly grasped by this intuition that I would now like to examine more closely.

(<sup>134</sup>) (November 25) I would first have to try to get a closer grasp of this impression,

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(\*) Even more so in the years before I left than now. (\*\*) In the note "La flèche et la vague" (n° 130, 19 November).

(\*\*\*) And for myself too.

for me, that the 'background note' in the person of my friend Pierre is a note y i n. As I see it, this is true both at the level of the 'T', as I have seen it expressed in particular in his relationship with me and with others, and in his work, i.e. at the level of the drive for knowledge, of the creative faculties within him.

As far as the first aspect is concerned, he and I were obviously of *similar* temperaments, with the added nuance that what was excessive, what was 'superyang' in mine, seemed to disconcert him somewhat at times. It was above all, I think, this constant forward projection towards the accomplishment of my tasks, this isolation in relation to everything that wasn't linked to them, that aroused in him a kind of incredulous astonishment, in which I sensed a nuance of affectionate regret - the same regret that I had felt many times in my mother, when she saw me so cut off from the beauty of things around me (\*). Strictly speaking, it wasn't a feeling of discomfort, a sign of rejection of a certain reality. At least, I don't remember a single time when I felt that he was uncomfortable with me, or when I had the impression of an attitude or a movement of rejection, of taking a stand, or even of a clash between us. And I have no doubt that this was in no way a deliberate 'diplomatic' gesture on his part, on the part of someone who had decided not to let anything show. On the contrary, he sometimes expressed the 'astonishment' I was referring to, without any trace of embarrassment or irritation. Clearly, the basic tone in our relationship, and one that has never wavered to this day (\*\*), was one of affectionate sympathy, with no shadow cast across it.

This remains a strange fact for me, and one that I don't think anyone could have suspected before I left the IHES (and even then, at the level of what 'passes' directly in a tête-à-tête, let's say), the fact that from the first years after our

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(\*) My mother, like my father, retained until the end of her life a capacity for communion with nature, as well as a keen sense of observation of everything around her, both of which I still lack today. This was perhaps the only 'yin' aspect of her being that she didn't repress, that she was able to develop freely. On the other hand, as far as 'projection towards a goal' is concerned, which is one of the dominant traits of my 'self', it's also perhaps the only aspect of my person through which I've managed to be even more yang than my mother!

(\*\*) (26 November) While the basic tone remained one of sympathy and attraction, the fact remains that since I left, over the years and more and more, this relationship has become fixed, sclerotic, drained of what gave it quality of life. I feel like I'm standing in front of a 'shell' that's so perfectly watertight that nothing gets through, either way. On this subject, see the notes "Deux tournants" and "Le tombeau", n° s 66, 71.

There was a deep, essential ambiguity in his relationship with me, in the presence of a hidden antagonism, a desire at least to distance himself from me, and a desire to oust me. The latter manifested itself in a particularly brutal way (which left me stunned at the time), although infinitely subdued in manner, during the episode of my departure from the IHES (mentioned in the section 'The ousting' (63)). My friend had just been co-opted as the fifth 'permanent' member of IHES, thanks mainly to my warm words to that effect. In the 'explanation' that took place between us (perhaps there were several, I couldn't say), he never lost that perfect, smiling naturalness, with all the aspects of benevolent kindness, that made him so endearing. He then explained to me, without my detecting the slightest hint of hesitation or embarrassment, and even less of antagonism or enmity, or secret satisfaction, that he had already decided to devote his life and all his energy to mathematical work.

that this dedication to mathematics which was his, for better or for worse, had to take precedence over anything else; that the reason why I was waiting for the joint support of my colleagues and, in particular, of himself (to ask for the suppression of funds coming from the Ministry of the Armed Forces) seemed to him to be entirely unrelated to mathematics; that he regretted, of course, that this was a prohibitive circumstance for me, and that, given different 'axioms' of life from his own, I was going to leave the IHES for a cause which, from his point of view, seemed of no consequence; but that, to his great regret, he could not associate himself, any more than my other colleagues, with a request which was foreign to him, and the outcome of which was entirely indifferent to him ( ).<sup>134</sup>

In essence, I have given the 'manifest', explicit content of my friend's speech, as my memory recalls it, without any effort to try at the same time to rediscover and restore a style of expression, or the atmosphere of a conversation, of which I have retained no particularity beyond what I have said here. The episode took place at a time when I hadn't yet the slightest suspicion that, behind the manifestly innocuous (and sometimes strangely absurd) content of a speech, there was often a very different, muted message. This message was undoubtedly perceived at an unconscious level, but was emphatically rejected and repressed from the conscious field. As I suggest in the above-mentioned note 'The Eviction', it must have taken considerable energy to succeed in evacuating a message that was nonetheless quite vivid. It is in this note, however, written more than fourteen years later, that I take the trouble for the first time to subject this episode to close scrutiny.

and clearly formulate the meaning that has long been denied.

I followed one of the threads, undoubtedly the strongest, of the associations that presented themselves to me. I did so with some reluctance, as if by this 'digression' I was straying from my main purpose. However, I now realise that this is not the case. Without doubt, the image of a person and a temperament that emerges spontaneously from the description of concrete situations in which they find themselves involved is more vivid and convincing than an enumeration of 'traits' that are supposed to define them. Rather than launch into that, I'd prefer to note yet another association, and embark on another digression, by comparing the relationship examined here with that between Serre and me. In terms of the relationship between our persons, the impression that prevails for me is by no means that of a '*complementarity*' as with Pierre, but rather that of an *affinity* between two temperaments, each strongly 'yang' to the other. More than once, in the course of eighteen years of close mathematical communication, this affinity has manifested itself in occasional frictions, expressing itself in passing chills, none of which has lasted long. As I remember it, these episodes were caused by casual impatience on Serre's part, which didn't sit well with my own susceptibility. Sometimes Serre was annoyed by the obstinacy with which I pursued an idea against all odds, when it seemed important to me. I would bring it up again at every opportunity, without worrying whether it would 'pass' or not, strengthened as I was by the conviction (which was rarely mistaken) that I had '*the right*' point of view. I don't know why Serre had developed an aversion to my cohomological 'big fuss' - perhaps he was simply allergic, like André Weil, to all 'big fuss'. On the other hand, when I began to develop 'my' cohomological yoga, in the second half of the fifties, Serre was practically my only occasional interlocutor - so it wasn't going well! I think he only took a cautious interest in this work, and only began to realise that it was going somewhere, with the development of staggered cohomology from 1963 onwards, followed the same year by my sketch of a demonstration ("in four spoonfuls") of the rationality of  $L$  functions (\*).

It seems to me that the relationship between Serre and me was typical of a yang-yang affinity, to

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(\*) Another point of friction that I remember, probably even more episodic, was my insistence on linking the theory of quotient transition in algebraic groups and formal diagrams (still poorly understood in the 1950s) to questions of the "effectiveness" of flat equivalence relations,

the opposite of the relationship with Deligne, which was a yin-yang complementarity. In terms of mathematical work and the style of approach to mathematics, however, the situation was reversed. As I said in a previous note ("Les neuf mois et les cinq minutes",<sup>(123)</sup> ), I feel that Serre's approach and my own are *complementary*, in the sense of yang-yin complementarity. It was this very complementarity that gave rise to occasional friction, due to the strongly yang temperaments of both him and me.

The relationship between Deligne's and my approaches to mathematics was quite different, no doubt about it. I can say, without reservation, that it was with Deligne more than with anyone else that I had the experience of a perfect *affinity* in our ways of seeing and approaching the mathematical questions that interested us both. This experience has been renewed every time there has been a mathematical dialogue between us. It's quite clear to me that this is by no means a chance circumstance, due for example to the influence I had on him during those decisive years of learning. This affinity did not develop over a long period of familiarity - on the contrary, it was present from our very first contacts that was the force at work in creating, almost overnight, a bond of such strength, rooted in our shared passion. There is a deep affinity between our two approaches to mathematics, which predates our meeting, and which expresses (I'm convinced) an important aspect of the original temperament in both of us - a 'basic tone' yin in the apprehension and discovery of things (\*).

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or even (later) the transition to the quotient in the context of fpqc bundles. These points of view, first taken up by Gabriel and Manin, are now commonplace just about everywhere in algebraic geometry and even elsewhere. It seems to me that Serre's reticence disappeared when I finally took the trouble (as no one else seemed prepared to do) to prove in black and white the first effectiveness theorem, for flat and finite equivalence relations.

(\*) (26 November) The reflections in this note are a continuation of those in the notes "The rising sea". and "The Nine Months and Five Minutes" (n° s 122, 123), seem to suggest for every person the presence of a "double signature", or a *double* "basic tone": one (the most apparent, no doubt) concerns the "boss", i.e. the structure of the "ego" and the mechanisms that govern it; the other concerns the "Worker", aka the "child", i.e. also the drive for knowledge, discovery of the world, creation (including, of course, the drive for love). (It's true that it's the most common thing in the world to take the boss for the worker and vice versa, in other words, to take bladders for lanterns - but that's another story... . ) So for me this basic double tone is yang (boss) - yir (child), for Serre it's yang-yang, for Deligne it's yir-yir (child).

There is no question of 'demonstrating' such an intimate conviction, any more than I would dream of wanting to 'demonstrate' that the basic tone in my own mathematical work (let's say) is yin, 'feminine'. At the very most, it is sometimes possible, in the case of such things, to 'pass on' a feeling from one person to another, and trigger in the other a realisation of something to which they had not previously paid attention; something that had escaped their conscious attention, yet was already 'registered' somewhere, in diffuse form. The situation is surely blurred, as it so often is, by the efforts made by the person concerned to mould himself according to the prevailing values, the yang, 'masculine' values. Although I can see that his mathematical work and the (considerable) influence he has exerted are profoundly marked by his ambiguous relationship with me, I doubt whether the efforts in question to erase a basic temperament that is akin to my own, that I have rejected, have been successful. Admittedly, the rigorous dispositions that were not yet at play in him before my 'departure' have long since prevented him from dwelling (at least in writings intended for publication) on things that are too far below him, or on things that are anathema today. Yet it seems to me that in what he publishes, he has not been able to resist following the style of approach that is spontaneously his own. At least, that's the impression I got when I leafed through the few limited editions he was still willing to send me from beyond the grave, after my 'death' fifteen years ago.

But of course, my understanding of Deligne's mathematical approach goes back to the years before my 'death', between 1965 and 1969. For five years, we were both very much in touch with the same things, and our mathematical communication was uninterrupted (except for a year he spent in Belgium), and even more so during the years before my death.

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it's yin-yin (without my feeling any doubt or hesitation on the subject). Against the background of sympathetic relations with each other, it is this 'distribution' of 'signs' (or 'tones') that means that in terms of relations between people, my relationship with Serre is one of affinity and my relationship with Deligne is one of complementarity, and that it is the other way round in terms of relations between our approaches to mathematics.

Of the four possible 'distributions', only the yin-yang double tone remains. Given the disfavour of yin in our macho society, a disfavour that will tend to play especially on the first tone (the 'boss tone'), I presume that the yin-yang double tone must be less frequent than yang-yang. Yet I know at least one well-known mathematician who seems to fit this signature. Of course, the second tone, or 'original tone', is trickier to pin down, since it will often be 'blurred' by outside influences, by the desire to be and do 'like everyone else'.

intense than the one I had with any other mathematician, including (it seems to me) Serre. I have had occasion more than once to evoke those years (\*) of intense creativity in both of them. They were marked by an impressive start in my friend's life, which did not surprise me, so much did it seem to go without saying 1 It was a time when his very sure sense of substance, of what is tangible behind the most abstract appearances, or in the most 'general nonsense' formulations, was not yet obscured by complacency, nor by the burial syndrome that appeared later. He then made numerous contributions to those themes (extreme-yin, I might say) that later consensus (with his unreserved blessing) had long since excluded from the ranks of 'serious mathematics' (\*\*): topos formalism, cohomological 'big fiddles', etc. I review and highlight these contributions, with obvious pleasure, in the introduction to SGA 4 (\*). Other such contributions (among others even more 'muscular', which immediately placed him among the 'big stars') can be found in my double report 1968/69, which is mentioned in the note 'The investiture' (\*\*).

(<sup>134</sup> 1) (26 November) (\*\*\*) Typical detail: these military funds, about which nobody wanted to lift a finger, as long as there was talk that they would be the cause of my departure, were abolished the very year of my departure to general indifference! You never know, it might upset a distinguished guest who's a bit fussy about the matter... The funds in question represented only a small part of the resources of the IHES (5 , if I remember correctly). Without having to consult each other, between my four

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(\*) See in particular the notes "L'enfant", "L'enterrement", "L'éviction", "L'investiture", "Le nœud" (in Cortège V, Mon ami Pierre), and the note "L'héritier" (in Cortège IX, Mes élèves).

(\*\*) (26 November) I would also point out that some of these mathematics have been exhumed with much ado and without my name being mentioned, at the 'Colloque Pervers' in 1981, and the following year with the 'memorable volume' LN 900. See on this subject the notes "L'Iniquité - ou le sens d'un retour", "Thèse à crédit et assurance tous risques", "Souvenir d'un rêve - ou la naissance des motifs", n° s 75, 81, 51.

(\*) (26 November) These comments had been added in a second edition of SGA 4, entirely reworked (especially for everything to do with sites and topos). They can give the impression that Deligne was involved in the birth of the main ideas and results that constitute the 'powerful tool' of spread and A-adic cohomology. I have thus added water to the mill of Deligne and my other cohomology students, sharing (ten years later) the remains of a deceased master!

(\*\*) This double report is reproduced in volume 1 of Réflexions Mathématiques.

(\*\*\*) This sub-note to the previous note ("Brothers and spouses - or the "ble signature" n° 134) is taken from a footnote to that note. (See reference at the end of the third paragraph of this footnote).

colleagues at the IHES (not counting the director) were unanimous in seizing the opportunity to get rid of me (almost at the same time, incidentally, as the director himself). And I thought I was indispensable, and loved!

(6 December) The two physicists at the IHES, Michel and Ruelle, were unhappy that the 'Physics' section at the IHES was a bit of a poor relation, next to the mathematics section, represented by Thom, Deligne and myself (two of whom were Fields medallists!). This imbalance had just been exacerbated by Deligne's co-option (which had, moreover, been done with the unreserved agreement of Michel and Ruelle, and unanimously by the IHES Scientific Council, with the exception of Thom). There had been consultation between physicists and mathematicians at the IHES, to put pressure on the director, Léon Motchane, to re-establish a fair balance between the two sections, as far as possible. I presume, however, that my physics colleagues must not have been unhappy to see this imbalance effectively offset, and much sooner than they had hoped, with the sudden prospect of my departure.

As for Thom, he was incensed that Deligne had been co-opted against his formal opposition. What shocked him about Deligne's accession to the status of 'permanent' member of the IHES, on an equal footing with himself, was that the young Deligne - he was 25 at the time - was not already covered with honours. According to Thom, such a position should only come as "the crowning achievement of a career". Less than ten years later, we were a long way from the heroic years when I welcomed a still unknown Hironaka into my makeshift offices... The fact remains that Thom was so bitter that (according to what he told me himself) he was thinking of leaving the IHES and returning to his professorship in Strasbourg, which he had been careful to keep (more cautious than I had been when I left the CNRS for the IHES). Through my warm sponsorship of Deligne I had been the first and main cause of his frustration, and I presume that Thom must have felt, in his heart of hearts, that I had only got what I deserved through my impertinence, seeing myself forced to leave the IHES just a few months after having introduced my brilliant 'protégé' to it!

As for the director, at a time when he was cornered by the unanimous desire of the permanent, urging him to leave, he then (according to a tried and tested tactic that he used to perfection)

played the game of divide and rule, using the question of military funds as a convenient means of distraction, and at the same time getting rid of the most troublesome of his permanent staff. (A masterly turn of events, when the secrecy he had maintained around the presence of these funds appeared to me to be an additional and compelling reason to force him to leave 1) This didn't stop things from going on for a long time after I left, and his departure from the IHES followed closely on mine - the departure of someone who, like him, had been part of the IHES from its first precarious and heroic years, and who, with him and using his own resources, had ensured its credibility and durability.

(<sup>135</sup>) (26 November) One of the many affinities between Deligne and myself, in the years before my departure, was the pleasure he took, as I did, in developing (when the need arose) what I call 'big jobs'. Most, if not all, of my energy as a mathematician was devoted to such tasks. If it were a question of building a house, doing 'big jobs' would mean : not just making a tantalising sketch of the house, or even two or three from different angles, or even making detailed plans, with dimensions and all; but bringing and cutting the stones that are to be used to build it, one by one; assemble them into walls, lay the beams, rafters and tiles or lozes; fit doors and windows, washbasins, sinks, drains and gutters; and install (if you're really going to live in it yourself) everything down to the curtains on the windows and the drawings on the walls. It could be a large house, or just a one-room cottage - but the spirit of the work is the same. And as long as you're living in it, no matter how thoroughly you've done everything, you soon realise that the work is never finished, that there's always something new to come - at least when the "grosse fourbis" - sorry, the house - is vast.

Most of my energy as a mathematician, between 1955 and 1970, was devoted to demarining and developing four *big* "big fourbis" - without, of course, having reached the end of any of them, see above. These are, in chronological order, the cohomological tool, schemas, topos and motifs (\*). These four main themes are intimately linked to each other, like separate buildings on the same farm or hamlet, all working towards the same goal. And each of these 'big fourbis' has

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(\*) The 'cohomological tool' didn't wait for me to exist. I am referring here to a certain personal approach, which led in particular to the 'mastery of étale cohomology' (which seems to me to be the main technical and conceptual ingredient in the demonstration of Weil's conjectures, completed by Deligne). This is what

I had no intention of doing so, so I had to develop other 'big furs' that were already much smaller - a bit like building a large house, or even a whole hamlet, where you have to install a lime kiln, a carpentry and joinery workshop and so on. Every year, for example, the need arose again to add two or three (small) "big elders" to the arsenal of categorical notions and constructions. People who have come ten or twenty years later, who have found everything ready-made and are comfortably settled in (and even others who basically know what they're talking about), shrug their shoulders with an air of condescension at so much unreadable 'nonsense' (Deligne dixit) and hair-splitting eh four ('Spitzfin- digheiten', as an illustrious German correspondent called them, albeit well-disposed towards me \*)). These are people who have no idea what it's like to build a house on the bare earth, and who will probably never build one, contenting themselves with playing landlord in those that others have built for them, with their two hands and with all their heart.

I was a bit brisk just now, seeming to lump my friend Pierre in with the rest of the gang

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twenty years later, with 'A la Poursuite des Champs', in the direction of 'non-commutative' (or 'homotopic') cohomology. For the 'commutative cohomology' direction, I give a few precisions about this approach at the beginning of the note 'My orphans' (n° 46). The four 'big fourbis' referred to here correspond essentially to the five 'key notions' in the note quoted, except that the 'cohomological tool' corresponds to *two* such notions or ideas (namely, derived categories, and the formalism of the 'six operations').

It is interesting to note that the only one of the four 'big fourbis' (or main research themes) named in my Eulogy (see notes n° 104 and 105) are topos. As chance would have it, this is also the one of the three buried by my cohomology students, the one that had not yet been unearthed under new paternities, at the time of the Eloge Funèbre (which was published in 1983, the derived categories were unearthed in 1981 at the Colloque Pervers, and the motifs in 1982 in the 'memorable volume' LN 900).

(\*) My correspondent kindly assured me, just to please me, that he was well aware that my work was "largely free of such defects" ("weitgehend frei von diesen Ubeln"). For him, these were the 'defects' into which we could not fail to fall (such as the 'Spitzfindigkeiten' of categorists of all kinds), if we were to develop a theory (as I suggested with regard to motives) on foundations that would still remain conjectural. Here we find the visceral rejection of the 'mathematical dream' discussed in the section 'The Forbidden Dream' and in the following three sections (sections 5 to 8). This is yet another aspect of an automatic repression of any 'yin', 'feminine' approach or process in mathematics.

who "have no idea what it's like to build a house...\*". Not only did he see me at work, but he was happy to build houses of his own, as if he'd never done anything else in the twenty years he'd been in the world. Incidentally, this story of 'big forks' and house-building and all that (in case the reader hasn't already noticed...) is yet another aspect, or another image, to capture something that I had previously tried to grasp as best I could with the image of 'the rising sea', then with that of a train of waves following one another (\*). This is the 'yin mode', or 'feminine' mode, of apprehending reality, and the corresponding approach to soaking it up and extracting an image that renders this reality with suppleness and fidelity. So here I am, taking a diversion via my own person, to return to my initial point - that of 'passing on' this strong perception that I have of a kinship, an essential affinity between Deligne's approach to mathematics and my own. But in this aspect of Deligne's work that I have just tried to define with the help of an image, there was a complete 'blurring', it seems to me, after my departure and death in 1970 - I think that the 'big fourbis' are totally absent from his 'later' publications. Certainly he could not reasonably have made use of this trait in his disowned master, in order to debunk him, while tolerating that same trait blossoming in himself, in accordance with his own nature.

It's true that if it's not a question of following an inner need, the expression of an elementary impulse, but simply of increasing one's prestige through the accumulation of *results* that 'make a mark', my friend really had no interest in continuing to embarrass himself with (more or less) 'big stuff'. Even in my day, and outside the Bourbaki group (which was itself involved in a rather large 'fourbis'!), it was already a rather frowned-upon thing to do. This is hardly surprising, given that the 'superyang' blinders in our society and in the consensus of the scientific world are not new. This was perhaps the main reason why the houses I enjoyed building remained uninhabited for so many years, except by the bricklayer himself (who was also the architect, carpenter etc.). And even today, even the part of my work that has long since become common heritage (and even where there is still no other reference available than my writings), remains surrounded (at least for those who are not part of the "beau monde" and who make no point of looking down on it) by an almost awe-inspiring halo, as if entering it would require almost superhuman faculties. It's true that it's

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(\*) See the two notes "The rising sea" and "The arrow and the wave", n° s 122,

often lengthy, and it couldn't be otherwise, given that everything is well and truly done, by hand and in detail, from beginning to end, with even explanations at each chapter's turn saying what we're getting at (\*). It didn't seem to me that my students, when they were working with me, had too much trouble getting into the swing of things. But that was at a time when 'tangible results' had already won the backing of the mathematical establishment, and my students worked with the confidence that they were playing a 'safe' card. I have the impression that, since then, more and more people are happy to give credence to the 'unreadable' (\*\*) version, in keeping with a fashion that is much more tyrannical today than it was in my day.

But even leaving aside the desiderata of fashion, when it comes to calculating profitability and 'returns', care must surely be taken to avoid 'big stuff' like the plague. Developing a 'big kit' and making it available to everyone is a *service* to a scientific community, which often accepts it reluctantly. I've never been too bothered by this understandable reluctance; I knew that I had 'the right stuff', and that sooner or later, people wouldn't be able to resist coming to it. But even when they do, the 'returns' in terms of 'credit' can only be modest. If I were to draw up a numerical balance sheet, not of the concepts, questions and ideas that I introduced and developed in the fifteen years from 1955 to 1970 and which have either become part of the common and anonymous heritage, or have been buried without music (waiting to be exhumed with great fanfare), but of what might be called 'great theorems', I doubt that I would find even ten. Perhaps the total time directly devoted to proving them is of the order of a few weeks, or a few months at most. There wasn't a single one before 1957 (Riemann-Roch-Grothendieck theorem) - and yet I know I hadn't wasted my time in the three years before that. In fact, none of the 'great theorems' have been proved to date (even though that wasn't the intention at all).

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(\*) It's only over the years, I think, that I've realised the need to include such explanations, often purely heuristic, to try as far as possible to communicate to the reader a sense of 'direction' and purpose, strongly present in me at the time of writing. Today, this seems to me to be much more essential than meticulous writing of key demonstrations, which the reader will be happy to reconstruct or even build from scratch, as soon as he senses where we are going, and that this 'where' attracts him. ...

(\*\*) This is clear only to Deligne, who repeated it to me in person at his recent visit. It was SGA 4 (more than half of which develops the language of topos with extreme meticulousness), declared 'unreadable' by my friend, as justification for his brilliant 'SGA 4 V operation'.

my main concern), if during those fifteen years I hadn't stubbornly followed a passion for understanding within myself, trusting the approach it dictated, whether or not it was 'profitable' (in terms of such and such desiderata), or whether or not it was well regarded in the wider world. This approach consisted each time, starting from a strong initial intuition, or a handful of such intuitions, in taking them as a solid, foolproof thread that pulled me into the unknown; And as I did so, to change the image, I couldn't help but gradually, with the unknown in the process of making itself known, like rough stones that you 'know' by cutting them, build houses, some very large and some not so large, and all fit to be lived in - houses where every nook and cranny is destined to become a welcoming and familiar place for many. The doors and windows are of applomb and open and close without creaking, the roof doesn't leak and the chimney doesn't pull. It doesn't have to be Notre Dame de Paris, and there's no 'great theorem' hidden in each one's bread bin - these are simply houses that had to be built, and that I built to be lived in. I found my joy in making them, beautiful and spacious, knowing full well that the work I was doing, alone or in company, had to be done, and that at each moment it was as good as I could make it.

It was this spirit, too, that I found in the Bourbaki group in the 1950s, and which made me feel at ease there, 'at home', notwithstanding the differences in background and culture, and the occasional difficulties that I mentioned earlier. At that time at least, it was still a spirit of *service* that I found there. Service to a task, and beyond the task, service to other men, eager like us to understand things great and small, and to understand them thoroughly and to the end. This "service" did not take the form of austere duty or asceticism. It arose spontaneously and joyfully from an inner need, it expressed something in common that linked these very different men.

And it is this same spirit that I recognise in the Cartan seminar, where so many French mathematicians got their start, and later (in the 1960s) in my own seminar (known by the acronym SGA, "Séminaire de Géométrie Algébrique du Bois Marie"). One of the differences between the two seminars was that mine were strongly centred on the development of the 'big fourbis' mentioned earlier (i.e. 'm e s' fourbis), for which there were never too many hands, whereas the themes followed by Cartan from one year to the next were more eclectic. What seems more important to me is what was common to the two seminars, and above all, what seems to me to have been their essential function,

their *raison d'être*. To be honest, I can think of two. One of the functions of these seminars, close to Bourbaki's intention, was to prepare and make available to everyone easily accessible texts (by which I mean essentially complete texts), developing in a detailed way important themes that were difficult to access (\*). The other function of these seminars was to provide a *place* where motivated young researchers, even if they were not geniuses, could learn the trade of mathematicians on topical issues from eminent and benevolent people. Learning the trade - in other words, getting your hands dirty, and at the same time finding an opportunity to make a name for yourself.

It would seem that my departure in 1970 marked the end, in France at least, of the 'great seminars' - *lasting* places where, year after year, some of the great themes of contemporary mathematics are being worked on - and places that are also *benevolent* and inspiring, for all those who come to get their hands on them. I don't know if they exist elsewhere in the world (perhaps in Moscow, at the instigation of I. M. Gelfand?). What is certain is that such places are decidedly contrary to the spirit of the age, just like the 'big fourbis', written out in black and white, meticulously, for *all to see*.

It's not by chance that hardly anyone writes careful and (pro- visorily) exhaustive papers any more, on subjects that have been mature for ten or even twenty years, that are obviously crucial, and which in the meantime are only accessible to a handful of people 'in the know'. Anyone who is part of the mathematical 'big world', unless at the same time they are also part of the 'handful' in question, will have no difficulty whatsoever in being kept up to date by one of these people, who will be only too happy to oblige. As for the others, what the hell! In the sixties, I saw a lot of books clamouring to be written. I would have written them myself, but I couldn't do everything at once. To my knowledge, none of these books has yet been written (\*). However, I know more than one person (if only among the ex-students) who was quite in the habit of writing them.

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(\*) "Difficult to access", either because these themes remained imperfectly understood, or because they were known only to a few initiates, and the scattered publications dealing with them gave an inadequate picture.

(\*) (28 November) I should make an exception here for the theses that were written at my instigation. The spirit which drove me and which, I believe, was communicated to my students, at least during the time they worked with me, was that which drove me for my own work; in other words, to 'build the houses' that were obviously needed, even if I was often the only one to feel the need for such and such a house.

and who had the feeling and the knack to be able to write the kind of book that was (and still is) needed. And from the little that has come back to me of the later work of some of them, I don't get the impression that it was the abundance and difficulty of their more personal work that prevented them ("sorry, I really don't have the time!") from doing this service to the famous 'mathematical community'. For more than one of them too, it's a safe bet that this would have made him more famous, as the author of a book that has been read and quoted (even if not everything he exposes comes from him - but the 'how' is by no means a negligible quantity...) than by the more or less thick bundle of his separate editions.

Clearly, it's not a simple 'lack of time' that is preventing some of us, with impressive unanimity, from making accessible to everyone what remains the privilege of a few - or even from having (if only here and there, the time to write a book, let's say) an *attitude of 'service'*. Here I am irresistibly reminded of the SGA 5 seminar in 1965/66, which had been suppressed for eleven years, for their own personal benefit, by the very people who had been the first and only beneficiaries, my friend Pierre and my other cohomology students in the lead t It's true that there was a body to share, and therefore a rather special motivation in this case. But I'm also thinking of other cases, where the service provided filled obvious gaps, and was brushed aside by the people in charge (\*). People will say that these are still rather special cases, that it was my person who was targeted, when it was obvious that it was I who had inspired the work in question. And yet I can sense in all of this a 'spirit of the times' that transcends any individual case.

The aspect of the 'spirit of the age' that I'm trying to pin down here, as best I can, is *the discrediting of an attitude of service* - a discrediting that I perceive through a host of

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"particular 'house'. I have the impression that, as a general rule (with one exception), this feeling ended up being communicated to the student, causing him to 'get hooked' on a particular subject, and subsequently to identify strongly with the chosen subject. With the exception of Verdier, who did not deign to make available to everyone the work on the foundations agreed between us and which is still waiting to be written, the thesis work of all the students who did their state doctorate thesis with me has become what might be called a 'standard reference'. They are houses fit to live in, and none of them duplicates any other. ...

(\*) I'm thinking here, of course, of the work of Yves Ladegaillerie, and that of Olivier Leroy, discussed in four previous notes and sections ("On n'arrête pas le Progrès", "Cercueil 2 - ou les découpes tronçonnées", "La note - ou la nouvelle éthique", "Cercueil 4 - ou les topos sans fleurs ni couronnes", notes n° s 50, 94, section 33, note n° 96).

There are converging signs, and for me this is an obvious fact. Everyone is free to deny it, just as they are free to examine it for themselves and see for themselves. My purpose here is not to 'prove' it to a reluctant reader, but to try to grasp its meaning.

From the point of view of this reflection, the first meaning is obvious. The attitude of service is typically a 'yin', 'feminine' attitude, and it's not surprising that it's one of those that is devalued. The nuance that I thought I perceived many times was that such an attitude was just right for those who didn't have the means of a 'master' attitude - that the work done in this spirit was *menial* work good for the pedestrians among those who ride the coach of great ideas and 'brilliant discoveries'.

However, I also know that there is more to it than that - because otherwise, why should we prevent, at all costs, a 'pedestrian' of good will (when, by chance, there are any) from quietly doing in his corner the dirty work that is rightfully his, finally providing solid references where previously we had to content ourselves with saying (when we deigned to say something...) "we know that..." or "we can demonstrate that", or more rarely and more honestly "we admit that..." ? !

I was first confronted with this troubling question eight years ago, during Yves Ladegaillerie's misadventures in trying to 'fit in' his thesis (\*). Admittedly, this was at a time when my interest in mathematics and the world of mathematicians was at a very low ebb. I was a bit flabbergasted, without trying to unravel the meaning of the mystery. With a few variations, my attitude didn't change much in the years that followed, until last February, with the reflections continued in *Récoltes et Semailles*. And yet, by dint of picking up on signs, and even if I didn't mean to, I couldn't help gradually picking up on their meaning, or rather, *their* meanings. I can see two of them. One has to do with me - it's the burial syndrome, which I haven't quite got round to yet. The other has nothing to do with any particular person. It has to do with an *attitude of exclusivity in the possession and control of scientific 'information'*, an attitude which prevails within the scientific 'establishment', and which makes it a kind of ruling caste by divine right, within the so-called scientific 'community' (\*\*).

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(\*) On this subject, see the two notes° s 50 and 94, cited in the previous footnote.

(\*\*) (6 December) It should be noted that the thirst for domination is a *superyang* imbalance, and the far form

This is a theme that I have already touched on (barely, barely) in the note "Consensus deontology - and information control", and also a little in "The "snobbery of the young", or the defenders of purity" (<sup>25</sup>), (<sup>27</sup>)). I suspect that this is a *new development* in the scientific world, which has been creeping up on us for the past two or three decades. I don't think I was among those who propagated and welcomed this unwritten 'new ethic', the ethic of 'double standards' (\*). If I have any responsibility for its advent, it is rather that I did not see it coming (\*\*). Before these last few years, I had no idea that the unrestricted access to information that I had enjoyed practically since my first contacts with the scientific world in 1948 had become, over the years, and I can't say exactly when or how, a huge *privilege* that I shared with a handful of friends - *a class privilege*, to use an old-fashioned term, which nevertheless seems to me to express a very tangible reality.

But my aim is not to make a 'class analysis' of the mathematical world, and of the 'relations of force' and 'means of power' in that world - any more than it is to make a 'picture of morals'. It's time to return to a more limited purpose - that of understanding the essential motives of the main protagonists in the 'news story' of

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the most common cause of such an imbalance. It corresponds to an obliteration of the yin term, "feminine" in the yinyang pair "Master-servant", or "that which dominates (or masters) - that which serves", neighbour of the pair "mastery".

- service".

(\*) (6 December) This is not entirely accurate, as can be seen from the sections "Lie pouvoir de décourager" and "La mathématique sportive" (n° 31, 40). But I think it's fair to say that while I have often been fatuously elitist, this has not taken the form of a desire to dominate, or even to crush, nor has it obliterated my spontaneous attitude of *service*: service to a task, and through it and alongside it, service to all those who have embarked with me on a common adventure... During the sixties, it became almost a fixed idea, and in any case one of my pressing and constantly present motivations, to write and have written the basic texts that were lacking, in order to give the widest possible dissemination to the ideas, techniques and visions that were known only to a very few. Looking back over twenty years, I can see today that this constant concern of mine has not been passed on to any of my students. They preferred to be *masters*, without being at the same time (as their late master had been) *servants*.

(\*\*) I don't know if there are many older people or colleagues of my generation, or even younger colleagues and friends, who have seen it. I doubt that there is a single one of "those who welcomed me fraternally into the world that became mine" to whom Harvest and Sowing is dedicated - apart perhaps from Chevalley. That's certainly one of the things I would have liked to talk to him about - but he's no longer here to tell me. ...

my early funeral!

(<sup>136</sup>) (28 November) The two previous notes were essentially digressions around the theme of the yin-yin affinity between Deligne and myself, in terms of mathematical work and the approach to mathematics. I don't know whether they helped to 'get across' my perception of this affinity and its nature, which for me is beyond doubt. I have written elsewhere that "in my work, I am as 'yin', as 'sea and motion', as one can be". On reflection, I would say that this is not literally true - that one 'can be' even more so, because (as I see it) Deligne is even more so than I am. Or at least, the 'yang in the yin' seems more pronounced in me than in him. What's fiery in me takes on a more measured air in him. Where I launch out boldly, more than once he will remain cautious, and often well-founded, in his expectations. As long as I have the beginnings of an idea, an 'end' that I can get my hands on, I don't hesitate to throw myself into a mathematical quagmire that I feel is substantial, without bothering to take a closer look at the initial idea ('ihr auf den Zahn fuhlen', as they say in German...), or to predict the outcome of the melee. Sometimes the idea doesn't make sense, for some obvious reason that escapes me because I'm so keen to 'jump into the fray'. Eventually I realise - sometimes I feel like an idiot, and yet it's rare that I regret having jumped in. That's how I make contact, and no other way. with an unknown substance - by rubbing up against it, whether 'advisedly' or not.

My friend, on the other hand, first probes and examines - and he sets off, when he feels sure, if not of the point of arrival, which would be asking too much, but at any rate that there is somewhere to land, and that he won't come back empty-handed. I never had the impression in his work of any kind of *dispersion of energy*, as was often the case with me - but rather that with him, *all the strokes work*. From this point of view, his style of work bore the mark of *maturity*, whereas mine bore more the mark of *youth*, sometimes muddled by dint of being fiery. When we first met, however, I was approaching forty while he was twenty. And more than once, I sensed in him a kind of smiling indulgence towards me, the kind of indulgence that a benevolent adult would have towards a child in his care, when he didn't see me embarking on some (small) 'big job', without ever doubting anything....

The aspects I'm talking about here are no doubt difficult to detect in 'on the net' work,

published, which present a final, or at least advanced, stage of reflection. My exi- gency in my work is no less than in his, and I hardly ever entrusted notes to a typist or printer until they had reached a stage where they satisfied my need for complete clarity. On the other hand, in the style of writing that I follow in 'Réflexions Mathématiques' (and particularly in 'A la Poursuite des Champs'), the original approach to the work is apparent on every page. The reader will notice many 'failures'. They are all small - usually spotted the next day or two, if not the very same day, and rectified in the pages that follow (The fact that this is so surprised me - it's one of the signs of this extraordinary 'fa- cility' in my mathematical work, which I have discussed elsewhere (\*)). One of the reasons for the 'little misses' was of course my lack of familiarity with a subject I hadn't touched for seven or eight years - and these blunders became rarer as the work progressed, as the contact I'd gradually lost was re-established. All the same, this way of taking at face value, without hesitation, what my rather nebulous memory was telling me about things that I knew more or less well at the time, is a good illustration of the 'go-getter' aspect, and sometimes the messiness, that constitutes (among other things) the 'yang in the yin' aspect of my mathematical (or non-mathematical) work. I'm convinced that an equally spontaneous text from Deligne's pen would be much closer to what is commonly considered 'publishable' - indeed, publishable by his own exacting standards.

If I insist here on the character of 'maturity', of 'yin very yin' in the style of work and approach to mathematics of my friend, it is in no way to suggest by this the idea of any imbalance in his work, that his work is marked by a lack or absence of 'yang', 'virile' qualities. If this were so, his work would not bear on every page, like Serre's or mine, the delicate mark, which cannot deceive, of *beauty*. But this is not the place, any more than I did in the case of Serre or myself, to follow line by line the delicate harmony of yin and yang, of the 'feminine' and the 'masculine', in his published work, which is known to me, and in this book.

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(\*) See the note "The trap - or ease and exhaustion", n° 99. It seems to me that this 'ease' is even greater now than it was before I 'left'. This seems to me to be linked to a maturation that has taken place in me over the past fifteen years, and which is felt in my mathematical work as elsewhere.

who I know from his work through the personal contact I've had with him for almost two decades.

Nor should it be thought that my observation of a balance between yin and yang is a kind of truism, that it would immediately apply to any man who, in one capacity or another, is considered a 'great mathematician'. This perception of beauty that I just mentioned is not equally present, or to the same degree, in the work of all the mathematicians who have left a lasting mark on the mathematics of their time. Among them, I know of two who, like Deligne, seem to me to be predominantly yin in both their work and their personality, and whose work has never given me the impression of an inner balance, of a beauty that never leaves you wanting more. The yin imbalance is so extreme in one of these colleagues that he seems entirely incapable of even formulating clearly and correctly the slightest definition or the slightest statement (let alone an idea. . . ) - even though he has a deep intuition about many things, and has introduced a number of important and fruitful ideas. Each time, they have taken shape through the work of others. It is clear that he has a rare and effective repression of 'yang' traits and forces, both in his work and in his way of being. This repression takes on the proportions of a veritable impotence, including in his work, where he would be incapable of completing the slightest thing by his own efforts. He compensates for this powerlessness by a 'tude of megalomania, internalising at the same time the defects that he likes to cultivate in himself, as if it were *thanks to them* that he was able to conceive the ideas that (in his eyes) make him 1 st great scientist of the millennium...(\*)

I sense a repression in the opposite direction in my friend Pierre, evacuating certain 'yin' traits and leading him (with varying degrees of success) to model himself on a superyang image. This repression is a long way from the opposite extreme I've just described. It does not go so far as to erase from the reader or interlocutor the feeling of beauty, of satisfaction without any aftertaste of unease, which are the signs of a true understanding, giving at every moment their fair share to clarity, and to shadow, to mystery. In other words, the 'superyang' brand image chosen by my friend should hardly impinge on his work itself,

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(\*) I'm talking here about attitudes and ways of being that I was able to observe in the days before my departure, when I had the opportunity to meet this prestigious colleague on a familiar basis. It's not impossible that something has changed since then (although that would be a rare occurrence. . . ).

At work, I mean, when the presence of the 'boss' must be as effaced as it is (I think) at Serre's, or mine (\*\*).

On the other hand, it seems to me that the role of the boss becomes important, even invasive, when it comes to choosing work *themes*. There is this fixed idea of standing out from my person, and by the same token, the refusal to follow certain inclinations of his own nature which are too strongly associated in him with the image of the disowned master. Also, if he happens, like anyone with great means, to prove difficult theorems (even 'proverbially difficult' ones), and even to introduce beautiful ideas and develop them, he would not think of naively 'rethinking', in his own way and even if only in broad outline, a whole science (such as topology, which could really use it....) - or even to create a new science from scratch, to 'bring new worlds to light' (as I wrote elsewhere) (<sup>136</sup> 1). And yet, if there's anyone I have no doubt he has the means to do it, it's him. If there is anything he has lacked until now to do it, it is *generosity* - true generosity, which is at the same time a calm assurance that makes us follow the impulse of our own nature wherever it takes us, without worrying about encouragement or 'returns'.

But there is also the simple joy of "building houses", large or small, for others to live in, without necessarily having to be on the scale of a "whole science" or a "new world" - the joy of lugging stones and beams around like the first bricklayer or carpenter who comes along, without fear of being mistaken for this or looking like that - or of making available to everyone what (according to some) should remain the preserve of the very few. This is an attitude of service, a certain humility, another expression of the same generosity mentioned earlier, of the same fidelity to one's own nature. My friend has exchanged it for an attitude of self-importance ("me - to do such work I") and a caste attitude (\*), in terms of the choice of work themes that are supposed to be 'acceptable'.

Finally, there is a third attitude or force, through which 'the boss' influences my friend's choice of themes for his work, the substance he gives himself to probe, a force that sets him a course.

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(\*\*) I come back to this hasty impression at the end of sub-note n° 136j (of 4 December) to the present note. (\*) This "class" attitude, in my friend and in the "great mathematical world", appears in my thoughts first appeared in the two notes (from March) "Consensus on ethics - and control of information" and "Youth snobbery - or the defenders of purity" (n° s 25, 27), and they reappear in last week's note "Yin The servant, and the new masters", n 135.

imperative barriers. It's the 'master's funeral' syndrome, or *the fos-soyeur syndrome*. It's not just a question of refraining from naming the person who must remain ignored. It's also a matter of burying the work itself, or more precisely, of *cutting it off* cleanly, as if with a *chainsaw*, in one's own work as in that of others, at the level of each of the main branches sprouting from a vigorous trunk (\*\*). As I pointed out the day before yesterday (in the previous note, 'Yin the Servant, and the New Masters'), of the four major themes that I identified and developed during my period as a 'geometer', between 1955 and 1970, only one was 'taken' and used in broad daylight by my brilliant pupil and successor; the other three were 'cut down' - muted, of course. One of the themes was only partially exhumed in 1981, and another the following year - like cherished shoots that had sprouted from the scarred stumps of the main branches that had been cut off, and which, for the occasion, had been surrounded by garlands of bright colours and gaudy neon lights, just to give the impression...

(<sup>136</sup> 1) (4 December) (\*) My own approach has constantly led me to 'rethink' from top to bottom everything that stands in my way as a mathematician, whether it be the most seemingly insignificant thing, or something on the scale of 'an entire science'. It's true that, having only two arms like everyone else, I haven't always been able to go so far in carrying out a programme of work to 'remake an entire science from top to bottom', as I did in the case of algebraic geometry, starting from a few very simple key ideas around the notion of the diagram. Even in this case, where I invested a large part of my energy as a mathematician for twelve years in a row, I was far from 'completing' the planned programme - for that, I would have needed a good twelve more years! (And nobody after I left cared to continue the task, which must have seemed (wrongly) thankless... .

As for other cases where I have rethought a science, although I haven't gone that far, I would point out the following *homological algebra* (both commutative and non-commutative - the latter moreover

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(\*\*) I was confronted for the first time with the reality of "the chainsaw" on 19 May, during the reflection in the double note "Les héritiers... .", "... and the chainsaw" (nos. 91, 92), then in the following four-three coffin notes (which, with "Le Fossoyeur", make up the "Fourgon Funèbre" or Cortège X de l'Enterrement), on 21 and 22 May (notes n° 93-96).

(\*) This sub-note to the preceding note ("Yin the servant (2) - or generosity", n° 136) is taken from a footnote to it. (See footnote in the third paragraph before the end of the footnote)

did not yet exist at the time of my first reflections in 1955), and *topology*, with the introduction of the notion of *topos*, which is still waiting for its time to become the daily bread of the topologe geometer, in the same way as the various notions of "spaces" and "varieties" that are commonly used today (\*\*). No doubt certain important parts of current topology will hardly be affected by the systematic development of the topossical point of view in topology. This point of view would therefore seem to me to be rather the crucial element in the "creation from scratch of a new science" - a science which achieves a synthesis (entirely unexpected when I arrived in the 1950s) of algebraic geometry, topology and arithmetic (\*). Over and above the construction of the new algebraic geometry, and through the 'mastery of stale cohomology' (and that of the A-adic cohomology that follows from it), it was the development of a master builder of this new science that was still in the making, and the development of solid technical foundations, that was in my eyes my main contribution to the mathematics of my time. The 'yoga of *motives*', which is still conjectural, seems to me to be the soul, or at least the nerve centre of this new science, which is so vast that until now I had not even thought of giving it a name. Perhaps it could be called *arithmetic geometry*.  
*metic*, suggesting by this name the image of a 'geometry' that would be developed 'above the absolute base'  $\text{Spec } \mathbb{Z}$ , and which admits 'specialisations' both in the traditional 'algebraic geometries' of the different characteristics, and in 'transcendental' geometric notions (above the base bodies  $\mathbb{R}$ ,  $\mathbb{C}$  or  $\mathbb{Q}_A \dots$ ), via the notions of analytic or rigid-analytic 'varieties' (or better, *multiplicities*), and their variants.

I see yet another 'new science' that I had foreseen as early as the 1960s, taking its source in my reflections on homological algebra begun in 1955. It is a vast synthesis of ideas coming from homological algebra (as it developed in contact with the needs of algebraic geometry, or better said, "arithmetic geometry"), homotopic algebra, the "general topology" version of topos, and finally the theory (in limbo since the sixties) of (non-strict)  $\infty$ -categories, or,

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(\*\*) Compare with certain comments in the second part of the end-March note "My orphans" (n° 46), and in its sub-notes n° s 46. to 46.

(\*) See previous footnote.

(11 March 1985) The term 'entirely unexpected' is undoubtedly excessive, for the prescience of such a synthesis is already to be found in Weil's conjectures, which acted as a powerful source of inspiration.

as I prefer to say now,  $\infty$ -fields. I had expected, as a matter of course, that this synthesis would be taken in hand by some of my cohomology students, starting with Verdier, whose famous thesis (\*) was supposed to be precisely along these lines. It seemed to me that the development of a satisfactory common language with all the desirable generality and flexibility should be a matter of a few years' work, surely fascinating, by a small nucleus of motivated researchers. After some very fragmentary beginnings in this direction by some of my cohomology students, my departure in 1970 signalled an immediate abandonment of this work programme, among many others that were close to my heart. This is why I went back over some of my ideas in a 1975 correspondence with Larry Breen, in the hope of reviving a vision of things that I felt were 'on the way', and that 'everyone else' took care to skirt around them carefully whenever they were confronted with them. In my letters to Larry Breen (reproduced in chap. I of "In Pursuit of the Fields"), I proposed calling this science still in gestation, which for a decade or two I had been alone in glimpsing, *topological algebra* (\*\*). Finally, fed up and despairing of seeing anyone but me tackle a task that had been burning to be undertaken for twenty years, I set to work in February 1973, with "A la Poursuite des Champs", to sketch out, at least in broad outline, the project manager for what I see to be done.

It is clear that there is no common ground between the "arithmetic geometry" mentioned earlier and topological algebra, one of the main roles of which, in my view, is that of "logistical support" in the development of this new geometry. For this new geometry to reach the stage of full maturity attested (let's say) by a mastery of the notion of pattern, comparable to the mastery we have of stale cohomology, we must undoubtedly expect several generations of geometers to have worked on it, more dynamic and bolder than those I have seen at work; without even mentioning a comparable mastery of *Anabelian algebraic geometry*, which seems to me (along with patterns) to be one of the most important of the new geometries.

(\*) On this subject, see the note "Credit thesis and comprehensive insurance", n° 81.

(\*\*) With the exception, at most, of Deligne, to whom I had thought I had communicated a vision, which he hurried to bury with the rest the day after my departure. I refer several times in *Récoltes et Semailles* to this part, the earliest of all, of my overall programme of foundations for a kind of 'all-round geometry' - notably in 'Le Rêveur' (section n° 6) and in the notes 'Mes orphelins', 'L'instinct et la mode - ou la loi du plus fort', 'Le compère' (n° s 46, 48, 63<sup>vi</sup> ).

of the two 'neuralgic' parts of arithmetic geometry, which are already discernible (\*).

Finally, there is a fourth direction of thought, pursued in my past as a mathematician. The aim is to bring about a 'root and branch' renewal of a discipline that has been in decline for so long.

instant. This is the 'moderate topology' approach to topology, on which I expand somewhat in the Sketch of a Programme" (par. 5 and 6). Here, as so often since the distant years of high school, it would seem that I am still alone in feeling the richness and urgency of the work to be done on the foundations, the need for which seems to me here more obvious than ever. I have the very clear feeling that the development of the point of view of moderated topology, in the spirit evoked in the Outline of a Programme, would represent for topology a renewal of comparable scope to that which the point of view of diagrams has brought to algebraic geometry, and this without requiring an investment of energy of comparable dimensions. Furthermore, I believe that such a moderate topology will eventually prove to be a valuable tool in the development of arithmetic geometry, in particular for formulating and proving "comparison theorems" between the "profinite" homotopic structure associated with a stratified scheme of finite type over the field of complexes (or more generally, to a stratified schematic manifold of finite type over this field), and the corresponding "discrete" homotopic structure, defined by transcendental means, and modulating suitable hypotheses (of equisingularity in particular). This question only makes sense in terms of a precise "unscrewing theory" for stratified structures, which in the context of "transcendental" topology seems to me to require the introduction of the "moderate" context.

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(\*) (For some key ideas in Anabelian algebraic geometry, see Outline of a Programme, par. 2 and 3).

By "neuralgic", I mean here a part of this "arithmetical" geometry which provides it with intuitions, threads, and problems, entirely new in relation to the *acquis* of the sixties (this "*acquis*" consisting essentially of a framework and a language, and a homological and homotopic formalism common to the three disciplines encompassed by arithmetical geometry). Perhaps a third such "neuralgic part", intimately linked to the motives, should be added to the previous two, namely the theory "*à la Langlands*" of *automorphic forms*. If I have refrained from mentioning it, it is because of my regrettable ignorance of the theory of automorphic functions. (I don't know whether the opportunity will arise for me to finally remedy this ignorance...)

To return to the person of my friend Pierre Deligne, he had ample opportunity, during the years 1965-1970 of close mathematical contact with me, to become thoroughly familiar with this set of ideas and geometrical visions, which I have just reviewed in broad outline. (With the exception of the ideas of moderate topology, which only began to germinate and intrigue me from the early 1970s, if I remember correctly). His role in this vast programme was twofold, and in two opposite directions. On the one hand, relying on the ready-made tool of 4-adic cohomology, and on the ideas (which had remained hidden) of pattern theory, he made remarkable contributions to the development of the arithmetic geometry programme. The most important of these were undoubtedly the development of a theory of mixed Hodge coefficients, and above all his work on Weil's conjectures and their -adic generalisation. On the other hand, apart from the *tools* and ideas that he needed directly for his work (and whose origin he systematically tried to make people forget), he did everything possible to hinder the natural development of everything else - this is the "chainsaw effect", which I have had ample opportunity to mention in the course of my reflections on Burial, including again (allusively) in the preceding note (n° 136). This chainsaw effect was partially blurred by the partial exhumations (in 1981 and 1982), "like stunted shoots that have sprung up again... . "under the sudden pressure of immediate needs. (These occasional exhumations have just been mentioned again at the end of the previous note). He also did his utmost to constantly give the impression (without ever saying so clearly...) that the authorship of the ideas, concepts, techniques and results he used, and whose origin he was careful to conceal, belonged to him, when he wasn't generously attributing it to one of my former students or collaborators.

All in all, after this rapid retrospective of what has been so tenaciously truncated and buried by my friend, I return to the impression that prevailed in the previous note, where I suggested that the interference of the 'boss', of egotistical greed in his work, was essentially limited to the choice of work *themes*. After all, the gravedigger-tron- çonneuse attitude is apparent in her work, with very few exceptions, wherever the opportunity arises - and I realise that these 'opportunities' are innumerable! This *gravedigger syndrome* (which is undoubtedly intimately linked to his emphasis on superyang values) seems to me to have had a truly 'invasive' effect on his work and his oeuvre, in no way comparable to that of his pro-yang options; and this effect is by no means limited to the choice of themes, which the 'boss' would make available to the 'worker-child', in order to

then tiptoe away. It seems to me, on the contrary, that the boss hardly takes his eyes off the Worker throughout the work, so worried is he that the latter might forget the imperative instructions; in other words, that the work itself is very often invaded by *inner dispositions* that are entirely foreign to the nature of the work of discovery, which is a *leap* into the unknown. This is something that was strongly felt many times during the reflection on Burial, and which I tended to lose sight of during my long reflection on yin and yang.

(<sup>137</sup>) (7 December) It's been over a week since I've continued with the notes, apart from some housekeeping work (including sub-notes to two of the previous notes). I had to have three teeth pulled (that's what it's like to be approaching sixty...), a necessary but brutal intrusion, which has meant that I've been working at a slightly reduced speed recently. I took the opportunity to fall back on some correspondence that was still outstanding. Now everything seems to be back to normal...

In the four previous notes (from 24 to 28 November), I tried above all to identify more closely the relationships of affinity or complementarity between the temperament and the mathematical approach in Deligne and myself, in order to situate this 'reversal' of yin and yang roles, which I thought I had perceived in the way my friend tries to present himself and me, at least at the level of the 'mathematical' personalities of both of us. Along the way, other aspects of reality appeared concerning my friend or myself, and beyond our persons, aspects of the world of mathematicians or quite simply, of the world of men. In the end, it seemed to me that it was the attitude of service, and the signs of the disappearance of such an attitude in the scientific world, that was the most striking new thing to come out of this stage of reflection, as I am trying to suggest by the name 'Masters and Servants' that I have given it. To come back to the initial aim of 'situating' a certain reversal, I now have the impression of having 'identified' the real situation concerning my friend and myself sufficiently closely to be able to follow it up. The first thing I'd like to point out is that this initial intuition of a reversal of yin and yang roles, which came to me the day after the reflection of 12 May "L'Éloge Funèbre (1) - ou les compliments" was indeed correct. It was already clear, from the reflections of 10 November in the note "Les obsèques du yin (yang enterre yin (4))" (n° 124), that my friend was endeavouring to give a super-sirile image of himself.

myself, and superfeminine to me. The question raised in the note of 24 November "Le renversement (3) - ou yin enterre yang" (n° 133), was whether this presentation actually constitutes a "reversal" of reality. The 'new fact' that appeared in the note 'The rising sea'... (n° 122), the knowledge that, like my friend, the basic tone in my approach to mathematics was yin, 'feminine', might at one time have raised doubts.

However, the reflection of the last three notes dispelled this doubt. It was already clear from the outset that I had always been perceived by Deligne (as by my other students and ex-students), at least on a conscious level, as very strongly (too strongly perhaps...) masculine (\*). But it also became apparent that, in the relationship between Deligne and myself at the mathematical level and against the background of a strong yin-yin affinity, there was also a yin-yang *complementarity* (which we might call 'secondary', as opposed to this affinity playing the 'primary' role), in which it is really I who play the 'yang', virile role, through a 'yang in the yin' component which is much more marked in me than it is in him.

The deliberate intention that I noted in Deligne, and which seems to me to be echoed eagerly from many quarters (\*\*), does indeed seem to me to be a *deliberate intention to reverse roles*, and more specifically, *yin-yang roles* (\*). It seems to me that this is

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(\*) Besides, current values being what they are, I doubt that scientific prestige can be carried by an image (generally accepted and received), which is not necessarily a 'yang' or even uperyang image. It's only at an unconscious level, it seems to me, that the 'feminine' nature of my approach to mathematics has been perceived both by my friend and ex-student, and by the mathematical public in general (at least those in contact with the kind of thing I've been working on).

(\*\*) I'm thinking here of the "insidious whiffs of disdain and discreet derision" mentioned in the Introduction (see Intr. 10, "An act of respect"). I shouldn't be surprised when I see some of the most prestigious of my students setting the tone themselves. The thing that seems common to me in the many 'puffs' that have reached me over the years is precisely an affection of condescension towards the strongly marked 'yin' traits in my approach to mathematics and in my work. On this subject, see also the comments in the footnote of 23 June, in note no.° 96 "Cercueil 4 - ou les topos sans fleurs ni couronnes".

(\*) The first time this deliberate reversal of roles appeared in my thinking, it was about the reversal of roles in the teacher-student relationship, as I am presented as the 'collaborator' of my student, who himself takes the form of the *true* founder and master of étale and A-adic cohomology. (On this subject, see the two notes 'Le renversement' and 'L'Éloge Funèbre (1) - ou les compliments', n° s 68®, 104) It is interesting to note that in the 'master-student' 'couple', it is the master who plays the 'active' yang role (as the giver or speaker), and the student the 'passive' yin role (as the receiver or listener). Here again,

This is another important aspect of L'Enterrement, in addition to the four already discussed above (in the notes of 13 and 17 November "Rétrospective (1), (2)", n° s 127, 127<sup>¶</sup>). It is all of these five aspects, undoubtedly intimately linked, that we now need to assemble into a coherent overall picture of L'Enterrement.

To be convincing, such a painting would also have to bring together, in a common perspective, *three successive 'planes'*. In the foreground, there is Deligne alone, the Grand Officier at my Funeral, a non-pupil and non-heir of the master, declared deceased and having no place to be or to have been. . . Apart from the deceased himself (who is, however, only a deceased person, a tacit extra), this is clearly the 1 st central figure in the funeral ceremony. He is closely followed, in the background, by "the busy group of my ex-students, carrying shovels and ropes" (to quote from memory the enumeration of the Cortèges, in "L'Ordonnancement des Obsèques"). Finally, in the third shot, there is (almost) the entire Congregation, who have come to celebrate my funeral (and those of the four co-deceased, standing tall in their "solidly screwed oak coffins"), and to lend a hand at the burial.

Between these three planes there seems to be a perfect harmony, a "*Unanimous Agreement*", like those we see at any other funeral celebrated in the proper manner, between the priest filled with pious compunction, the family of the deceased displaying the tunes of the occasion, and the bulk of the audience, intoning where it should be intoned, and being silent where it should be silent, without ever, ever making a mistake.

To continue with this last image, I now find myself in the position (less comfortable than that of the dear departed, who is decidedly out of the picture...) of someone who, faced with such a touching ensemble, would impertinently propose to try to guess the true thoughts and motivations that animate and agitate the one and the other, priest, family and common people, behind the airs of solemnity or contrition appropriate to the occasion. The reflection has been going on for some time now, with the tacit guiding principle of preparing what is necessary to grasp the closest of these three 'planes' of the picture - that of the priest in the chasuble, sorry, of my friend Pierre Deligne I'm not sure about. wanted to say. This is where I would now like to turn my attention.

I'd like to say straight away that the aspect (or 'shutter') of the painting that was featured in the

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the brilliant reversal effected by my ex-student can be seen as a reversal of yin-yang roles, in the same direction (yin-yang becoming yang-yin) as that which constitutes the main message of my Éloge Funèbre, a

message that appeared in the note "Les obsèques du yin (yang enterre yin (4))".

note "Le Fossoyeur - ou la Congrégation toute entière" (n° 97), i.e. the part about "reprisals for dissent", seems to me to play only a very minor role in my friend's case, if it even comes into play at all. At no time did I get the impression that my friend Pierre felt in the least 'challenged' by my 'dissent'. On the contrary, it was a great opportunity, one he would probably never have dared to dream of, to elegantly get rid of the presence of a master who was a little too present, in this institution where, at the age of twenty-five, he had just reached one of the most envied (or at least, the most enviable) positions in the mathematical world. The fact that this dissidence became more pronounced in the months and years that followed was experienced, it seems to me (perhaps not on a conscious level, but it doesn't really matter), as an even greater windfall, which gave him an impressive 'inheritance' (\*) at his mercy, with no hint of resistance coming from anywhere (as he gradually came to realise over the years). He's not the one who would have pretended to complain, even inwardly or unbeknownst to himself, about this unexpected windfall! And it seems to me that the same observation must be valid, all things considered, for most of my students 'before' (my departure), and in any case, each of my five cohomology students. If one or other of them, whether inwardly or more or less clearly expressed (\*), has been able to hint at a feeling of dissatisfaction, of frustration at my dissidence, I tend to believe that this is in the nature of a *rationalisation* of a fossilising attitude towards his providentially disappeared master, rather than a *cause* (albeit one of many) of it. What strengthens me in this conviction, as much for my cohomology students 'in general' as for their undisputed leader Deligne, is that the forerunner signs of the Burial that was to come (as long as the right opportunity appeared - and, oh unexpected miracle, it did!) - is that these signs were already apparent before I left in 1970, and in any case after the famous SGA 5 seminar of 1965/66, destined for the massacre that I know. It is no coincidence, surely, that with such a perfect ensemble, all five

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(\*) On the subject of this "inheritance", see the note "The heir" (n° 90) and the sub-note (n° 136<sub>1</sub>) of the note "Yin the Servant (2) - or generosity" (n° 136).

(\*) The only one of my ex-students who ever let me hear a sentiment in these tones (with, in addition, a certain I'd like to point out that one of the authors of the book I've been reading for the last year or so is Verdier. Back in the days of *Survivre et Vivre*, he seemed to sympathise with my dissidence. There was even an episode of cordial collaboration with his wife Yvonne, on the occasion (if I remember correctly) of the organisation of a travelling exhibition on the initiative of Robert Jaulin (of whom Yvonne had been a pupil), which I joined as a surviving participant.

(\*\*) have lost interest in the fate of this seminar where they learned their trade, and at the same time, the beautiful mathematics that they were almost the only ones, for twelve years, to have the privilege of knowing and using. I've gone into enough detail on this subject in the course of my reflections on the fate of SGA 5 that it would be useful to say more here. I will only point out, as far as Deligne is concerned, that in three of the four articles he wrote before I left in 1970, the intention to hide, or at least to conceal and minimise as far as possible the influence of my ideas, is clearly apparent, without waiting for my 'dissidence'.

What, then, is the root and the particular nature of this attitude of antagonism, of eager competitor to supplant, to erase, n my friend towards me - an attitude which coexisted with an affectionate and trusting sympathy, and with a communion at the mathematical level, from the first years of our meeting? I'm even convinced that it must have been present in a muffled way from the moment we met, and probably even before; and also that it arose much more from the outset from the role I was to play for him, than from any particularity in me - if not all the 'particularities' that made it possible for me to play this role for him. It's also the role he's been trying to erase for the last twenty years. It certainly implied, without any intention on either side, and by force of circumstance, a 'parernal' aspect. And there is no doubt in my mind that it was around this aspect that the conflict arose - a conflict that already existed in him, long before he ever heard my name or even (no doubt) the name of our common teacher, mathematics.

This conviction, to tell the truth, is not the fruit of reflection, and even less would I claim to 'demonstrate' it. Rather, it came about over the years, after I had left, and I couldn't really say myself when or how; little by little, I think, by dint of signs large and small, none of which I dwelt on, even for a moment, but all of which together ended up leaving the trace of a knowledge, diffuse and imperfect, to be sure, but a knowledge nonetheless, that was there one day... . I could undoubtedly, through a laborious process of unearthing half-forgotten memories and probing them one by one, deepen and materialise this knowledge that remains somewhat imponderable;

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(\*\*) (12 December) I should, however, single out J. P. Jouanolou, who ended up writing three consecutive seminar papers, developing notions and techniques that he was going to need directly and immediately for his own thesis work.

and 11 is quite possible (and even probable) that such a job would hold many surprises for me. Yet I don't feel motivated to do it. This is probably because (rightly or wrongly) it seems to me that this is not really *my* job, but my friend's - that what I'm probing here concerns him much more than it concerns me. As far as I'm concerned, this intuition or 'knowledge' or 'conviction' that I've just formulated is enough for my present desire to understand, and I rely on it without any reservations.

As so often in my life, I am confronted here with a relationship of antagonism to the father, in which I am the surrogate father, the 'adopted' father (much more so, it seems to me, than the 'adoptive' father (\*)), is immediately associated in my mind with the situation referred to in the note "Reversal (2) - or ambiguous revolt" (no. 133) - a situation of which my mother's relationship with her father is for me the most extreme prototype. Yet the differences between the situation in question and that of my friend Pierre's relationship with me are immediately obvious. In his relationship with me, I never perceived the slightest hint of 'revolt', or even antagonism in the slightest form of virulence, aggression, showing claws or teeth, even in a smile. There was no shortage of smiles on either side, but they were either smiles of sympathy (as I sensed them), or sometimes of innocent surprise, and sometimes almost pained, when he could see (and I ended up sensing the nuance of intimate satisfaction) that certain blows, delivered with a light touch and a velvet paw, had hit the mark where it was intended.

To put it another way, this antagonism, whether expressed towards myself or towards other people (when it was a question of reaching out to the deceased master through them, and yet still very much present in him. . . ), has always, and without exception, taken the extreme yin form: that which delights (and excels) in reaching out and hurting, even eliminating or crushing, with

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(\*) (12 December) As I was writing these lines, I realised just how cautious it is to make such a statement about the 'non-symmetry' of roles, especially as these roles are played out at an unconscious level. I presume that at that level, and apart from the mathematical communication itself, I must have entered into the 'paternal' role, prepared for by the context. But this role was clearly not of comparable weight, in my life and in my relationship with my friend, to that of my mathematical step; it remained episodic, and there should be no trace of it after my 'departure' from the mathematical scene in 1970. On the other hand, my ex-student's attachment to me, for better and (above all) for worse, never ceased to manifest itself over the next fifteen years, both in his work itself and by maintaining, against all odds, an ongoing personal relationship with me.

all the appearances of the most exquisite delicacy. While his deliberate choices for his brand image as a mathematician are superyang, as mine undoubtedly have been, without any more success than his), it seems to me that at the relational level, the basic tone (towards me at least, and towards those he considers to be related to me) is decidedly and across the board, superyin. (I would make one reservation on this subject, however, an important one, which I'll have to come back to).

Another 'obvious' difference between Pierre's relationship with me and that of the 'ambiguous revolt': from what little I know of his family, I think I know that Pierre's father is a good man with a gentle, modest temperament, so not the 'profile' that would provoke a reaction of revolt, later transferred to a substitute father.

(<sup>138</sup>) (8 December) As I finished my reflection last night, I had the slightly painful impression of someone who understands less and less. Before going to bed, I stayed for a while following the associations generated by the past reflection. I thought I saw a few points of light appear, which I think will help me in today's reflection.

Surely the most important of these associations relates to the 'velvet paw' aspect of my friend, who likes to scratch (and sometimes deeply and mercilessly) with the most inoffensive airs in the world, and 'with all the appearance of the most exquisite delicacy'. This image, which came up in the course of a comparison (with a situation of 'revolt' mentioned earlier) that had been shipwrecked, immediately struck me as rich in meaning, as an essential aspect of this 'antagonism' that I set out to explore. And in retrospect, the image of the 'innocent smile and velvet paw', capturing the quintessence of almost twenty years' experience, seems to me to be the 'sensitive point' in yesterday's reflection, the unexpected 'point of light' as I groped around in the dark. If this impression of groping and darkness prevailed even afterwards, it's because, too caught up in the ideas I'd had in my head the moment before and which I had to pursue or place, I hadn't been able to pay attention to the delicate 'tilt' that had taken place in me as soon as the image appeared. And in the half hour that followed, as I pursued a few associations related to this image and to one or two other moments of the past reflection, my attention became scattered once again. It is only now, looking back over the course of a day, that I can see a perspective of the interrupted reflection that had escaped me earlier, as I reread

yesterday's notes.

If I take care to follow the strongest association of all and the one most closely linked to my own experience, putting aside for the moment others that are more 'structured', more 'intellectual', I come up with the following. I suddenly find myself back, as if in a single impression that would sum them all up, in this multitude of particular cases (experienced either as a co-actor or as a close witness) of the *conjugal circus* - the circus of the woman-man couple. The circus of the couple, married or not, with or without children, young or old or young-old or the reverse, in the dregs pulling the devil by the tail or in ease driving a carriage, it's all the same, the circus of the couple doesn't change for all that. Suddenly I find myself back there, in one aspect of this circus that struck me above all others (it took me a long time, it has to be said, before I saw anything other than fire in it). . . ): it's the very particular, very 'innocent face', 'I said nothing and did nothing', 'velvet paw' tactic played by the woman, in a certain game where it's always her who leads with perfect dexterity, and where it's always him who follows (and often, cashes in) without realising anything. I've seen very few couples that didn't work to this tune, with infinite variations, it's understood, left to the improvisation skills of each of them, not to mention their particular temperaments and other circumstances. Just today I had the opportunity to see a particularly dazzling demonstration of this, which I won't go into here.

It was a somewhat colourful and nuanced description of these circus games, in broad outline at least, or even just an evocation of the tones (velvet paw, just on the 'her' side) in which it is played out, that was largely absent from the reflection of 12 November that I have just looked at again, in the note 'Le renversement (1) - ou l'épouse vehe- mente' (n° 126). Clearly, I was pursuing this line of thought with such reluctance that it ended up looking like an austere 'forces and motivations' analysis.

- I was definitely not in good form that day! It was also the first time, in 'The key to yin and yang', that there was any mention of the 'reversal of yin and yang'. The extreme case that obsessed me a bit then, and continued to do so as recently as yesterday, was that of my mother (mentioned in the note of 22 November 'The reversal of yin and yang').

(2) - or ambiguous revolt", n° 132) However, in my "attempt at a four-point analysis", I took care to identify the first of these three "points" in such a way as to apply to the vast majority (if not all) of couples that I have been able to get to know at least a little closely, without there being any doubt as to the nature of the relationship.

the vehement tone of (ambiguous) 'revolt' necessarily predominates (albeit in an obscured form). That doesn't mean that there isn't something else in common, something that escaped me that day. It only began to dawn on me last night, during that well-spent half-hour when I let my thoughts wander in the wake of my 'shaped' reflection... This important common factor, which I had previously only perceived in the extreme case of 'vehement wife', is the subtle play of *yin-yang role reversal*.

I'm not sure whether I should say that this game is the 'springboard' for the power game I referred to earlier, or that it is *identical* to the latter. Surely, what for *her* (and often for him too) constitutes the quintessence of the male role, of the role devolved to the man, is the *possession of power* - a possession that is often fictitious, of course, but which in any case draws an element of reality from the social consensus. Perhaps I have tended to underestimate the strength of this element of reality, the strength of the *symbol of* the man as representing authority in relation to the woman - and in particular, its strength as a driving force in the woman's motivations. I suspect that, for her, 'being a man', or 'being the man', means *exercising power* above all else. The 'reversal of roles', at the level of egotistical motivations (\*), is undoubtedly no more and no less than the *exercise of power by women over men*.

Given the existing consensus, this exercise of power by women can scarcely take place in any other way than covertly. It doesn't consist of commanding, or pretending to decide (with the expectation that the decision will be followed), but of *making things work* - and above all, turning things upside down, without ever seeming to do so. The tactic for keeping it moving, passed on wordlessly from mother to daughter, from wife or young daughter to young daughter, from generation to generation, is the tactic mentioned yesterday at the bend in the road, the '*velvet paw*' tactic. If you pay close attention, you'll recognise it in an infinite variety of guises, from the extreme yang case of the wife

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(\*) The reversal of yin-yang roles at the level of the erotic drive and in the game of love has been discussed elsewhere, in passing (see in particular the note "Acceptance (the awakening of yin (2))"). The erotic impulse is by nature foreign to the games of the ego, and in particular to the games of power, even though the ego is eager to make it an instrument to serve its own ends, and skilful in achieving this (within certain narrow limits at least and by distorting and mutilating the original impulse, if there is any relationship between the two types of yin-yang "reversal", that is to say, between on the one hand the free play of the two impulses yin and yang and in the lover, and on the other the obsessive play of an incessant and insidious demonstration of power by one of the spouses over the other, it seems to me that this relationship can hardly be other than this: that each of the two types, at every moment, excludes the other.

vehement, embodied for me by my mother, to the extreme-yin case of the sorrowful (or even overwhelmed) wife, which I saw embodied by another close relative.

It seems to me that there are very few women who don't practise this age-old tactic and master it thoroughly (\*). It is practised every day, especially in the con-jugal circus, although it is not limited to that. It seems to me that it is rarely practised between women (perhaps simply because it is more difficult to 'make a woman walk' than a man). On the other hand, for some women, this tactic becomes like a second nature, in their relationship with *all* men, or at least those who are perceived by them as having a marked masculine character.

If I'm talking about 'tactics' here, that only expresses an incidental aspect, the 'tactical' aspect, of a more important reality: that of an inveterate inner attitude, towards 'men' in general, or at least towards anyone, father, lover or husband in particular, who in her life plays a privileged role as a *man*, invested (by social consensus, or by her own choice) with *authority*. This attitude is by no means always in the nature of a thirst for domination (as in the case of "vehement wife") - at least not in the sense in which the word "domination" is usually understood. It's more a case of a hunger, which sometimes becomes all-consuming, *to constantly exert an action* on the other person, to "keep them in motion" (sub-text: in motion around her own person. . . ). This is often achieved by any means necessary. One of these means of exerting action, and hence power, is to *hurt*, and sometimes to hurt as deeply as possible, to knock out outright, and even to destroy, physically or psychologically, if only the occasion was propitious; and this, always, without seeming to touch, with "all the appearances of the most exquisite delicacy". More than once I myself have been 'sent to the wall' I Often too, caught off guard as a co-actor or as a witness, I've had my breath taken away by the apparent gratuitousness of the act that hurts or destroys, with an innocent smile or an absent air, but always looking as if nothing has happened, seizing with an infallible instinct the moment and the place to touch the other where he or she can be most profoundly affected - whether that 'other' is the victim or the target.

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(\*) It's also true that there are very few men who don't 'walk the walk' when this tactic is applied to them. For most of my life I've walked without a hitch. That only really started to change when meditation came into my life at the age of forty-eight (it's never too late to do the right thing). Even today, I sometimes let myself get caught up in it (not often, admittedly, and never for very long).

father or lover, husband or child, or a mere acquaintance or even a stranger (provided only that the opportunity is there to strike and hit. . . ).

(<sup>139</sup>) (9 December) This is the extreme, yet by no means rare, case of *violence for violence's sake*, of *gratuitous* violence and malice. This kind of violence, whether it strikes a stranger or the person closest to us and supposedly loved, is not characteristic of either women or men; it is neither 'yin' nor 'yang'. But the disconcerting and insidious *form* in which I encounter it here, under the mask of an air of distracted absence or even ingenuous gentleness - this form, which has ended up becoming very familiar to me, seems to me to be peculiar above all to women. This is undoubtedly linked to the 'patriarchal' social consensus, which invests men with authority and power over women (\*). This form is her own way of satisfying a desire for power which, because it is forced (by force of circumstance) to follow paths other than those open to men, is no less imperious or all-consuming in her - quite the contrary! It would seem that not being able to unfold in the light of day, being condemned in advance to an occult existence, only serves to exacerbate and further proliferate this craving within her, to the point, in many cases, of truly 'devouring' her life and that of her loved ones.

Fortunately, this craving does not always reach the level of gratuitous, all-out violence, and the registers in which it is deployed are not all in the tones of violence. While tones of discreet derision are most often the rule, giving vent to a veiled antagonism or secret enmity, simply mischievous tones of indulgent affection, a little mischievous on the edges, are not excluded. And while it's true that the tried and tested tactic of the 'velvet paw' is a woman's privilege and weapon of choice, this privilege is by no means exclusive. On many occasions I have witnessed men (\*) wielding this weapon at close quarters, with a mastery that is second to none.

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(\*) This consensus, moreover, and the authority of men in their relationship with women, have been greatly eroded over the last few generations, and more and more so these days. I'd be the last to complain! It doesn't seem, however, that this superficial change in laws and customs has changed much in the deeper workings and 'style' of relations between the sexes, and in particular in the visceral and carefully concealed antagonism between women and men. This is undoubtedly due to the fact, highlighted at the end of the discussion in this note, that this attitude of antagonism, and its means of expression through a certain power play (or reversal of power), is much more the result of *the transmission of an 'inheritance'* from generation to generation, than that of 'objective' conditions within the family.

(\*) However, I note this difference, in the cases known to me, that when there is violence, apparently, the victim is the victim.

just as perfect (\*\*). remarkably, in all these cases, the man who had "appropriated" this weapon for himself was someone who tended to repress certain virile sides of his being, and (by the same token, no doubt)! to mould himself according to the *maternal model*.

This same tactic is frequently observed, and is virtually the rule, in the power games played by children, girls and boys alike, vis-à-vis their parents, or vis-à-vis other adults in their place. This immediately brings to mind the situation of writers or journalists in countries (past or present) where direct or indirect censorship is rife, making it impossible or risky for them to express their true ideas and feelings directly and openly in public. The main difference between this last case and the previous ones is that in this case the recourse to indirect, veiled, sometimes symbolic expression of one's true feelings is no longer the work of the unconscious, but of conscious thought. The reason for this, surely, is that there is then a sufficiently widespread consensus in favour of the unorthodox ideas and feelings that need to be 'put across' without appearing to be so, so that the person concerned no longer feels obliged to hide them from himself, for fear of appearing as a hideous misrepresentation in his own eyes. It is only in extreme cases of ferocious political or religious terror (such as existed in the Middle Ages, or in the Soviet Union and its satellite countries in Stalin's time) that any attempts at unorthodoxy are forced (by some, at least) to plunge even deeper, by evading the gaze of the Internal Censor, as well as that of the censorship instituted in morality and the police apparatus.

All these examples seem to suggest that the "velvet paw" style (or "I didn't say anything,

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The only exception in this respect concerns my friend Pierre De ligne, in his relationship with me and those whom he likens to me, as belonging to my 'sphere of influence'. The only exception in this respect concerns my friend Pierre De ligne, in his relationship with me and with those whom he assimilates to my person, as belonging to my 'sphere of influence'. This is therefore an attitude of antagonism and violence (muted, admittedly I) with no 'personal' cause, by which I mean no cause in grievances (real or imagined) that he harbours against those he is trying to reach. On the other hand, this is behaviour that many women exhibit, and not only (as in this case) towards close friends, or mere acquaintances or even strangers, but also towards those closest to them, such as a lover or husband (of course, and as a priority), or a brother or even one's own child.

(\*\*) It would seem, moreover, that this tactic, implemented by the unconscious, always inherits from it that 'tact' and almost infallible surety, so rarely present in fully conscious action. I don't think I've ever seen this tactic used without mastery.

nothing thought, nothing wanted") appears, more or less automatically, in any situation of any duration, where a balance of power to our disadvantage makes it impossible, or at least dangerous for us, to express candidly, directly, our feelings, desires ; ideas, intentions - and, more particularly, feelings of antagonism or enmity towards those who are perceived as exerting a constraint on us (and, in particular, the very constraint that was intended to prevent us from expressing our true feelings) (\*). This is not the only case in which the style in question and the inner dispositions it covers appear. Very often, this "balance of power" is more or less *fictitious*, and corresponds much less to an "objective" reality, taking into account the real dispositions (or means of power) of the person or persons perceived as the "oppressor", than to the *idea* (conscious or unconscious) that we have of them. This idea is rarely the result of a careful and intelligent examination of a given reality, but is almost always part of the 'package' of conditioning of all kinds that we receive at a young age, taking into account certain fundamental choices that have been made in us since that early age. Thus, whether in a girl or a boy, the choice (unconscious, of course) to identify with *the mother* implies the adoption of a whole set of attitudes and behaviours (such as those expressed in the 'velvet paw' style), and at the same time the ideas (unconscious most of the time, but it doesn't matter) that underlie them (such as the ideas about a certain balance of power, and the antagonistic reflexes that accompany these ideas). In the opposite case of identification with *the father*, but when the father himself has integrated into his person certain typically 'feminine' traits (or which are such in our society, at least), it is conceivable that the effect could be quite similar to that in the first case.

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(\*\*) As I was writing these lines, the thought occurred to me that the situation I have just described is precisely the one we were confronted with in the early years of our childhood, all of us without exception, that is. A large part of our unconscious (the part we might call 'the oubliettes', generally perceived at the unconscious level as a sort of 'rubbish pit') is nothing other than the response of our child psyche to this pressure from our environment, which forces us (it's practically a question of survival) to bury away from our own eyes, as a sign of disavowal, everything in us that falls under social censorship. This censorship is soon internalised in an inner Censor, whose sullen presence guarantees the permanence of this premature burial. And yet, despite the Censor, duly buried unorthodox pulsions, knowledge and feelings manage to express themselves, sometimes with exacerbated and fearsome effectiveness, in indirect, often symbolic, yet perfectly concrete ways. The 'velvet paw' section offers a particularly 'striking' - and often disconcerting - example...

cases.

The point I'm getting at here is that in today's society, and in the mid-20th century, we've got to look at ourselves as a whole.

It seems to me that this style ('velvet paw'), and this 'feminine' inner attitude that I'm examining here, are only to a very limited extent a spontaneous individual reaction to objective power relations, established by society or by the particular circumstances surrounding our childhood (or even our adulthood at such and such a time); that it is rather an '*inheritance*' taken from one or other of our parents (if not both at once?), who himself had taken it from one of his own parents.), who himself had taken it from one of his parents. Clearly, this type of inheritance tends to follow the *maternal* line, being passed down primarily from mother to daughter. But on more than one occasion I've seen a mother-to-boy inheritance at close quarters. There's nothing to lead me to believe that transmission can't also take place, exceptionally, from father to son, or even from father to daughter.

(<sup>140</sup>) (10 December) I would like to come back to some associations around the theme of *gratuitous violence*. This was the theme that began yesterday's reflection, but I then turned away from it to return to an examination of the 'feminine' (or 'velvet paw') style in power games, and as a means of expressing antagonistic attitudes towards others (and above all, towards men who are perceived as highly virile or as being, in whatever capacity, in a position of authority, prestige or power).

As I said yesterday, (seemingly) gratuitous violence, violence 'for its own sake', is no more unique to women than to men. Everyone has had the opportunity to be confronted by it suddenly, at the turn of the road, whether in the guise of 'the most exquisite delicacy', or as a kick or a burst of machine-gun fire in the ventre. The latter style, the 'yang' style, is certainly rarer in these so-called 'peaceful' times, and in civilised countries like ours. For most of us, well-bred people more or less well-placed in a country of affluence, this violence that-says-its-name-right is not part of everyday life, as is the other, muted violence with its ingenuous airs. And yet, you only have to look at the 'news' column in the first major daily paper you come across, or listen to the news (\*), to realise that 'hard' gratuitous violence is still rife on the streets, even in our own country. This does not

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(\*) It's true that these are things I stopped doing a long time ago, contenting myself with occasional information through intermediaries.

It doesn't always go so far as to slit the throat of the anonymous old lady they've taken it upon themselves to burgle. But when young people in search of adventure 'borrow' the car left carelessly open in front of your house, it's rare that by leaving it in a ditch ten or twenty kilometres away, they haven't ransacked it beforehand. Even in the peaceful countryside where I have the good fortune to live without worrying too much about anything, the smallest farmhouse or cottage doesn't remain unoccupied for long before it's already been ransacked from top to bottom (that's for utility) and, what's more, copiously vandalised (that's for pleasure). In all the cases I've just mentioned, the gratuitousness of the violence is particularly striking, because the person it strikes is a stranger, often someone we've never seen before and never will.

So this is what we might call "*anonymous*" violence. Since time immemorial, no doubt, wars have been a kind of collective orgy of such violence - the times when the opportunity to kill for free is king, and when the life of a vague individual is worth zero compared to the pleasure of pulling a trigger and testing one's power to make a pale, nameless silhouette slump in front of one's face...

If there is one thing in the world, as far back as I can remember, that has always left me bewildered and speechless, it has been to see myself confronted once again with violence that is beyond comprehension, violence that strikes and destroys for the sheer pleasure of striking and destroying. If there is one thing in the world that imbues us with this indelible feeling of 'evil', it is not death or the suffering that the body can endure, but this thing. And when such violence (whether it has a hard face or a soft one, whether it seems 'big' or 'small') comes at you unexpectedly from one of your loved ones, it is sure to strike hard and deep, to bring out (or resurface...) and unleash on you a nameless anguish. The root of this anguish goes deep down, when it finds the soft, fresh soil of childhood, or even infancy, in which to take root. This anxiety, "the best-kept secret in the world" in my life as a child and as an adult, appeared in me at the hands of my mother, in my sixth year.

It was at the age of 51, during the month of March 1980, that I uncovered the episode of the implantation of anxiety in my life. The hold of anxiety over me had already been defused, to a large extent at least, with the appearance of meditation in my life (in 1976), and it was gradually taking on an increasing role. A third decisive turning point in my relationship with anxiety came in July and August 1982, during a close examination of the

the mechanism of anxiety in my everyday life. The situations that created anxiety, from my childhood to my middle age, were those that, in the unknown depths of my being, made me relive "that which is beyond comprehension". These were also the times, to be precise, when I saw myself once again confronted with the familiar signs of violence that seemed inexplicable, elusive and irreducible... The sudden eruption of this violence suddenly causes a wave of distraught anguish to resurface and surge, which is immediately taken under control and repressed. This visceral reaction has remained virtually unchanged to this day (\*). If anything has changed in recent years, it is the appearance of a *reflexion* in the wake of anguish, which makes comprehensible, and often obvious, what had appeared under the threatening mask of 'that which is beyond comprehension', of the delirious ; and above all, over the last two years, by the appearance of a *look at myself*, a look of interest and concern for this anguish itself, which a reflex movement of peremptory force would have me hide from myself. Or, to put it another way, my relationship with anxiety has become, especially over the last two years, no longer one of visceral refusal, or of taming wild beasts or gravediggers, but rather, and increasingly, one of attentive and affectionate *acceptance* of the message it brings me about myself - about my present, my past and its action in my present. This, it seems to me, is the last step I have taken so far, towards an increasingly complete inner *autonomy* in relation to others, that is to say, above all else: in relation to my loved ones and my ands (\*\*).

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(\*) (14 December) It would be more accurate to say that this reaction remained "more or less the same" until... the *time of* my meditation in July and August 1982. While there have been many 'provocations' that have caught me off guard since then, the 'visceral reaction' in question has only appeared once, a year ago. It was the occasion of a short meditation, lasting a few hours, which completely clarified the situation. As soon as a confusing inner situation is faced up to in a simple way and accepted, the anguish that accompanies it, bringing us the message of our confusion, disappears without a trace, except that of knowledge and renewed calm.

(\*\*) We have already discussed this "last step" at the end of "L'acception" (n° 110), in the somewhat different light of "L'acception". different from a liberation from the need for *approval* or *confirmation*, which "really constitutes the 'hook', discreet and unfailingly solid, by which the conflict can 'hang' in us, and by which we are... under the dependence of others..., by which, in short, it 'holds' us, and (for all intents and purposes) manoeuvres us as it pleases... . ". (This derided passage could have been written on this very day - but I swear I didn't copy it down!)

I don't know if there are any more such 'steps' ahead of me, which will give me the distance to

It seems to me that it's the violence that doesn't say its name, the 'feminine' kind of violence, that generates the most anxiety, much more than the more spectacular violence of a punch in the face. The person who plays with muted violence, and in so doing also plays on those secret valves that release waves of nameless, faceless anguish in others, holds in his or her hands a weapon that is more formidable than any authority or simple power of coercion. And to manipulate these floodgates of anguish as he pleases and as he pleases, with an air of innocence, represents a *power that is undoubtedly* more incisive and more formidable, even if it remains hidden, than any de facto or de principle power instituted by social consensus. This is woman's 'just revenge' on man, in a society where man claims (or has claimed) to dominate her; and this is also the price 'he' pays for his illusory supremacy (present or past). If she is a *slave* (and in our countries, she is less and less so), he is a *puppet* in her hands, or very nearly so (and he is as much a puppet today as he ever was).

For some years now, whenever I'm confronted with a situation of gratuitous violence (whether directed at myself or others, whether brutal or insidious), I've come to associate it unremittingly with *self-contempt* - or rather, I *see* this self-contempt in the person who, openly or inwardly, affects to despise others. I have no doubt that this is not in me a simple push-button mechanism, a 'philosophical' or 'psychological' dada that I would be quite happy to trot out on occasion, as a means perhaps of exorcising by a conquering formula the anguish I was talking about, by handily sticking an all-purpose label on a threatening stranger. It's simply a *knowledge of* an essential, profound and (once seen) obvious relationship.

This knowledge doesn't 'evacuate' anything, it simply allows me to *situate* an unknown, it's in no way a sentry, placed there to block the way to anguish, or to expel it from the place. Such is not the nature of knowledge, in the sense that I understand it. A con-

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see my current autonomy as still relative, and not complete (as I would be inclined, perhaps a little naively, to believe... ).

The emergence and blossoming of a relaxed relationship that is attentive to anxiety represents a *liberation* in our relationship with others. In fact (as we say in the following paragraph), it is the possibility for others to 'manoeuvre the floodgates of anxiety' in us as they please (in particular by alternating between gratification and rejection, in a measured and deftly administered way), that represents their principal means of power over us.

It's a *restlessness within us, on the other hand, that constantly pushes us to block the path of the 'in-trus', lest they disrupt a compositional 'calm'*. It is a restlessness within us, on the other hand, that constantly pushes us to want to block the path of 'intruders', lest they upset a 'calm' of composition. The calm I'm talking about doesn't fear intruders, it welcomes them. And the surface agitation created by the new encounter with anxiety does not disturb this calm, but contributes to it.

(<sup>141</sup>) (13 December) With my 'quip' in the previous note, about the 'slave' and the 'puppet', I've surely found another way to annoy everyone, and (if I'm read . . . ) to be called every name in the book! Unless the hypothetical reader applauds contentedly, who knows, convinced that the image is well sent and applies to the whole world, except for himself (or herself); and except perhaps again, at most, to the sarcastic author. By this supposition, moreover, he would be giving my modest person a credit that in no way belongs to him. At the very most, I would venture to admit that for some years now (and especially since a certain meditation on anguish in July and August 1982), I have begun to leave, and even to have left, the famous 'circus' - the conjugal circus, of course, but also the others that resemble it like brothers. In the first part of *Récoltes et Semailles*, there's even a section in this vein, called "Fini le manège!" (No.° 41, last March), which clearly announces this colour. In that case, it wasn't the conjugal circus, but a certain mathematical circus, in which I have spent a good part of my life, like everyone else. But it is also true that a few weeks after this promisingly named section, on 29 April, a note appeared entitled "Un pied dans le manège" (n° 72), whose name would seem to herald a different sound! The difference with before, perhaps, is that if I still turn here and there in some merry-go-round (and I hardly see any more than the mathematical merry-go-round that continues to attract me...), it's myself (or my friends) who are on the merry-go-round. ), it's myself (or at least someone inside me) and no one else who pulls the strings that keep me going round and round, and these strings are no longer invisible to me.

Having made these reservations, I can say that for most of my adult life (and more specifically, until I discovered meditation), I 'went round and round' (like everyone else, again), both in the marital merry-go-round (it went round and round for no less than twenty years!), and in the others. I don't regret it, because the knowledge I have of carousels of all kinds I owe first and foremost to those in which I myself turned, and if I turned for so long, it was because the student was slow.

to learn - and also, surely, that in more ways than one I found bait in them. In the end, I suppose, they lost their strength and charm. ...

It seems to me that in all these carousels, I was always the one who 'walked', and I was always the one who 'made it walk'. Or to put it another way, I don't think I've ever had the slightest propensity for the famous 'velvet paw' style - I've sometimes played hard with my claws, but never, I think, with claws drowned in velvety down. This is one of many traits that attest to the fact that at the level of the structure of the ego, of the 'boss', of that which is conditioned in me, the basic tone is strongly 'masculine', without any ambiguity whatsoever. The yin, 'feminine' tones, on the other hand, dominate at the level of the 'child', the original in me, i.e. also in the drive for knowledge and in the creative faculties.

I'd like to say a few more words about the 'gratuitous violence' in my life. In the previous note (from three days ago), I referred to it in the light of the person who finds himself the target of this violence, or at least the person who is confronted with it in others (even if only as a witness), when I wrote :

"If there is one thing in the world, as far back as I can remember, that has always left me bewildered and speechless, it has been to see myself confronted once again with this violence that is beyond comprehension, the violence that strikes and destroys for the sheer pleasure of striking and destroying. ... "

These lines, and those that follow them, correspond well to reality", the reality of my own experience in any case, and surely also that of countless men and women who, like me, have been confronted with such violence. They could give the impression that the person who wrote them is himself a complete stranger to this violence, that all his life he has been free from such delusions. But this is not the case. I remember four relationships in my life, three of which took place in my childhood or adolescence (between the ages of eight and sixteen), relationships marked by an enmity not based on any specific personal grievance, and expressed in the form of systematic and merciless mockery, or by rouffées and other brutalities. On the first occasion, the victim, a classmate (still in Germany), was the whipping boy of the whole class. The situation dragged on for years, I seem to remember. The next two cases took place during the war, when I was staying in a children's home (just out of a French concentration camp).

Switzerland at Le Chambon sur Lignon, "La Guespy", between 1942 and 1944. This time the "terrible people" were one of my classmates (whose parents, like mine, had to be interned as German Jews), and one of our two supervisors, both of whom spoke German like me. They were both a bit of a bully for a sometimes ruthless group of young boys and girls, of which I was one - but I think I gave them a harder time than anyone else in the whole gang. Living under the same roof, and being refugees with a precarious status, under the constant threat of the Gestapo rounding up Jews, could have given me feelings of solidarity and respect, but it didn't. It was a very difficult experience.

In all three cases, the person I took as a target of malice was of a gentle, rather shy, non-combative nature, which I then classified as 'soft' or 'cowardly', and which therefore formed part of the traits that were supposed to make him a bit of a shiny new character. In an age devastated by violence and contempt for the individual, and myself filled with an aversion to violence in war or concentration camps, and everything that goes with them, I nevertheless felt entirely justified in the contempt and violence I inflicted on others, for the simple 'reason\*' that I had taken pleasure in classifying them as 'unsympathetic' (and other adjectives to match....), after which everything (or almost everything) became permissible, not to say highly commendable. I, who prided myself on being 'logical' and fair-minded, failed to see that my behaviour, and its justification by antipathy (the true nature of which I certainly wouldn't have thought to fathom), was the same as that of the good-natured German of the 1930s towards 'dirty Jews' (something I had seen at close quarters in my childhood); and that it was the same behaviour that made possible the unprecedented outburst of violence that was then sweeping the world. Of course, following in my parents' footsteps, I tried to distance myself from this violence as if it were a strange aberration (sometimes even 'beyond comprehension'). I was full of an almighty condescension towards all those, soldiers or civilians, who in one way or another agreed to be active or passive cogs in the heroic mass graves and the abomi- nations that accompanied them. And at the same time, at my modest level and within my own limited sphere of action, I was doing what everyone else was doing...

If I try to discern the cause of such a strange blindness in the service of a deliberate purpose of contempt and violence, it comes down to this. The violence that I myself had had to endure in the course of my childhood since the age of five, without ever having been designated as such to my attention as a child, had ended up creating a state of chronic tension, which remained unconscious and carefully controlled by a strong will. This tension, or accumulation of aggression with no particular target, created the need for a release of aggression. This 'need' was not, however, of a physical nature - there was no shortage of opportunities to let off steam through physical activity in any of these cases - but *a psychological* one, surely there must have been an accumulated resentment, mostly unconscious of course and not materialising in palpable grievances towards a particular person (one of my parents, let's say, or one of the people who took their place), onto whom I could then have transferred feelings of resentment, and given them concrete, perhaps violent, expression. There must have been a 'vacant' violence in me, a diffuse, wandering violence, looking for a target on which to vent. It often seems to be animals (insects, toads, dogs or cats, even oxen or horses...) that bear the brunt of such wandering violence, in search of a victim. This was not the case for me; I can't remember ever having martyred an animal, large or small, in my life. Apparently, I just needed a scapegoat closer to home, a *person!* When you're looking for one, it's always easy to find one.

I have no doubt that what I've just written describes a certain aspect of reality. However, I feel that this description still remains on the surface of things, it only identifies a certain 'mechanistic' aspect, without really going any further into the uncon- scient experience. For the moment, in place of this experience, there's a kind of great 'blank', a void. This is not the time or the place to go beyond that, to probe further into what this 'blank' covers, what dissolves in this 'emptiness'. Is it that famous 'self-contempt' that was so peremptorily asserted in the note three days ago, and which suddenly, now that it's *me*, seems to have vanished without a trace? Now or never, at last, would be the time to get to the bottom of it, to clear up this tenacious and ambiguous 'vagueness' that continues to mark my knowledge of myself, just as the 'vagueness' that once surrounded the role and very existence of anxiety in my life. It seemed to me that anguish was the 'best kept secret' of my whole life. Is there another, even better-kept secret, one that I've barely touched on here and there, on two or three occasions, since I started meditating? I have the

The feeling that I've got everything I need to get to the bottom of it - including this sudden surge of familiar interest, which tells me that the time is ripe to take the plunge!

However, I have a feeling that I'm not going to do it here, in this meditation that is in some way 'public', or at least intended to be published. This meditation, among many others, will at least have had the virtue of unexpectedly bringing to maturity a question that has suddenly become very close to me, recognised at last as crucial to my understanding of myself, whereas previously it had seemed like one question among a hundred, on a long waiting list whose end I may never see...

It's by no means out of the question that I'll have the opportunity to meet one or other of the three men (two of whom are about my age) who were once the innocent targets of my violence and aggression; or if not, at least that I'll have the chance to write to one of them. It will be good for me to be able to make amends in full knowledge of the facts. Perhaps it will be good for him too. Strangely though, I don't get the impression that any of the three of them ever really held a grudge against me, or that my violence had triggered in him any personal animosity towards me in particular. Rather, it seems to me that the whole context in which he was caught must have been experienced by him as a kind of calamity, from which there could not even have been any question of escaping, and that my own person was perceived more as one of the figu- rants in this calamity, than as a ruthless and hated tormentor (which I was). Of course, I may be wrong, and I may never know - just as I may be lucky enough to be confronted one day with this karma, which I sowed in my blindness.

I think there must have been a maturing in me in the years following the 'Guespy' episode, although there was no reflection on the subject as far as I can remember. The fact remains that there were effective reflexes in me afterwards that would have prevented me from associating myself again with acts of collective violence by an entire group against one of its members. I don't think it ever happened again in my adult life, or that I was ever tempted to play such a role again, which I must have realised was false and lacking in courage under its cheerful, 'sporting' exterior. But even after the war, life was full of situations full of veiled violence and anguish, perpetuating in me the deep-rooted tensions that had marked my childhood and adolescence. It was in this context that

There is a fourth relationship, marked by occasional outbursts of animosity and violence that I can call 'gratuitous' - not founded or provoked by concerned grievances, nor even (I think) by acts that could pass for 'provocative'. It concerns my relationship with one of my sons. I know, however, that I was no less attached to him, and that I 'loved' him no less than my other children. But at some unconscious level, I must have rejected certain aspects of him, precisely those that made him softer and more vulnerable, and harder to get to grips with, than his brothers and sister. Decidedly, he didn't 'fit in' at all, even less than my other children, with the beautiful superyang images that I would have liked to find in my children - and all the more so because some very harsh circumstances that had surrounded his first two years and had left a deep impression on him, made it more difficult for him to develop a trusting relationship with his parents. The fact remains that during the time he still lived with me under the same roof, until around his tenth year, I sometimes subjected him to punishments of a humiliating nature, imposed in a thunderous voice. These were things that *had* completely faded into oblivion, just like a certain atmosphere that had come to permeate the family air - it was a few conversations with his sister and two brothers, two or three years ago, that opportunely brought these things back to my memory. Perhaps the day will come when he too will be prepared to talk about it with me - he, perhaps, being the one of my children who has borne the brunt of a family atmosphere charged with hushed anguish and unacknowledged tensions; or at the very least, the one who has been the most 'taken in' by his father, while each of them has had their fair share of the parental 'package'. I know at least

- and I'm happy about that - that what's preventing any of my children from having an simple and trusting relationship with me, her father, and to talk together about a heavy past and to probe it, it is *not* a fear that they would have kept towards me, and that they would have tried hard to hide.

But then again, this is not the place in these notes to delve further into a complex situation involving six or seven other people as much as myself. What was important to me above all was to make an unvarnished observation of the occasional appearance, here and there in my life and in my own actions, of this same apparently gratuitous violence, which so often "left me bewildered and speechless", when I encountered it in others. This observation is not made with any particular 'intention'; it does not claim to 'explain' or 'excuse' gratuitous violence in anyone, any more than gratuitous violence is supposed to explain or excuse 'violence' in others.

my own. It's not impossible, or even probable, that with further reflection, the two violences, that in others and that in myself, will end up shedding light on each other. If I have made this observation, it's simply because it was in the way and (on pain of ceasing to be true) I couldn't not make it here.

(<sup>142</sup>) (14 December) Last night's reflection was a timely reminder of something we are so prone to forget, and especially (in this case) of something I *am* so prone to forget that I am not 'better' than anyone else, that I am cut from the same cloth as everyone else; just like the friend I am about to put in the hot seat, the focus of unbridled attention...

Yesterday I gave a sort of description of the appearance of (seemingly) 'gratuitous' violence, the discharge of accumulated tension and aggression onto a scapegoat who, for one reason or another, happens to be in charge. This 'mechanistic' and superficial description, which is certainly 'well known', can give credence to an equally 'mechanistic' *attitude* towards this violence, in oneself or in others. It is then seen as a kind of inescapable inevitability, an inevitability rooted in the very structure of the psyche - alas, what can we do about it? Such an attitude, under a 'rational' or 'scientific' guise, seems to me to be nothing more than the rationalisation of an *abdication*: an abdication before the presence of a creative *freedom* in ourselves and in others, which gives each of us the option of *taking responsibility for* the situations in which we find ourselves, instead of passively following the slopes of ready-made mechanisms. While it's true that we rarely make use of this 'freedom' option, the mere *presence* of this option and of the creative possibilities within us, whether we choose to make use of it or not, changes the nature of things completely. It is in *this way*, and in no other way, that situations involving relations between people, or between a person and himself or the world around him, have a dimension that is absent when, instead of people, we are dealing with (say) computers, however sophisticated they may be. This is also where the privilege of *responsibility* for our actions and for the motivations behind our actions comes into play for each and every one of us. This responsibility is in no way removed by the fact that we often resort to the convenience of hiding our own motivations.

To return to the case in point as an illustration, if I was able to play the great soul while using my power to torment a comrade who had done me no harm, it was because behind the surface 'good faith', I had chosen an attitude of crass, phenomenal bad faith, which was as obvious at the time as it is now, forty years later. It was a *choice*, which nothing forced me to make, and which amounted to turning a blind eye to the tensions and aggression that had built up inside me (while, of course, claiming to have nice 'non-violent' ideas), and 'quietly' (sic) venting them on the scapegoats at hand. Such violence - that is to say, almost all the violence and abominations that are rampant in the human world - can only take place, and its secret function can only be fulfilled, on the *condition* that it remains rigorously secret (even though it is obvious); on the condition, therefore, that we allow ourselves to be taken for 'bladders for lanterns', that we play a crude double game with conviction, obscuring our most elementary faculties of knowledge for the sake of the cause. It is true that we are encouraged to do this by the air that has always surrounded us, while we have always seen those around us eager to sanction by their consensus the subterfuges, however crude, at the service of fictions that had their assent. And my own subterfuge, in the cases I have mentioned, did indeed have the assent or tacit encouragement of those around me, without which I could not have maintained it and continued my game.

Taking responsibility for a situation, on the other hand, is no more and no less than approaching it *in good faith*, in the full sense of the word, i.e. without taking advantage of the ease with which we can hide the obvious ins and outs of the situation from ourselves by using crude subterfuge. It also means, quite simply, making use of our healthy faculties of perception and judgement, without taking care to hide them for the needs of one cause or another. This may seem strange, but it is also simple and obvious: when we approach a situation with this kind of attitude, an 'innocent' attitude, it is immediately and profoundly transformed, however confused and knotted it may have seemed. Or to put it better, if it was indeed 'knotted' and hadn't moved a muscle for a long time, it's because we ourselves were preventing it from evolving, from 'flowing' according to your own nature; that we were obstructing its spontaneous movement, following the example of all those who have surrounded us since our earliest childhood. All we have to do is *stop* stiffening up, *stop* obstructing, for things that seemed frozen to start moving again,

so that what was stuck can be unstuck, and so that the hard accumulated tensions can finally be released and resolved in a new, broad movement.

This 'ease' or 'convenience' that we have, with everyone's encouragement, of 'mistaking bladders for lanterns', and thereby blocking what is made to sink, is not in fact 'comfortable' at all. The cushy interior immobility that it allows us, we pay an exorbitant price for - that of an interior tenseness, and the astronomical investment of energy to maintain both this tenseness, and the bladders-lanterns fiction. Having said that, everyone does as they please, at all times - that's our privilege. And at every moment, by w h a t we do, we *sow*, for ourselves and for others. And the harvest of what we sow begins in this very moment.

(<sup>143</sup>) Perhaps it is time to return to this 'foreground' of the Burial, that is to say to the ins and outs of the role played in it by the Grand Officiant at my funeral, my friend Pierre. I had already come back to this a week ago, in the note 'Patte de velours - ou les sourires' (n° 137, dated 7 December), only to digress again with this digression (over five consecutive notes) on 'la griffe' and 'le velours'. I feel that this 'digression', like many others that preceded it, was not in vain.

If I was led to do so, it was precisely because the most striking apparent feature, perhaps, in the way my friend took on his role, was the persistence, without any hint of breaking away at any point, of the purest 'velvet paw' style, in the service of an unfailing antagonism that never says its name (\*). Another salient fact is that, behind the pleasant, well-tempered appearances of a knowing smile and friendly airs, my friend often expressed an unequivocal, and apparently gratuitous, intention to *harm* or *hurt*, either towards myself or towards one of those he considered to be 'mine' (in terms of mathematical work). I elaborated enough on concrete facts in this sense in the first part of Burial for it to be useful to return to them here. It is a question of

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(\*) As I have already had occasion to point out elsewhere, the fact that antagonism, or a deliberate intention to reject or deride, 'never says its name' is in no way peculiar to our friend Pierre, but (as far as I am aware) applies to *all* the participants in the Funeral, without exception. So in this 'funeral of Yin' through derision, the underlying note in each of the participants (and as befits such a funereal occasion) is itself - yin!

For the "occult" nature of the Burial, see also the note "The Gravedigger - or the entire Congregation", n° 97.

of malevolence (strictly confined to the domain of scientific activity, it would seem), of '*violence*' in the strongest sense of the term, even though it remains rigorously hidden - the claw always drowned in exquisite downy silks. And this violence, this malevolence, has all the appearance of the most disconcerting *gratuitousness* - it seems to be exercised for the sole pleasure of harming and injuring.

As is the case whenever we are confronted with such a situation, it seems so unbelievable that we often hesitate to believe the testimony of our healthy faculties (\*). Denying this evidence, as is common practice, is one of the countless ways of not accepting a situation, and thereby perpetuating it. It is surely preferable to focus on the issue, to look at it from all angles, perhaps in search of aspects that may have escaped us and that provide an approach to it, that make it possible to integrate it into one's own experience. It seems to me that there are very few of us who have not at some point in our lives experienced such unjustified malevolence - and agreeing to remember this is already a possible step *towards approaching* a factual situation, which our normal reflexes would encourage us to get rid of straight away. It's surely also a good idea to probe further, to see if there isn't some hidden grievance that is the cause and springboard of violence that seemed to have no cause - just as it's also a good idea, if need be, to recognise bogus 'grievances' for what they are, of the kind (for example) that I myself have practised, knowing that so-and-so is an awful character who deserves no mercy etc. - to see if it's possible that these 'grievances' are the cause and springboard of violence that seemed to have no cause.

But in the case in point, however hard I probe, I can see nothing that remotely resembles a *grievance* that my friend might (rightly or wrongly) harbour against me, or against any of those he has chosen as the target of malice. He himself never suggested anything remotely to that effect; not to mention the fact that, when probed by me on more than one occasion about some of his actions which had left me speechless, he never admitted that there could have been in him the slightest hint of enmity towards anyone. I ended up feeling a secret gratification in him, during my occasional encounters, when he gave me his good reasons, all objective, with his very own air of innocent surprise, a little amused... In short, I entered into a game that he played as he pleased and with an intimate satisfaction that took me a long time to perceive. (And yet he was far from the first person to make me squirm in this way!)

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(\*) On this subject, see the note "The robe of the Emperor of China", no.° 77<sup>¶</sup>.

I've finally got off this merry-go-round, better late than never (\*\*)!

If, on the other hand, I probe myself, reviewing my relationship with my friend since we met nearly twenty years ago (in 1965), I find no trace either of anything that, at any time, could have been the cause of any grievance against me. In the conventional, superficial sense of things, I can say that during all that time, and more particularly in the first five years of close contact, I 'did him nothing but good'. But this observation immediately reminds me of another, less superficial one - that of a *complacency* in me towards him, which emerged in the course of reflection in the notes "Being apart" and "Ambiguity" (n° s 67<sup>①</sup> and 63<sup>②</sup> ). It is clear that this complacency was by no means 'a good thing' for him - and also, that my brilliant young pupil and friend's attitude towards me developed in close symbiosis with my own attitude, and more particularly, with this complacency. It's not impossible, even, that at some unconscious level this complacency was (not only perceived, which is obvious anyway, but also) felt by my friend as a 'grievance', as a scenario perhaps too well known and replayed over and over again, in his youth as a child who was a bit of a prodigy on the edges, and which was served up to him (albeit discreetly) once again. He had perhaps naively believed that by setting foot in the 'big mathematical world', everything would be different from what he had known - and then no, it was still the same tobacco 1 (And by his own deliberate choice, today it's still the same tobacco, and even bigger, which is more. . .). )

I'll probably never know exactly what's going on here. It's not my job to get to the bottom of it, assuming I'm sharp enough to do it on my own. If there was a 'grievance', it was in any case, at most, a 'supporting' grievance, which helped to set 'something' in motion - a certain 'j e us' driven by a force of an entirely different magnitude; a force whose presence I have long f e l t , but whose nature remains enigmatic to me. Before leaving this 'foreground' of the Burial painting, I would at least like to try and surmise the nature o f that force.

There is clearly a *greed* to supplant, oust and erase, as well as a desire to *appropriate* the fruits of others' labours and love affair with mathematics. For all that, it is clear to me that this is *not* a simple 'bulimia' of prestige and admiration,

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(\*\*) This was in 1981 - the 'second turning point' referred to in the note 'Two turning points', No. 2.<sup>③</sup>  
66.

It is the desire for honour, or even power, that is the mainspring of his role in Burial. How often, in the course of my reflections on this role, have I been struck by the extent to which his *obsession* with burial meant that he was burying himself! Thanks to his exceptional gifts and equally exceptional circumstances, he had everything he needed to far surpass his master and to leave a profound mark on the mathematics of his time. All he had to do was let his inner child play to his heart's content, without bothering him with instructions, barriers here and forbidden directions there - simply taking care of what was necessary, strictly housekeeping. In doing so, and without having to push, pull or elbow, the 'boss' in him, no more or less greedy than in anyone else, would certainly not have lacked all the imaginable marks of prestige, admiration, honours, and power to boot, not even knowing what to do with them, when it's the kid who's having the time of his life, leaving the boss little time to play the boss...

Decidedly, in simply 'utilitarian' terms, it was a bloody bad business to get embroiled in a funeral that had been sticking to him for fifteen years or more, and that was going to stick to him for the rest of his life, if the cumbersome deceased hadn't suddenly disrupted the ceremony by lifting the lid of his coffin when (as expected) he was least expecting it! (All bets are off as to how this unfortunate incident will affect Pierre's future bets... . ) Or to put it another way, my friend had the makings (in his intellectual capacity, at least), and the credentials, to be in mathematics a Peter the Great, and he chose instead to play the little Peter. That sounds like a bad deal indeed, at least if the aim was really, above all, to satisfy vanity.

(<sup>144</sup>) (15 December) Towards the end of last night's reflection, I felt the slight uneasiness of someone who, with a peremptory air, serves up a line of reasoning of impeccable logic, while dismissing the vague feeling that there is nevertheless something wrong. This 'something' appeared, in fact, as soon as I stopped writing. One vague way of putting it is this: the 'logic' of the unconscious, the logic that governs our most crucial choices, is in no way that of ordinary conscious reasoning, and even less that of 'orthodox' reasoning. In this case, the perception I have of the 'assets' of the young man Deligne in the second half of the sixties (let's say), and the weight I give them

(which is at least the same as the weight given to them by any reasonably well-informed mathematician) - this perception and this weight (which I would be tempted to describe as 'objective') bear no relation to the dispositions and feelings of the person concerned himself. This is particularly true of his own abilities, which are certainly the key asset of all those at his disposal.

I have the impression, however, that at the conscious level at least, and with all the modesty that modesty demanded, my friend had integrated and made his own the flattering echoes that had been coming back to him for a long time, no doubt, about his unusual gifts. But there is no doubt in my mind that at a deeper level, where the great choices that dominate a life are made without words, this 'objective' version of things became (and still remains today) a *dead letter*. In its place, there is an insidious *doubt*, which no 'proof' of value (or of superiority over others...) will ever uproot - a doubt all the more tenacious because it remains forever unformulated. I saw it in my friend, just as I've seen it in others less brilliantly gifted, and it's the same. This doubt is the obstinate messenger of an *intimate conviction*, which also remains unspoken, even more deeply buried than this doubt itself: an in-time conviction of powerlessness, fundamental and irremediable. *It* is also this 'self-contempt' that I spoke of at the very beginning of Harvest and Sowing, in the context of a reflection that remained 'general' (\*). It reappeared, again in an impersonal context and under a different guise, a month or two ago, as a 'feeling of cracking' (\*\*) - this diffuse feeling that I had first noticed in myself, the day after I discovered meditation. And several times during the reflection on the Burial, there was a sudden and acute perception of this "intimate conviction of powerlessness" in my friend, throwing new light on a situation that seemed to defy common sense.... . (\*\*\*)

I know that this intimate conviction, in my friend or in any other, is itself like the *shadow of a knowledge* - of the knowledge of a 'crack' that does indeed exist, of a 'mutilation' suffered, and sanctioned and maintained to this very day by its own acquiescence. The shadow does not, however, restore the knowledge from which it comes, beneficial in itself like all knowledge - it is rather like a caricature of it.

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(\*) See "Infallibility (of others) and contempt (of self)", n° 4.

(\*\*) See note "The half and the whole - or the crack" (no. 112), 17 October.

(\*\*\*) On this subject, see the note "Le renversement (3) - ou yin enterre yang", where (among other things) certain such "sensitive moments" of reflection are discussed.

a deformed, gigantic sculpture, a scarecrow version. What distorts knowledge in this way and renders it unknowable is a *fear* - the very fear of making contact with this knowledge itself, of letting it rise from the depths where it has always been repressed, and of assuming the humble reality of which it is the faithful reflection.

Getting in touch with this dreaded knowledge, getting in touch with a fully conscious view of this reality known in its deepest layers, and shunned - this is what it really means: getting back in touch fully with that in us (whether we call it "the force", or "the child"), "believed lost and dead for a long life". For it is certainly this strength and nothing else, the strength of childhood, that enables us to take on the knowledge of that in us which is cracked, mutilated, paralysed. And taking it on also means getting back in touch with that *other knowledge*, which predates our mutilation and is even more essential than it: the original knowledge of the presence of that 'strength' that lies within us, a strength that is neither muscle nor brain, and which contains both.

Strangely enough, this lost knowledge of the presence within us of this 'force', this *creative power*, as an obvious, indestructible part of our true nature - this knowledge is rediscovered through the discovery and humble acceptance of a *state of powerlessness*, resolved by this very acceptance. The knowledge of a state of powerlessness covers and conceals the even more deeply buried knowledge of our creative force. This knowledge is like the key that opens the door to our creative strength, and in truth the two are inseparable, like the front and back of the *same* knowledge (\*), both objects of the *same* fear.

When I talk about 'the force' buried in each of us, I'm not talking about something abstract and vague, some verbal subtlety of a 'philosopher', or a psychologist who's a bit of a philosopher around the edges. It is this strength that allows you to 'do maths' (or 'make love'...) like a child breathes - that is, without prudently obliging yourself not to leave the wake left by your predecessors, and to repeat with application the gestures and recipes (or the clichés...) that were theirs; and it is also the strength that gives you courage and humility, in

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(\*) In this image, of course, the '*right side*' is the knowledge of the state of powerlessness, of inauthenticity, of the 'crack', while the '*left side*', even more hidden, is the knowledge of our undivided nature and our creative power. Over the years I've seen again and again that it's the '*other side*', the more deeply buried knowledge of the two, that is the object of the greatest fear, and the most vehement denials. It is not so much the familiar and anodyne state of being a trained and (more or less) 'learned' monkey that worries anyone, but rather the innocence of the child who feels things as they are and calls them by their name, and who does and says as he feels, without shame at being different from what is 'expected' of him.

in your own home as well as in that of others, to call a spade a spade and not to take the bladders for the lanterns, even if in doing so you go against the most established consensus, or the most inveterate and well-honed mechanisms within yourself ( )\*

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(\*) (16 December) The action of the creative force in everyone, the force of renewal (or "child force"), can be recognised by its fruits, both in the works of the hand or the mind, and in the facts of everyday life, in our relationship with others and with the beings and things around us. I've noted again and again that creativity in everyday life is much less common than creativity through 'works' (in the conventional sense - that is, tangible 'products', shaped by the hand or mind, of creativity).

The presence of continuous creativity in a person's life is the sign of a continuous 'contact', however fragmentary and imperfect, with the creative force within him or her. This is something different from the mere presence of 'gifts', and of a continuous investment of energy to take advantage of them, expressed in a more or less important production, also more or less 'rated', but which does not in itself have a creative virtue, a virtue of renewal.

In my intellectual quests and particularly in my mathematical work, with modest 'gifts' (but considerable investment), it seems that this 'contact' with the force within me, that is to say, the tacit and profound knowledge that I had of it, was almost intact. In other words, I was pretty much 'functioning' on all my (creative) resources in this (admittedly very fragmentary) area of my life, with virtually no loss, diversion or blockage of energy by the usual 'friction effects'. One of the most common of these is a certain pusillanimity, which so often makes us deaf to the inner voice telling us what we have to do, when what it's teaching us is precisely 'new', that is, leading us down paths that only we tread. This kind of inhibition, virtually absent from my relationship with mathematics (and, it seems to me, more and more so as the years go by), has on the other hand existed\* in other areas of my life just as much as in anyone else's, and in particular, precisely in the area of 'everyday life'. It's not unusual for me to detect this kind of inertia, or laziness, in my day-to-day life.

Coming back to mathematics, I see a sort of reversed relationship in my brilliant ex-student. He has 'gifts' that have always amazed and enchanted me, in no way comparable to my own. (It's true that the longer I live, the more I see that it's by no means 1 to the really essential thing, to do innovative work in science or elsewhere; see on this subject the reflection in the note "Yin the Servant (2) - or generosity" (n° 136).) His investment in mathematics is considerable, as was mine in the past, and from a young age he has benefited from exceptionally favourable conditions for the development of his gifts, and for the conception and elaboration of a work that is commensurate with them. Twenty years on, I'm still waiting for this work and I'm still not satisfied! There is surely a certain 'contact' with the creative force within him, attested by the beauty of the things he has made - but this contact is disturbed, tormented. My friend's relationship with his work, and even within his work itself, is one of conflict - the work becoming, more and more over the years, an *instrument in the hands of* the 'boss' to satisfy *his* cravings, alien to the child's thirst for knowledge and discovery.

The first example I've come across is a good one - it's sure to make the heart of any young (or even not so young) glory-loving researcher beat faster. Who wouldn't want to be the intrepid pioneer of sciences still in their infancy, and as such feature prominently in all the textbooks, like Kepler, the father of modern astronomy 1 But when it comes (as Kepler and others did) to tenaciously spin your own yarn in solitude and in the indifference of everyone (if not disdain or hostility), for thirty years or even just one - then suddenly there's no one left! You want to be in the textbooks, in good company in fact, but you're also *afraid of* being alone, if only for a year or even just one day. But those who 'know' the presence of the force within them (and in order to know it, they have never had to talk about it, either to others or to themselves...) - they also know that they are *alone*, and that being alone does not cause them any anxiety. And knowing whether he'll be in the textbooks is the least of his worries - especially when he's working.

It so happens that this same Kepler, in his very work, "went against the best established consensus" in his science, and established for millennia, no less. In his day (when the Inquisition still existed) this was even more inconvenient than it is today, when you stand a good chance of losing your job, or not finding one, but without risking ending up on the stake. To come back to Kepler, I don't know what he was like in his everyday life, with regard to the 'best established consensus'; perhaps he kept his nose to the grindstone, like everyone else. What is certain is that today, as in the past and since time immemorial, there aren't many people who would deviate even a hair's breadth from the consensus, and it's probably always the same tobacco - the *fear of being alone*, the flip side of a deep and almost universal human need: the need for approval, for confirmation.

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I doubt that such a relationship of conflict can be resolved without first having been assumed - that is to say, before anything else: recognised. At least, not once in my life have I seen such a thing happen, without the other person, which is what led me to write that the knowledge of our powerlessness was 'the key' to regaining full knowledge of our creative power, and thereby also, fully, that creative power itself. In my mathematical work, the question has not arisen, because there has been no deep blockage in this work, equivalent to partial powerlessness, which would have made me 'operate' on only a small part of my possibilities. On the other hand, the question arose for me as it does for everyone else, at the level of my daily experience, in my relationship to others and to myself, to my body and to my body's impulses. It was at this level that I experienced, over and over again, that becoming aware of a blockage, of 'powerlessness', was indeed the *key to* freeing imprisoned creativity.

by others (and would there be only *one* who approves and confirms)... (\*)

(<sup>145</sup>) But I've lost my train of thought again! I had started from the realisation that my 'reasoning' of last night was off the mark, when I wanted to 'get across' this conviction of mine, that my friend's motivation for playing the role I know in my Burial, and in the way I know, *was not greed* (for prestige, admiration, honours, power). It's true, of course, that by swapping a child's impulse for a *role*, he'd made a 'bad deal', even from the point of view of 'returns', prestige and so on. But that proves absolutely nothing. Such 'miscalculations' are moreover the almost absolute rule, it seems to me, and by no means the exception, in the choices (at the unconscious level) of our main investments and options. But even though the reasoning is worthless, I have no doubt that what I wanted to convey is the perception of a reality: that it is *not* this very real greed, which has taken a growing and truly devouring part in my friend's life, that *it is not this greed* that constitutes the *nerve* in this role played by my friend, as the key figure in the implementation of my funeral.

If I try to take a closer look at this very clear-cut feeling (without there being any question of 'establishing' its validity!), I come up with this: it's this *gratuitousness* in the antagonistic or malevolent act, a gratuitousness that has often left me speechless, that doesn't 'fit' at all with the all-purpose 'explanation': greed. As far as prestige, admiration and honour were concerned, at least, and even 'power' in the ordinary sense of the term, my brilliant ex-student and friend gained nothing, either at the moment or in the longer term, by showing his master the 'discreet and delicately measured disdain' of which he had the secret; or by using the same disdain (perhaps less delicately measured) towards a researcher of lesser status than himself, or towards his present or past work, in such a way as to discourage someone whose confidence in his own judgement was not as firmly rooted as it was in me; or for another, who had persevered courageously against the general disdain of which my friend set the tone, by robbing him of the fruits of his perseverance against all odds. While it is true that in this last case, as in others, my friend pretended to appropriate the fruits ripened by others in solitude (and sometimes in the disdain of his

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(\*) Here I am reiterating, by another means, observations that had already appeared in the sections "The forbidden fruit" and "The solitary adventure" (n° s 46, 47), and also, in passing, in the note "Acceptance" (n° 110).

seniors), this 'benefit' (in the style of 'Pouce' (\*)) is so derisory, when you think of *who is* appropriating it, that the 'explanation' put forward goes up in smoke!

As far as I'm concerned, I know for a fact that it's not that kind of profit that's the 'nerve' of such appropriations. On the contrary, I sense in them the *intoxication of a certain power* - a power that is more delicate, and no doubt more exhilarating, than power in the conventional sense, as a man of science and importance commonly exercises it by sitting on committees, councils, juries and the like, by directing an institute, or the research of brilliant young researchers, or by speaking in the ear of a minister. The 'intoxication' of which I speak appeared (for the first time in the reflection) in the note 'La Perversité' (n° 76), when I suddenly find myself confronted with "an act of *bravado*, a kind of intoxication in a power so total, that it can even allow itself to display (symbolically...)... its true nature of 'perverse' spoliation of others".

It was a dazzling act of bravado, ostentatious and yet at the same time *occult*, informal, slipped in there out of the blue, with even a semblance of an explanation for this strange name 'perverse bundles', what could be more natural? We'll shed some light on this in three words, plus a short list of 'things that should have found their place' in our modest but brilliant article... . (\*).

Once again, I recognise the purest "velvet paw" style, aka "Pouce! - and behind the uniformity of a *style* that has become familiar to me in more than one person, I also sense the *common nerve*: this imperious, all-consuming *thirst* to wield power; a *certain power*, and in a certain mode - the power of the cat over the mouse, when it plays its Great Game with that perfect grace (which only the mouse is unable to appreciate to its full value), and with "the most exquisite delicacy" that's for sure - or the power too of a clever wife over her big dodo of a husband...

Based on the case in point raised by my friend, I have already been led to talk about the 'style' in question, and its meaning, in the general context of couples of all kinds. This was in my thoughts a week ago, in the note "Le renversement (4) - ou le cirque conjugal" (n° 138, 8 December). That's where the 'nerve' of the 'velvet paw' game (aka 'Thumb!') appears for the first time, with all the clarity it deserves, as a *game of power*. Like

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(\*) See the notes "Pouce !" (n° 77) and "Appropriation et mépris" (n° 59<sup>2</sup>) about this style of appropriation by my brilliant friend and former student.

(\*) See the note "Le Prestidigitateur" (n° 75 ).<sup>22</sup>

a game of power, however, of a very particular nature: the fascination of the game for those who play it, its often all-consuming charm, consists precisely in the *hidden nature of the power that* is exercised through it, this 'neither seen nor known' nature, which allows you to play the other (of him, never *with* him. . . ), to make him turn in circles as you please, always leading the dance, while the other follows stumblingly blow after blow, in pathetic response to these small blows carried by invisible cables. . . ), making him turn in circles as he pleases, always leading the dance, where the other follows stumblingly blow after blow, in pathetic response to these little blows carried by invisible threads that are wielded at whim and pleasure. . .

It will have sufficed for me to write down in black and white what I have been obscurely feeling for years, without ever having bothered to formulate it clearly - it will have sufficed for me to make this short effort to condense into words what had long remained diffuse, so that what only yesterday appeared 'enigmatic' to me (viz, the nature of a 'certain force' in such and such a friend), suddenly opens up to me its obvious meaning 1 This 'force' in him, or (as I wrote earlier) the 'nerve' of such acts that may seem 'inexplicable' (or even 'beyond comprehension'), I had already clearly identified in the reflection of 8 December. But while the starting point for this crucial reflection was indeed a certain 'enigmatic' game played by my brilliant friend, it was *another* experience, richer and more intense than the one associated with his person, that fuelled this reflection; an experience that had been fully assimilated (or not by much), and which gave me an already-formed knowledge that the more epidermal experience of my sporadic relationship with my friend Pierre could not have communicated to me at the time.

Admittedly, it was this experience that I ultimately had to understand, and thereby fully accept; and if I launched into a digression on the 'couple's carousel' without any inner reservations, it was because I felt that this carousel had something to tell me about my relationship with my friend. His thoughts continued to linger in the background, like a discreet background note.

However, the two did not fully 'come together' that day, or in the days that followed. No doubt the moment was not yet fully ripe. For the junction to take place without reserve or effort, with the ease of the obvious, I first had to 'clear the ground', by obstinately and unhurriedly following, one by one, the most compelling

associations that demanded my attention. I didn't rush things, and\* I knew that this was what I had to do - attend to what was calling me insistently, without letting myself be distracted by a 'subject' or a 'thread' (of thought), or even by a programme to complete.

While I'm weeding and hoeing, the forces of earth and sky are at work. When evening comes, all you have to do is collect the ripe fruit that falls into your open hand to

welcome him...

(<sup>146</sup>) (17 December) It seems to me that with the reflection of the day before yesterday, there was a kind of unblocking of an understanding that had remained indecisive, a little stunned, in the face of a quantity of facts and intuitions piled up before me in a rather amorphous heap - like a jigsaw puzzle of which I had only managed, as best I could, to assemble a few pieces here and there. Now I feel as if I've stumbled upon 1 neuralgic 'piece' of the unknown picture that needs to be pieced together, around which the others will finally fall effortlessly into place. In any case, I have no doubt that I have touched the 'nerve' behind the role played by my friend Pierre in the burial of the master and his (more or less) faithful followers, and at the same time, the 'nerve' of his relationship with me, the deceased master.

This craving to play with a certain power, discreetly pulling invisible strings with a canny air - this craving must surely have been present long before I met him, unknown to him and to everyone else. If I didn't see it manifest itself in the first few years we knew each other, before the episode of my departure (in 1970), it was undoubtedly because in those years of intense learning and the blossoming of a delicate and powerful thought, my friend's energy was totally absorbed elsewhere. The conditions were ideal, in fact, to serve as a springboard for his exceptional abilities. The episode of my departure, first from the institution of which we were both members, and then (in the year that followed) from the mathematical scene, was a crucial turning point not only in my own spiritual adventure, but surely also in his. It was this episode that suddenly gave him the means of power that only the day before he would not have dared to dream of: first, the power to 'oust' from the scene an ex-master who was taking up a great deal of space there, and from whom he had previously confined himself to discreetly distancing himself (\*); then, when it became clear that the ex-master was disappearing from the scene, the even more exhilarating power to make him vanish without leaving a trace.

(\*) On the subject of this concern to distance oneself, then to oust, see the notes "L'éviction" (n° 63) and "Frères et époux - ou la double signature" (n° 134), as well as the sub-note (n° 134<sub>1</sub>) to the latter, and finally the section "La récolte inachevée" (n° 28). (\*\*) See, on the subject of the liquidation of a "School" and the "chainsaw" effect, the notes on "The heir", "The co-heirs... .", ". . and the chainsaw" (n° 90, 91, 92) and the first four notes of the Cortège "Fourgon Funèbre" (coffins 1 to 4) n° s 93-96. On the subject of the vision that was buried, see the two glimpses (in two different lights) given in the two notes "My orphans" (n° 46), and sub-note n 136<sub>1</sub> to the note "Yin the Servant (2) - or generosity".

Note that in the main text, the expression "and in so doing.... ." ("... to cut off. . . the development of a vast

programme...") is not. adequate. The liquidation of a School was the *first* "coup de tron-

to trace a certain School which bore the name of the late master; and in so doing, finally, to cut off, in all its main branches (except the one on which he himself was per- chased), the blossoming of a vast programme in the service of a vast Vision, which he himself had nurtured for a long time (\*\*).

The meaning of this great turning point in my friend's life appears to me as a kind of reversal in the mutual relationship of hegemony between the two dominant forces in his person, those which seem to me to take precedence over all the others: mathematical passion, and the 'craving' for the game of power ('with a velvet paw'). The first of these forces is essentially 'impulsive' in nature (\*), the second is egotistical, 'acquired'. Before the turning point, it was the drive for knowledge that dominated my friend's life (as far as I knew), while the drive for power was more or less dormant, in a state of vacancy. At the end of a vertiginous social ascent in the space of a few years (\*\*), and in a situation that suddenly presented a draconian *choice*, it was the temptation of power and its secret intoxications that prevailed (handily, I think, and without any desire to fight) over the passion for knowledge. The latter does not disappear from the scene, but from now on it is the vassal and humble servant of the craving, an *instrument* in the hands of the latter. Passion (alias "the worker") goes about her work under the jealous eye of Fringale, alias "the boss", who never leaves her side. As the worker has good tools (not all of which are forbidden to him) and good hands, even if he's kept short in this way, he still manages to maintain production and the reputation of the company. But it's not the same as it used to be, when the worker (who was a bit of a child) got his kicks all day long, while the boss was far away and only came to work once a season!

The subsequent evolution seems to me to be more quantitative than qualitative. It's the gradual evolution of a certain *tactic* on the part of the boss, following a style which remains uniform, while the relationship between the boss and the worker doesn't change a bit. This type of boss is cautious by temperament, and only likes to venture where he is sure of winning. To do that, . you have to be sure

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çonneuse" radical to "cut cleanly" a set of main branches, but not the last one (as shown in particular by the notes cited, n° s 93-96).

(\*) Whether the mathematical passion is 'impulsive in nature', whether it is an expression of the 'child' (alias "This is part of the common lot (from which I was no more exempt than anyone else) in the relationship between 'the worker' and 'the boss'.

(\*\*) On this subject, see the note "L'ascension" (n - 63 ).<sup>¶</sup>

of the field - or, alternatively, to be sure of the tacit approval of the 'whole Congregation', starting with the smaller group of the deceased's ex-students. The evolution of the personal relationship maintained with the latter, against all odds, is a faithful reflection of the evolution of the 'knowledge of the field'. There is a gradual *escalation* in the boldness of the game of power and contempt, culminating after twelve years (in 1981) with the prowess of the Col-loque Pervers, where all restraint (and even, all caution) are blithely thrown overboard in the general euphoria (\*). It took twelve years for my friend to realise that the ground was so fertile that there was no need to be cautious: anything goes. The time was ripe, decidedly, to finally bring out the secret weapon, the *motives* - exhumed under an alternative paternity the following year (\*\*).

I don't feel motivated to retrace here the successive steps of this twelve-year climb, even though I have everything I need to do so. That would be the work of a chronicler, as I did enough of it in the unexpected 'investigation' pursued in the first part of L'Enterrement (or La robe de l'Empeur de Chine). These 'steps' of an escalation seem to me like so many *probes*, launched by my friend in the direction of a mute con- grégation, with each time the same answer: he could go i For nearly fifteen years, Elle has been his mute ally and his guarantor, while he was, without knowing it or caring, his docile instrument (\*\*\*)�.

(<sup>147</sup>) I don't know whether this craving in my friend is directed at others as well as me, and at younger mathematicians in whom he smells my "odour". I haven't heard anything to that effect. On the other hand, it is clear to me that it was through his relationship with me, and thanks to a situation that is certainly unusual in the scientific world, that this propensity in him that had been living in the shadows became, overnight, a devouring craving. During the episode when I left, when he explained to me, with all the appearance of seriousness, that he had given his life, totally, to mathematics (\*), he undoubtedly 'believed' what he was saying, and I myself, a little stunned though I was, did not think of putting his words into practice.

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(\*) On the subject of the "Perverse Colloquium", see Cortège VII "Le Colloque - ou faisceaux de Mebkhou et Perversité", notes n° s 75-80.

(\*\*) On the subject of the exhumation of motifs, see the notes "Memory of a dream - or the birth of motifs", and "L'Enterrement - ou le Nouveau "père", n° s 51, 52.

(\*\*\*) see the note "The Gravedigger - or the entire Congregation", n° 97.

(\*) On this episode, see the note "Brothers and spouses - or the double signature" (n° 134).

words in doubt. And yet, if I had had a finer ear, or to put it better, if I had had the maturity to listen and trust a 'finer ear', which does exist in me as it does in everyone, I would have known that what he was telling me about himself might have been true the day before, but that it wasn't true that day. It was a noble reason given for a dubious act, an act that neither he nor I then had the simplicity to face up to, despite its dazzling meaning. It was *something else* than such a passion, which had seized the reins of his life in those days, never to let go until today.

So it was my person, or rather something in my friend's relationship to my person, which (given the right opportunity) acted as the trigger for this drastic change in the nature of the dominant force. In the context of his life, and in the sense and direction of his investment in mathematics, this is the moment to remember the famous 'vo- lets' or 'aspects' of Burial, highlighted in the reflection of 13 November (in the note "Rétrospective (1) - ou les trois volets d'un tableau", n° 127), and in the note that follows it ("Rétrospective (2) - ou le noeud du tableau", n° 127<sup>¶</sup>), volets that have had time to get a bit lost along the way since then. I pretended to remember a little in the note from ten days ago, "Patte de velours - ou les sourires" (n° 137, 7 December). In particular, I reconnected with the intuition of that eternal role of 'adopted pare' that I had to play with my young friend, and which, it seems to me, has remained active in him to this day. On the occasion of this reflection, I reiterate an unreserved conviction, which must have formed and taken shape little by little over the past six or seven years at least (perhaps even longer): that it was 'around this aspect (the paternal aspect in his apprehension of my person) that the conflict was woven - a conflict that already existed in him long before he ever heard my name spoken.(So that's the famous 'Superfather' part, while the 'Supermother' part is still in limbo, for the moment at least).

In fact, it was only a page later that the famous 'smiles and velvet paws' style made its first rapid appearance, as an object of attention. In the days that followed, the associations that followed seemed to distance me from my friend, as well as from the hidden 'paternal' aspect of the role my friend had assigned me in his life. This aspect has not been mentioned again until today - you can't think about everything at once, let alone talk about everything at once! In terms of thinking, however, it seems to me that somewhere, in the background, indistinct but nonetheless present and active,

the thought of this paternal aspect had to be present, it had to act as an effective and discreet stimulus to this long digression on a 'claw in velvet' style. After all (I'm making this clear to myself now, after the event, but it must already have been there in the form of a diffuse yet peremptory motivation...), the figure of the 'father' is in no way foreign to this famous style, quite the contrary. It could even be said that the very first person in a little girl's (or boy's, never mind boy's) life that this style gently and smoothly (though not always tenderly) leads is none other than Dad! And as long as the innocent little girl (or boy) adopts and makes his (or her) own this style and this know-how - which must become second nature at the same time as learning to speak, or almost - the very first guinea pig and beneficiary, no doubt, will be that same big jerk Dad!

More often than not, when I saw this game being played, it was accompanied by the hidden anger of a grudge, as well as a deliberate attempt at derision. And of course, in most families, there is no shortage of reasons to bear a grudge against the father, or even those cleverly suggested (or even created from scratch) by the loving wife. In my friend, however, I never sensed any such hint of resentment or spite. When I saw him hurt or harm 'for pleasure', it was *really* (as I felt) *for pleasure alone*.

not (I think) the pleasure of the suffering or humiliation itself that he inflicted, but rather the secret intoxication of exercising, at his own pleasure and in that particular style in which he was a master, *a power* - more exhilarating or more piquant still, no doubt, by this ingredient with a '*perverse*', '*forbidden*' connotation (harming, or causing suffering *for pleasure*), and yet one that *he* could indulge in, delicately and casually and apart from that, to his heart's content...<sup>(\*)</sup>

(<sup>148</sup>) (18 December) With last night's reflection, I feel that this 'foreground' of the painting of The Burial, centred on the relationship between my friend Pierre and myself, continues to emerge from the mists of the misunderstood and the confusedly felt. For some time now I've been faced with the task of inserting a certain 'Superpère' section into this foreground (among others), and although I hadn't really formulated it clearly, this section didn't really seem to want to fit in very well. If there's one student I've always felt completely 'at ease' with me, not at all tense and at no time that I can remember, it's him! I hardly ever

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(\*) See in particular, as a detailed illustration, the note "La Perversité", n° 76.

It is true that I remember our very first encounters, and I cannot say that there was not in him that tension, often barely perceptible but nonetheless very real, which arises when we approach for the first time someone invested (in one capacity or another) with authority or prestige, and towards whom we have a particular expectation. It is at least probable that such a tension must have been present, and that I paid no more attention to it than to any other young researcher I happened to meet. What is certain is that if there was any tension on first contact, it very quickly disappeared without a trace. To use the image that appeared last night, he was as at ease with me as a child (or ex-child) is with a sugar daddy whom he has never had to fear, and who has rarely refused him anything.

I thought about the situation again last night, after I'd stopped writing. It now appears to me that my friend's relationship with me operated on two very distinct levels, and (it would seem) without mutual communication. One of these levels, which undoubtedly became established in the weeks and months following our meeting, was that of the personal relationship - that of the 'sugar daddy', in other words, kind as can be, not at all impressive, himself a bit of a child around the edges, including in his work, to such an extent that there is an almost maternal nuance about him, which I've already had occasion to mention once or twice: that of a child, giddy and a bit boisterous, and above all as naive as any. It's also true that in terms of his work, and objectively speaking, he really had no reason to be impressed. Of course, I knew a lot of maths that he didn't (and which he learnt in a few years, by playing games), and above all, I had an experience of mathematics that he still lacked. But he had a speed of assimilation, and an acuity of vision to quickly recognise himself in confused situations, which often amazed me, and which I lack. If I myself sometimes impressed colleagues, it was above all because of the uncommon *slowness* that I have in my work, due above all, I think, to a certain approach that I have to mathematical work. But there was certainly no reason for my brilliant young friend to be impressed, when his own slaughter, as long as he started writing (which he didn't mind at all), was far more effective than mine.

This level of my friend's relationship with me, the 'sugar daddy' level, seems to me to include the whole of his conscious image of me, and a good part of his unconscious image too. It's this image, it seems to me, that elicits in response, in ways that are undoubtedly

established since childhood, like a reflex urge, that of the famous game of 'claw in the velvet' - a game which requires us to be entirely 'at ease' with our partner, entirely 'sure of him' and therefore also sure of ourselves (\*). This is the level of complete assurance, based on an intimate knowledge of a situation, corroborated again and again by experience, which is interpreted in a fully concordant way by the faculties of perception and appreciation, both conscious and unconscious. The game itself is hidden, unconscious to the person concerned (at least I presume so), but the feeling of assurance and the perception of reality that underpins it are in the conscious, rational, 'objective' domain.

The other level, on the other hand, is entirely unconscious (at least that's my impression), uncontrolled and uncontrollable, of an irrational nature that seems to defy and make a mockery of any reasoned or reasonable knowledge of 'objective' reality (which I've just mentioned). At this level, the personal relationship, strictly speaking, linked to any realistic perception of the Other, disappears. I myself appear as a *giant*, powerful and secretly envied, and my friend feels like a *dwarf*, overwhelmed by the conviction of his irremediable insignificance, and devoured at the same time by the insane desire, not to be a giant himself when he is a dwarf by immutable condition, but somehow to *rise to* his level, to *pass* himself *off* as a giant at the very least, or, more secretly and insidiously still - the insane desire to *be that giant himself*, or at the very least, to *pass himself off as one*. I think I detect yet another nuance in this desire, which is like the echo, in deeper layers, of the desire present in the layers close to the surface, which finds a symbolic satisfaction precisely in this 'velvet paw' game, and is its nerve and spring

the desire for *role reversal*. In the upper layers, it's the reversal of yin-yang, dominated-dominant, object-subject roles that's at stake. This relationship is not the case here, however, because the giant has no concern to dominate the dwarf - he is content to be a giant, and thus, without knowing or caring, to be a perpetual and burning challenge to the one who feels overwhelmed by the irremediable condition of being a dwarf... this superb ignorance in which the dwarf finds himself.

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(\*) (29 December) This statement is only apparently contradicted by cases (which do not include my friend) where the 'playmaker' seems (at first sight at least) to be impressed, even subjugated by the person he is leading. This is, however, a *pose* for the sake of the cause, of which the actor himself is the first dupe (on a conscious level, I mean) - which is essential to give this pose a certain air of 'truth' that cannot be improvised! The most extreme case of this kind of game I've ever known is that of my mother in relation to my father. On this subject, see the two notes "Le renversement (1) - ou l'épouse véhemente" and "Le renversement (2) - ou la révolte ambiguë", n° s 126, 132.

He feels bound by it, he feels it as a tacit contempt and an affront. It is this relationship that he is determined to overturn, himself appearing as the giant, and consigning the latter to insignificance - insignificance through *oblivion*, if not insignificance through *derision*, in return for the ignorance and contempt in which he himself feels held.

I said earlier that the two levels, 'papa gâteau' and 'giant', 'would seem to have no mutual communication'. On reflection, it now seems to me that there is indeed communication between the two, if only through this desire for reversal: the desire at one of the two levels now appears as an 'echo' of the similar desire already seen at the other. At first sight, it seemed to me that this reversal of roles, at the deeper 'dwarf-giant' level, was *not* a yin-yang reversal of roles. What is true is that this reversal is not indeed of the dominant-dominated type. However, on further reflection, there is no doubt that the *values* embodied by the giant are yang and superyang values, whereas the dwarf appears to be the embodiment of yin non-values - in terms, I mean, of my friend's ideological options, not so different from the options that were still mine in the early years of our relationship (\*).

This will become clear, no doubt, when I have established a bridge between the image of 'the dwarf and the giant' and reality, or at least explained the origin of this image in the history and prehistory of the relationship between my friend and me. As far as 'prehistory' is concerned, I hardly need to point out that this kind of conscious or unconscious image only comes into being as a result of the deep-seated 'self-contempt' that I have already mentioned many times in my reflections; or to put it more accurately, that such an image is nothing other than a tangible, more or less concrete *materialisation* of this contempt. Perhaps I could even say that this 'secret conviction' is on the lookout for a situation that can serve as its support, and at the same time give rise to the scarecrow-image that expresses it. I believe that in everything in the psyche, however deeply buried, there lives a force that prompts it to express itself, often symbolically. This expression undoubtedly remains unconscious in many cases, but it is no less active, on the contrary, at the level of visible actions in everyday life.

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(\*) This concordance in the choice of 'yang' or 'superyang' values lasted until I left in 1970. In the years that followed, my value system at the conscious level 'swung' towards 'yin' and 'superyin' options - see the note "Yang plays yin - or the role of Master", n° 118.

To return this time to *the story* of my friend's relationship with me, it too certainly began before we met. He must have heard of me around the time of his first contacts with the world of mathematicians, in Brussels, around 1960.

- four or five years before we met, when he was sixteen or seventeen (\*). It is surely no coincidence that he asked me, and no one else, to teach him how to be a mathematician, or at least to teach him what was to be the central theme and tool of his work (namely, algebraic geometry). Before we met, the way I appeared to him (at least as a mathematician) could hardly have been anything other than my brand image, making me a kind of heroic and prestigious embodiment of the key values that prevail in the world of mathematicians", and this at a time when he himself was a modest student, fresh out of high school. This image that he had of me, and which was the very image that I liked to portray, was not simply an Epinal image, made to make glory-loving schoolchildren dream. It was based on tangible realities, and he certainly had enough flair to smell them in those years, in contact with mature mathematicians who were well into the game. From 1965 onwards, he was in a better position than anyone else to take my measurements himself. I sensed in him a fascination for a vision that was opening up to him, born and matured in me over the past decade and which continued to unfold and develop before his eyes. There was no doubt in my mind at the time that these visions, which he made his own 'as if he had always known them', would serve him in the full light of day as inspiration and as tools for developing even more far-reaching visions and work, within *his* means. He did not

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(\*) (29 December) I found this chronological information in the "Biographical note" (two pages long), by Pierre Deligne, written in 1975 on the occasion of the award of the "Quinquennial Prize" of the (Belgian) "Fonds National de la Recherche Scientifique" (Rue d'Egmont 5, 1050 Brussels). I intend to come back to this biographical note in a later note, where I will talk about Deligne's visit to my home last October. It was during this visit that I learned from him of the existence of this note, which he kindly sent me (at my request) at a later date. It was in this note that I also found the concrete form "the dwarf and the giant" of a certain image in my friend, a diffuse conception of which had gradually emerged in the course of the reflection on L'Enterrement. It began to appear in the note "L'enterrement" (n° 61), and became clearer in the course of the reflection in each of the notes "L'éviction", "Le noeud", "Le renversement", "Le massacre", ". . and the chainsaw", "L'Éloge Funèbre (2) - ou la force et l'auréole". It is only with the present note that this perception begins to 'fit' into a coherent overview of the 'foreground' of the Burial. (March 1985) For Deligne's biographical note, see "La profession de foi - ou le vrai dans le faux" (n° 166).

was nothing - and it is only in the light of this long meditation on a Funeral, nearly twenty years later, that I can see how the fine and passionate perception of what I had to convey to him must have served *at the same time* to flesh out and support, with first-hand elements of irrefutable reality, a frightening and aberrant image; an image likely to *paralyse*, like the 'intimate conviction' of which it is an expression. The very acuity of his perception of a 'greatness' and a depth in what I was transmitting to him and which he was the only one to have done well (and without effort) in its entirety - this acuity and this liveliness, which were his strength, then turned against him, making the aberrant image even more striking and peremptory.

Three days ago I thought I'd touched the 'nerve' of the role my friend has been playing for nearly fifteen years - and there was no doubt then that I'd touched a nerve centre: this all-consuming *craving for* a certain *game*, a delicate game of power, which was at the same time the symbolic and ephemeral satiation of the desire for a certain role reversal. . . With today's reflection, going deeper, it seems to me that we are now touching on the *nerve within the nerve*, the even more secret *sting* that constantly arouses and sustains this craving. For at the level of the 'sugar daddy', there is certainly the opportunity and all the latitude to play this game in complete safety, leading the dance with nonchalant delicacy, and sure to win every time. But the charm of the easy opportunity is undoubtedly dulled by the absence of a spur. And as I noticed just yesterday, there's no sting of pent-up grievance, of secret resentment - that's why they call him 'cake'! This missing sting, in short, is what I suddenly came across earlier, when, in the course of associations, and as if dictated by a knowledge that had been there all ready for a long time, I was led to describe this 'other level', 'uncontrolled and uncontrollable', where a dwarf and a giant live side by side.

And the initial impression of a still confused intuition, that between the two levels there was no mutual communication, suddenly disappears, giving way to an understanding, expressed and aroused at the same time by the double image of the 'nerve within the nerve' and the 'goad'. In terms this time of 'layers', some superficial and others deep, I would now use a third image again, saying that the latter nourish or sustain the movement of the former, that they are its deep *foundation*, solidly anchored in the structure of the ego. Without this foundation, the surface agitation would quickly dissipate and vanish, giving way at last to something else...

(<sup>149</sup>) (20 December) Since the reflection of five days ago, and especially the one pursued in the second of that day's notes, "The secret nerve" (n° 145), I feel that the work on this famous "foreground" of the painting of 1'Enterrement) has suddenly taken another turn. Before this reflection, I felt in the slightly awkward position of someone faced with a jigsaw puzzle, with the impression that they didn't understand much of it. Since April I'd been trying to put the pieces together one by one, and to inventory them carefully. It's not that I was short of pieces, no, I would have rather had the impression of having too many 1 In any case, there must have been enough to make a picture, partial perhaps, but a picture that stood up. The last piece of the jigsaw that I threw on the table was that of the 'reversal' (of yin and yang), held in reserve from the very beginning of 'The Key to Yin and Yang' (as an 'association of ideas' to which I promised myself I would return), and finally bursting onto the scene with unforeseen force in the note 'The funeral of yin (yang buries yin (4))', dated 10 November (n° 124)! The thirty-five days that followed, up until five days ago, were essentially devoted to turning over and over the pieces already uncovered, as the most compelling associations demanded my attention (\*). I expected that, in doing so, the pieces would eventually come together by themselves, to reveal the unknown picture. Nothing of the sort happened. On the contrary, they continued to thumb their noses at each other, as if fragments of ten different newspaper cuttings had been thrown together in a jumble and it was up to me to put them together! I was beginning to wonder whether I wouldn't be obliged, at the end of the day, to make a final inventory of the pieces, and another of the question marks concerning their assembly, and call it a day. ...

The situation changed five days ago, when, by dint of turning these famous pieces over and over, feeling them and smelling them, something finally 'clicked', when one of them (that of a *craving for a certain style*) was suddenly recognised as 'neuralgic'. I had the immediate impression of a *qualitative change*, that a *perspective* that had been lacking until then was already being organised from that particular piece, and it is in these terms that I express myself the following day, taking up the reflection in the following note ("Passion et fringale - ou l'escalade", n° 146). And my premonition com-

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(\*) The 'coin' that had been the starting point for all our thinking on yin and yang since the beginning of October did not come up again until fourteen days later, on 24 November, in the note 'Le renversement (3) - ou yin enterre yang' (n° 133).

m already beginning to be confirmed on the day itself, with the appearance of the '*daddy-cake*' part, which seemed to have been called by the '*neuralgic part*' precisely for the purpose of fitting it without burrs!

The '*Superpère*' piece, which had always been there (already inherited from the first part of *Récoltes et Semailles*, and taken up again at the beginning of *La clef du yin et du yang* (\*)), now seems to have been written off, as if it had simply been lost there by me. Under the fresh impression of the new '*cake*' play (\*\*), I tend to forget that this famous *Superpère* (not '*cake*' at all, as it happens) did indeed have something to do with the relationship between my friend Pierre and me, even if it didn't take centre stage (which was a long way off...). I ended up remembering it anyway at the next session, of course - at the precise moment, moreover, when I was about to explain to myself why that eternal piece of the jigsaw actually had nothing to do with it! It was, in fact, '*just the opposite*' of the *cake*-piece, which had just placed itself with such ease. And then no, on closer inspection, this piece that was supposedly alien to the game, and whose contours had remained the vaguest, suddenly took on its own shape, "taking on those of the force-image (conjured up by none other than my friend Pierre himself (\*\*\*) of the *dwarf and the giant*. At first I expected, on seeing it reappear in such strongly marked features, that it would be '*uncommunicative*' with the double neuralgic piece already in place (made up of *daddy-cake*, and the imperious urge to '*make it work*' - a little phone call here, a little phone call there... . ). And now, on the contrary, it appears as '*the nerve within the nerve*', as an even more neuralgic piece, fitting together without friction or detachment with the part of the puzzle already in place!

This particular piece, under its former name '*Superpère*', had already been brushed up against many times, and even taken in the hand and turned round and round like the others, and even (I remember now) declared to be the centrepiece, the '*heart of the picture*' and all that; but, perhaps for want of a striking image (provided by the person concerned himself), and above all no doubt because of its absurd, aberrant/entirely zany nature, even in terms of the big picture, it was not able to be seen.

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(\*) See the sections "*The enemy father (1)(2)*" (n° s 29, 30) and the note "*The Superpère (yang buries yin (2))*", n° 108.

(\*\*) The term "*new*" play is perhaps not entirely justified. But it is a play, at least, which had previously escaped inventerage, so obvious was it!

(\*\*\*) For more details on this subject, see the last footnote of the previous note "*The nerve within the nerve - or the dwarf and the giant*" (n° 148).

"I was embarrassed and ashamed of that damn coin: it was burning a hole in my hand and no one (including a certain "me" who still lives on inside me...) would ever take it seriously! So I might as well pack it up quietly and 'play' with something more manageable!"

When I say 'centrepiece', 'heart of the picture', etc., about the play that has become 'The Dwarf and the Giant', it's the 'self-contempt' aspect that I'm thinking of, of course, rather than the 'Superpère' aspect. For the moment, the latter designation for this play-aiguillon, or 'nerve within a nerve', is hasty and unjustified. I mean, it doesn't seem, at first sight at least, that this famous faceless giant with oversized hands is anything like a father figure. If he needed a name, it would seem to be 'Superman' or 'Supermile' rather than 'Superfather'. So all things considered, the latter is still very much on the cards, for the moment at least, as is the play (or 'part') 'Supermère', to which I'll also have to return.

For the moment, the most urgent thing seems to me to be to try and situate the part of the picture already placed, with the 'secret nerve' and the even more secret 'nerve within the nerve', in terms of a yin-yang dynamic in the person of my friend. I have three hard facts on this subject. Two are expressed by the yin-yin 'double signature' (\*): my friend Pierre has a basic 'yin' tone, both in what we might call the 'acquired personality', expressed above all in the tone of his relationships with others, and in the 'innate personality' or drive, expressed above all (for an outside observer such as myself, at least) in his style of work, which is spontaneous and free from interference from the 'boss'. The first fact, concerning the acquired personality, or the 'structure of the ego' (or in more colourful terms, 'the boss's head'), seems to indicate that this structuring took place in childhood and from the first years of life, through identification with a model of a 'yin' nature. This does not exclude, a priori, that this model was the father, if he himself had (as seems to me to be the case) an 'acquired personality' with a basic yin tonality. But on the other hand, my friend's predisposition to a craving for a kind of power game which, in our countries if not everywhere and always, is typically (if not exclusively) 'feminine', and more precisely, which is the game of all games that the wife is wont to play with the husband - this predisposition leads me to suppose that the identification was made with the person of the *mother*, and that it was from her that he 'inherited' the 'yin' personality.

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(\*) The idea of a "double signature" is introduced by the note "Brothers and spouses - or the double signature", n° 134.

It is possible that the father was both a husband-cake and a father-cake, and that my friend had ample opportunity long ago to make him his first 'guinea pig', and to get the claws of his father. It's possible that the father was both a husband-cake and a father-cake, and that my friend had ample opportunity long ago to make him his first 'guinea pig', and to get his claws (and velvet!) on him. But it is also possible that the propensity or predisposition in question in my friend remained unused until after his meeting with me, because the first designated target, namely his father, had yang aspects strongly enough marked to '*provoke*' this craving, and at the same time *give rise to* the tried and tested tactics for 'making strong heads work'. To tell the truth, none of the impressions I remember from the early years when

I knew my friend are such as to suggest that he was already familiar with this game, or even that he had played it before. In any case, even with the benefit of hindsight, I can't see any trace of it in his relationship with me, or with others, in his 'spoilt child' manner.

So I'd be inclined to think that this propensity in him was still latent, and that it only developed and took the hold I know it did on his life and work after my 'death' in 1970

(when he had

Twenty-six years old), and thanks to a particularly tempting economic climate.

The 'third fact' to be recalled here is my friend's choice of a value system in line with generally accepted values, his choice of 'virile' (or yang) values. Over the past fifteen years, these values seem to me to have veered more and more towards 'syperyang'. In his case, there is an obvious contradiction in this choice: while adopting 'official' yang values, he has nevertheless modelled himself, in most essential respects, on a *yin* model (\*). And it's not that this choice of values is purely 'phoney', that it's just a false flag, flaunted for reasons of circumstance, and which is only prevalent in the peripheral layers of the psyche. The powerful image of the dwarf and the giant, acting from deeper layers, would lose its meaning, and also the urge to overthrow that it arouses, if the value of the yang were not also interested in these layers. There's no doubt that this contradiction must give added impetus to this "intimate conviction" of cracks, of insidious powerlessness - even though (perhaps only for lack of an adequate childhood "model" on which to model himself) he knows (deep down) that he is fundamentally *different* from what he "*should be*"!

If my friend, as seems plausible to me, did not find in his pare the features which, according to

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(\*) This is a kind of contradiction that is common especially among women, and which my own life has been free of.

the current consensus around him *should have been* there, and that he could then have made his own, this must have aroused in him a diffuse *resentment*, a resentment that couldn't cling to any concrete grievance, towards a dad whose only fault was that he was *too much* of a 'cakewalk'! In the absence of a 'hook', this resentment would have remained '*vacant*', *waiting for* a suitable target - a target who, first of all, was (in context) a father figure, and moreover, whose *aptitude* for this role was obvious, through the undeniable presence, perhaps even excessive, of those traits that were lacking in his 'original' father. It's these traits, too, that make the newcomer 'father' the ideal *target*, in the sort of 'game' that's already all set in motion here, waiting only for the right partner, aka 'the spare father', aka (here we are at last!) 'the Superfather'!

All of a sudden I seem to be back on very familiar ground, which I only now recognise. It's a terrain in which I was a prisoner for twenty years, during the only marriage of my life (a marriage from which three of my five children were born). In the lines of the preceding paragraph, and without any deliberate intention (but rather like someone groping cautiously in the shadows to become aware of his surroundings), I have *also* just described in turn the neuralgic forces in the relationship to her father, and then to me, *of the woman who was my wife*. I can't say when or how the knowledge (or rather the irrefutable intuition) of the silent, obstinate presence of these two forces in her and of their mutual relationship came to me. One day I knew, without ever having thought to reflect on it, that the inexorable force that dominated my wife's relationship with me, from the very first days of our marriage, was driven by resentment towards me for not having been there for her, like *another real* father, in the days of a distraught childhood...

It's true, and I know it, that my friend's childhood was far from 'clueless', and that the personality he developed and that I have known, between the sixties and now, bears little resemblance to that of my ex-wife. But beyond the obvious dissimilarities, in the part of the painting that is emerging from the shadows, I see a striking similarity with another 'painting' that is well known to me. This similarity appears in the nature of the relationship with the father (linked to a temperament in the father where the yang traits are deficient), and in the repercussions of this on a relationship in adulthood which, in both of them, dominated their lives, as the focus of the forces of conflict in both of them (\*).

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(\*) (19 February 1985) There is a striking similarity between my friend Pierre's relationship with me,

For a moment, I was going to overlook a third 'similarity', which is not without consequence in my own life: in the two relationships in question, the *protagonist* in each case was *none other than myself*. And what, in both cases, singled me out for the role of 'Superpère' that I was called upon to play, was (in addition to immaturity) that which since childhood had been dearer to me perhaps than anything else in the world - that in which I had also invested myself most inordinately: a 'build' that was more virile than life itself...

So I'm back again, in a different and more penetrating light than eight months ago, with this feeling of 'things coming back' (\*\*\*) - with, now as then, a tinge of incredulous astonishment (it seems too 'right' to be true!). And also, this time too, but in more restrained tones than the sudden burst of laughter of yesteryear, there's a perception of comedy, adding the gentler note of humour to these inexorable 'returns'.

(<sup>150</sup>) (22 December) Yesterday again I didn't find the time to work on my notes, except for the careful rereading and correction of the previous day's notes. Over the last few days, my energy has been diverted by correspondence and other tasks, and I'm gnawing at the bit (not that this is anything new!) of not being able to sit down with myself again and push forward the reflection I've started. The writing is decidedly slower in this third part of *Récoltes et Semailles*, centred on the present reflection, 'La clef du yin et du yang', where the dynamics of yin and yang are the constant thread for penetrating further into the meaning of Burial. If I didn't take the precaution of setting an alarm clock to interrupt my work after three hours or so (to stretch my body or to warn me that the hour is approaching and it's time to stop), the whole night would pass like an instant! The three hours have passed each time, and I feel as if I've barely started (or resumed), with two or three unfortunate pages that I've just typed, if not just one or two, just long enough to get round to some seemingly innocuous association that I thought I'd jump over in a flash. .

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and (since the early days of their marriage) of my former wife. This kinship extends beyond the relationship with my person alone, in the sense that both have developed a propensity to use certain very close people to whom I have bonds of affection (my children in one case, my pupils in the other) as instruments to reach me through them.

(\*\*\*) See the note "Le retour des choses - ou un pied dans le plat", n° 73.

There's an impression of extreme slowness in progress, counted in pages per hour or per day - and the natural reaction to this impression, with a hot substance right in front of my nose pulling me forward, would be to double and triple my efforts, as I used to do until the last few years. But I know that this is the trap to avoid - the trap of this extraordinary 'ease' in the work of discovery (\*), when all you have to do is 'push' forward, to be sure of making progress, slowly perhaps but surely ; Like someone holding the ploughshare of a good, hardened steel plough, pulled by a pair of powerful, impassive oxen, and slowly and surely making his way, furrow after furrow, through dense, sometimes rough earth, yet at the same time supple and docile to the brilliant ploughshare that delicately and unhurriedly opens it up, penetrates it and turns it over in wide, brown, steaming strips, bringing intense, teeming subterranean life out into the open. The pace may be slow, but the field is vast, and each furrow dug seems to barely make a dent in the expanse that remains uncultivated. Yet at the end of the day, furrow after furrow, the field is ploughed, and the ploughman returns happy: for him, this day has not passed in vain. His toil and his love were his seed, and his joy at work, and his contentment at the end of each furrow and at the end of a long day, are his harvest and his reward.

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With the reflection of the day before yesterday, and perhaps for the first time in the writing of *Récoltes et Semailles*, I have the impression of having advanced onto the uncertain terrain of what is not yet directly perceived or felt, and which remains (and perhaps will remain) *hypothetical*. Lacking eyes that can see through what seems to me darkness and night, I groped my way along a hesitant path, with no assurance that it was 'the right one'. When the path forked, I didn't flip a coin to see which way I'd go; I relied on my nose and my common sense to point me in the most plausible direction, without having any idea where it would lead. The path I was following, or tracing out for myself, seemed to 'stick' to the facts known to me, and that was a good sign. But that didn't rule out the possibility, especially where those facts were tenuous, that another, quite different path might lead me down the same path.

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(\*) See the note "The trap - or ease and exhaustion", n° 99.

would have 'stuck' just as well, on condition perhaps that I delved a little deeper into this or that raw fact... . Then, at the bend in the road and to my own surprise, I suddenly found myself on 'very familiar ground', which I had long ago and painstakingly traversed, which I had come to know and leave behind. A situation that, just a few moments before, had seemed obscure, shrouded in the uncertain mists of 'no doubt' and 'maybe', was suddenly illuminated by the light of *another* situation that was understood. When I asked myself about the distant origins, in myself and in the other person, of the conflict in the relationship between this friend and me, they seemed to be revealed by a deep similarity I suddenly saw between this relationship and another that had weighed heavily on my life for twenty long years.

The appearance of this similarity was so powerful, I admit, that this feeling of hesitation, uncertainty and trial and error vanished immediately, to be replaced by a feeling of assurance and conviction. When, at the end of the reflection, I speak of the feeling ('of incredulous astonishment') that it 'was too right to be true', this feeling was the response to another, in the background, which said that 'it was too right *not* to be true'! And that feeling, surely hasty and unjustified in the present state of the facts available to me, has not been readjusted in the meantime; it is still present as a background note, whether I like it or not. Surely, without the help of certain experiences that I have come to understand and accept, and above all the long experience of my married life, the thought could hardly have occurred to me of this 'grudge in a state of vacancy' (of a grudge 'on probation', in short); and this very thought was also the 'diversions' that, in the space of a few moments, brought me once again onto the 'very familiar ground' of my marital experience.

It is certainly possible to say that a deliberate unconscious intention will have brought me to a place already designated in advance, which perhaps teaches something about me and about this deliberate intention, and nothing about motivations in others. Just as it is also possible that an assumed experience will have enabled me to apprehend a reality in others that would otherwise have remained entirely enigmatic, for lack of sufficiently sensitive 'antennae' on my part (and for lack of tangible facts about my friend's childhood and the personalities of each of his parents).

It seems to me that I am very close to completing my sketch (*à bâtons rompus* 1) of the "foreground of the painting" (of the Burial.) To assemble the last pieces of the jigsaw puzzle that I

remain in hand, I will use as necessary the elements of apprehension (however hypothetical they may be) that emerged in the previous note. This will also be a way of testing their consistency with all the other facts I know.

In the discussion the day before yesterday, it was the 'Superpère' piece of the jigsaw that clarified its shape and contours. I had initially identified it, somewhat hastily, with the piece 'The Dwarf and the Giant', in which the giant appears more as a kind of 'Superman' in an ac-cablant format, and not as the 'Father', or a 'Superfather'. But this last piece ended up appearing again in the same reflection, this time as the target of a 'grudge in sur-sis', a grudge in search of a target, as if the said 'Superpère' had been *called* by this very grudge and had appeared in response to this call, in fulfilment of a diffuse expectation. If that's the case, then it's fair to say that if the Superpère (borrowing my build and features, which were apparently tailor-made for the occasion) hadn't appeared in my friend's life, he'd have had to be invented! That's what it's all about, with nothing more hypothetical for me, in the case of the woman whose husband I was - and whose target I was, moreover, 'expected to be during a young life...'.

Thus, the Superpère appears as the "face side" of the "faceless giant with oversized hands" in the play "Le nain et le géant" (The Dwarf and the Giant). "The dwarf must see the giant from the back, no doubt doing his famous "demonstrations of strength" (mentioned in the note of 5 October "Le Superpère" (n° 108)). So here we have the 'Superpère' piece at last, fitting in with the 'giant' side of the 'Le nain et le géant' piece. As for the 'dwarf' side of this one, its outline also became clearer as a result of the day before yesterday's reflection, which here echoes that of the note of 17 October 'La moitié et le tout - ou la fêlure' (n° 112). It's still, as if often, the endless rejection of 'yin', 'feminine' traits in favour of 'yang', 'masculine' traits, which means that my friend finds himself to be 'fundamentally different from what he *'should be'*', even though he has modelled himself in accordance with a predominantly 'yin' model.

It's important to stress here that at no time in the past did I think, nor did I want to suggest, that my friend's person was marked by a predominantly yin *imbalance*, and therefore by a deficiency, a 'void' on the yang, virile side of his personality. On this subject, I would remind you that the main impression I got from him, at least during the first few years I knew him, was, on the contrary, that of a *balance*, a harmony, which made him so endearing to me and to all those, it seemed to me, who knew him at the time. This impression is very closely associated with another, which I have mentioned elsewhere

(\*) - that he seemed to have retained something of the freshness, the innocence of a child, in his approach to things (mathematics in particular) and also, it seemed to me, to people. For me, this balance, and this 'freshness' or 'innocence', are not subject to the slightest doubt.

— these are *facts*, which there is no question of trying to hide. They were expressed in my friend by a delicate sensitivity and, when the occasion presented itself, by the nuanced and unambiguous expression of what was perceived and seen. There was a firmness, just as there was a gentleness. The gentleness has faded over the years, leaving behind only the muffled, empty shell of a vanished gentleness — and the firmness has become closed and hard, behind a façade of precious, borrowed half-tones. A delicate yin-yang balance has been transformed over the years (without anyone noticing) into the eternal yang imbalance.

— the same one, but in a different style, that had dominated my own life since I was a child. That was his choice, and those choices can change — the die is never cast.

! The fact remains that in my friend's life, I've never known him to go through a period marked by a *yin* imbalance, by sluggishness, complacency or inconsistency.  
and I don't think there were any.

All this makes it at least probable that the person who served as his 'model' in childhood, and who certainly had strongly marked yin traits, did not lack the yang traits to balance them. If (as I tend to believe) this person was his mother, then I presume that she had yang traits that were strongly enough marked (particularly in relation to such traits that were no doubt less marked in the father) to appear as the 'best choice' as a 'male' role model for a boy; and at the same time, to encourage the development of a harmonious temperament through such a choice.

At this point, everything would seem to be for the best in the best of worlds, in a united family that (perhaps) doesn't have any disagreements. Everything would be for the best, if it weren't for one tiny stumbling block, in the form of a mute consensus and a very insignificant appearance: a boy is supposed to look like his father, not his mother...

(<sup>151</sup>) (23 December) It seems to me that in order to finish assembling the 'jigsaw' of the foreground of the Burial painting, all that remains is to place one last piece. It's the one I called 'the Supermum' in the note 'Supermum or Superdad?' of 11 December.

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(\*) On this subject, see the note "L'enfant" (n° 60), in Cortège V "Mon ami Pierre".

November (n° 125). This 'Super' name had been inspired, first and foremost, by the 'portrait' of me, full of superlative epithets, in my Eloge Funèbre (\*). Surely, a reflex of symmetry must also have come into play, since there was already some 'superpère' in the air, in more ways than one! On reflection though, the name I gave to the image that had just appeared wasn't quite right. What was evoked by this superyin image had no 'maternal' connotations whatsoever. If there was a symmetrical relationship with another image, it was that of the 'Superman', with muscles of steel and an IBM software brain, rather than that of the 'Superfather'. In this case, it would be 'Superwoman' or 'Supernana', with heavy tits up to her navel and beyond (not to mention up to her knees...), and buttocks to match, enough to make Hercules dream - as for the brain, let's not talk about it... a bit in those tones. The inadequacy of the language, too, must have forced my hand a little, given that there's no ready-made 'female' counterpart to the famous 'Superman' (itself a recent invention, incidentally, a modern version of a Hercules who's decidedly out of his depth). I'll go for 'Supernana' anyway, for want of anything better...

It has to be said that I've been dragging this misnamed room around for nearly a month and a half, without really doing anything with it other than mentioning it here and there as a reminder, as a sort of promise that it would be taken care of, but later. In the end, I guess she didn't inspire me all that much, and that might well be because of the name, which didn't really fit. After all, I'd be hard-pressed to find a single one of all the friends (ex-relatives) and colleagues I've had in the mathematical world up to now with whom I've played a 'maternal' role, or had the impression that they were playing such a role. Even those with whom I played a more 'yin', receptive role, rather than the predominantly 'yang' role of one who teaches, communicates and passes on, must be very rare.

- As far as I can see (after the years 1952, 53, when I did my thesis), I hardly ever saw anyone other than Serre, and even then... If I try to remember what my current, not to say permanent, arrangements were in relation to other mathematicians, it was above all that I always had brand new 'carpets' to 'place' (to use the image that was current at the time), not to mention the 'carpets' (also of my own making) that were less new but which (in my opinion) had not really been used, so to speak, and which seemed to me to be indispensable for the 'mathematics of the future'.

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(\*) See the notes "L'Éloge Funèbre (1)(2)" (n° s 104, 105), and "Les obsèques du yin (yang enterre yin (4))" (n° 124).

the good running of a mathematical house, in such and such a mathematical district as I was familiar with. To put it another way, in my relationship with my 'fellow' mathematicians, and even though we hardly talked about anything together other than maths (I must have been even worse at it than any of my colleagues and friends!), the yang predominance (or rather, the su- peryang imbalance) in my acquired temperament reasserted itself, as in any other relationship. Perhaps even more so, given my disproportionate investment in mathematics, an investment of an egotistical nature (need I add) and, moreover, motivated precisely by my long-standing superyang options!

It is these obvious aspects, manifested at every step in my relations with other mathematicians, that must have obliterated, for my colleagues as well as for myself, this *other* fact, in the opposite direction: that my style in mathematical work, and my approach to mathematics, are strongly predominantly *yin*, 'feminine'. It is this particularity, it seems to me, apparently rather exceptional in the scientific world, which also makes this style so *recognisable*, so *different* from that of any other mathematician. The fact that this style is indeed 'like no other' has come back to me through countless echoes, ever since I started publishing maths, and at least since my thesis (in 1953). This style has not failed to arouse resistance, which I would like to call 'visceral' - by which I mean that it did not seem to me (nor does it seem to me today) to be justified by 'reasons' that could be called 'objective' or 'rational'. This reminds me that my thesis (in which I introduced nuclear spaces), which I had submitted to the Memoirs of the American Mathematical Society, had been rejected by the first referee, a well-known mathematician who had worked on the same subject, and who had considered my work to be more or less muddy. It was thanks to Dieudonné's energetic intervention that my thesis was published despite the referee's unfavourable opinion. I learned a few years ago that it is one of the hundred most cited articles in the mathematical literature (\*) over the past two or three decades. I presume that if we have another twenty or thirty years of mathematics ahead of us, the same will apply to SGA 4, as (among other things) a basic reference for the point of view of topos in geometric topology; which SGA 4 has been classified as "unreadable" (among other qualifications of the same kind (\*\*)) by my brilliant friend

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(\*) Perhaps my memory is failing me here, and these are the hundred (or twenty?) most cited articles in functional analysis.

and former student Pierre Deligne. I know (as he knows himself) that this is one of the mathematical texts to which I devoted the most time and the most extreme care, rewriting and having rewritten from top to bottom, in particular, everything concerning the sites and topos and the categorical 'prerequisites'. The reason for this exceptional care was that I felt that this was a real cornerstone for the development of 'arithmetic geometry', the foundations of which I had been laying for decades (\*\*\*)�. I also know that when I did this work, I had long had (without wishing to flatter myself) the master's touch for writing maths in a way that was both *clear*, where the main ideas were constantly put forward like an omnipresent thread, and *convenient for finding one's way around* for reference purposes (\*\*\*\*). I may have been wrong to write (and to have written) a detailed reference work forty or fifty years ahead of my time, but the fact that times that were ripe (in the sixties) suddenly ceased to be so is not my fault, it seems!

These last associations with Deligne take me back to the period after my departure, when echoes in the same vein came back to me more than once "like puffs of insidious disdain and discreet derision". This nuance of *derision* was absent in the signs of 'visceral resistance' to my working style, which I alluded to earlier, before I left. I can detect no hostile or in any way malicious intention towards me. I had occasion to evoke such signs even within Bourbaki (\*), at least (if my memory is correct) until about 1957, when my work on the Riemann-Roch-Hirzebruch-Grothendieck formula dispelled any doubts that might have remained about my 'solidity' as a mathematician. I don't remember perceiving any resistance to my style of work between 1957 and 1970 (the year I 'left'), except occasionally from Serre (\*\*), but never with a hint of enmity - it was more of an epidermal reaction.

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(\*\*) See "The clean slate", n° 67.

(\*\*\*) This is surely also the reason why Deligne was so keen to discredit this text, that he sometimes even forgets the half-tone style he likes, and doesn't mince his words when debunking it 1 On this subject, see the note 'La table rase', already cited in the previous footnote.

(\*\*\*\*) It was, moreover, in the process of familiarising himself (in 1965, when he had just arrived at my SGA seminar) that he was able to make the most of his experience.

5) with the part already written on the net in SGA 4, and by writing some of the presentations himself (drawing on my handwritten notes), that this same Deligne learnt from me the art of writing a mathematical text, and in particular that of presenting a dense and complex substance clearly.

(\*) See note (unnamed) no.° 5, in the first part of *Récoltes et Semailles*.

(\*\*) On this subject, see the note "Brothers and spouses - or the double signature", n° 134.

annoyance. On the other hand, I had the impression that my friends sometimes felt overwhelmed, because I was moving too fast and they didn't want to spend all their time just keeping up to date with my complete works as I sent them my pamphlets, or told them (by letter or in person) what I was concocting.

I think I have understood the nature of the 'visceral resistance' to my style to which I alluded earlier. Its cause seems to me to be independent of the Burial that took place later (in which this resistance nevertheless ended up playing an important role). This resistance is nothing other than a ('visceral') *reaction* to a '*feminine*' *style* of *approach* to a science (mathematics, in this case). Such a reaction is common and 'in the nature of things', in a scientific world which, as much and more than any other partial microcosm in our society today, is steeped in *masculine values*, and the feelings, attitudes and reactions (of apprehension and rejection in particular) that go with these values. The reaction of resistance to my particular style of work, the embodiment of a creative approach with a '*feminine*' undertone, simply stems from the conditioning common to the scientist in the world of today and of recent decades - the scientific world, at any rate, as I have always known it.

Like any other reaction resulting from conditioning, there is nothing 'rational' about this reaction, and where it occurs, there is considerable resistance to even thinking of examining its meaning. It is strongly felt to be *its own justification* - a bit like the aversion to 'faggot' in most good-natured circles, or that to 'dago', which is also very local. However, in this case, I did not sense in this reaction itself a hint of (conscious or unconscious) enmity towards me, but rather an attitude of *reserve*, of unfavourable prejudice, *towards* - a

- *from my work alone*. Only when it became clear that through my style (or in spite of my style, never mind!) I was doing things that people had not been able to do before (and that they couldn't really do any differently either, after the event) - only then were these reservations put aside, perhaps reluctantly... . In any case, if for some people these reserves remained in tacit and unconscious form, I was too locked up in my work and my tasks to perceive them.

To tell the truth, it seems to me unlikely, to say the least, that such a 'visceral reaction' would magically disappear simply because Mr So-and-So has demonstrated theorems that we hadn't been able to demonstrate before. At the level where words are made and unmade

deliberate acceptance and rejection, the one thing and the other ("such and such a way of working should not be allowed", and "Mr So-and-so has proved such and such theorems") are really unrelated!

You might say that it's normal, then, that things changed after I withdrew from the mathematical scene - once I was no longer there, in short, to 'put a spanner in the works' of those who would pretend to be picky about my style, without being able to do the same with their own. This 'explanation' is flawed, though, because it doesn't take into account the nuance of derision, of hushed malice, that didn't exist before. Nor is there anything I know of that would lead me to suppose that between 1957 and 1970 I had the time to make myself so unpleasant to the entire congregation of my fellow members that a grudge or revenge motive might have come into play after my departure. With many friends in the world I was leaving, I had maintained warm, sometimes affectionate relations, and (as I have said elsewhere) I cannot recall a single relationship of enmity with a mathematical colleague before 1970.

There was, however, a *subsequent* grievance against me on the part of the Congregation, the cause of a sort of collective 'rancour', and in any case, of a collective act of 'reprisal', which, although it remained tacit, was nonetheless 'unfailingly effective'. I explored this aspect of "reprisals for dissent" in the note of 24 May, "The Gravedigger - or the entire Congregation" (n° 97). In that note, I left out a certain tone in these reprisals, with regard to myself and those who had the imprudence to claim to be mine - the tone of *derision*, which goes beyond the simple "end of refusal". And every time I felt this 'whiff', *it was a certain style that was the designated target*. To put it another way, it is the particularity that distinguishes this style from any other, its 'yin' or 'feminine' nature, that has been the providential circumstance, seized upon with alacrity by the collective unconscious to wash away the affront of dissent, by adding to the reprisals of *exclusion* the extra dimension of *derision* - derision that is supposed to designate, through a certain style, the indisputable signs of *impotence*.

And now that the word 'impotence' has finally brought to light a certain unspoken fact, it becomes clear just how much this *same* 'providential circumstance', added to that of my 'death', provides an unprecedented opportunity for my friend and ex-student and ex-heir Pierre Deligne to make this role *reversal* tangible, credible and *crude*, this senseless and apparently hopeless desire of someone who feels 'helpless' in the face of a '*giant*'! "Perched on

giant's shoulders" (to use the very words that appear as the final word in his curriculum vitae (\*)), from now on *he* would be the one who would be "giant" in the eyes of all, and he would point to t h e derision of the entire Congregation, like a "dwarf", a great boaster and a great vacuum-breaker, this giant of pure junk, but yes! - and yet he had been (and remains despite everything... ) "a perpetual and burning challenge for those who feel overwhelmed by the irremediable condition of a dwarf...".

This spectacular reversal in the distribution of the roles of "dwarf" and "giant", between himself and the Other (the Other who is seen as a *challenge*, and who must be supplanted at all costs!)

- this reversal is also, at the same time, the *reversal of the 'feminine' and 'mas- culine' roles*. It is indeed as the (plethoric, flabby and contourless) embodiment of the *feminine* (never named clearly and yet ardently repudiated), that the man who was (and remains despite everything... ) a giant, is designated to the crowd (and above all to the Prestidigitateur himself...) as a pitiful dwarf and an object of derision; and it is also as a heroic and exemplary incarnation of *virility* that the one who was a dwarf (and who, in spite of everything and in the depths of his being, 'knows' that he is and remains one, by immutable condition...) finds himself a giant with hands of steel, acclaimed by the same crowd that has come out to boo the Other.

This reversal, as symbolic as it may be, is visibly out of all proportion to the 'reversal', so to speak 'private', effected by virtue of a tried and tested tactic (known as 'the velvet paw') in the restricted and inconsequential circle of 'between four eyes'; a gentle little merry-go-round in which he feels he holds the strings that 'make the Other walk' and turn. ... The dwarf making the giant walk, alright, but still and irremediably a dwarf! Whereas the apotheosis of the dwarf who finds himself a giant and even higher perched, and who points the finger of derision at the very man on whom he is perched - this apotheosis takes place in a public square, in front of a large and jubilant crowd, who have come to acclaim the Eulogy of a deceased and buried 'dwarf', as the 'highlight' of a superb and delectable Funeral Ceremony.

(<sup>152</sup>) (24 December) With yesterday's reflection, I feel that I have just about finished 'assembling' this first plan of the painting of the Burial, at least as well as I feel able to do so with the 'pieces' of the jigsaw puzzle that I now have. It is

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(\*) On this subject, see the last footnote in "The nerve within the nerve - or the dwarf and the giant", n°

148.

It is understood that in this second part of the reflection on the Burial (the third part of Harvest and Sowing), my aim has been, no longer to gather material facts (I gathered enough of them in the 'investigation' part, in Cortèges I to X), but to arrive at an understanding of the *motives behind the Burial*, through the secret *motivations* (most often unconscious, no doubt) in each of the many protagonists (\*). These motivations derive, first and foremost, from the nature of the relationship of the person concerned with my modest person (as the 'deceased'); or, more precisely perhaps, with what I represent for him for one reason or another, linked or not to my departure from the world scene and the circumstances surrounding it.

The "foreground" consists, apart from myself, of the person who played the role of "priest in chasuble" at my funeral. He is also, of all those who were friends or students in the mathematical world before my departure, the one with whom I was most closely linked, by mathematical affinities of exceptional strength; and the only one, too, who continued a personal relationship with me after my departure, a relationship that continues to this day. It is for all these reasons that I have a wealth of 'data' about him that is incomparably richer than what is known to me by anyone else among the participants in the funeral. Finally, of all the mathematicians I have known (\*), he is undoubtedly also the one, by far, whose role in his life he assigned to me weighed most heavily - much more heavily, visibly, than the role commonly assigned to his teacher, even in the practice of an art to which one would have devoted oneself body and soul (as I myself had devoted myself to it). I've come to realise this over the last ten years or so, and that the role he assigned me also spilled over into his mathematical passion (and into what ended up taking its place). This perception in me, which had remained diffuse for all those years, became considerably clearer and fleshed out in the course of my reflections on L'Enterrement, and even up until yesterday.

It seems to me that with yesterday's reflection, at the same time as this first plan of the picture centred on the relationship between my friend Pierre and me, has finally fallen into place and come together

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(\*) (31 December) This 'statement', taken literally and given the number of its 'many protagonists' (and would there only be ten!), would of course be entirely out of reach. Apart from my friend Pierre, the best I can do is to get an overall idea, by identifying as best I can the 'motivations' and 'intentions' in a 'collective unconscious', which at best only approximates those of a particular 'protagonist'.

(\*) And even among all the people I've known, with only two exceptions.

also the 'third plan', consisting of 'the entire Congregation', which had come out in jubilation to take part in the Funeral and Burial with its eager acquiescence. As I wrote yesterday, what was still missing from the image that had emerged in the course of reflection on the note (of 24 May) 'The Gravedigger - or the whole Congregation', was the nuance of *derision* in the exclusion of the person treated as a deceased person and as a 'stranger', an 'outsider'. The meaning of this derision, clearly apparent from the note (of 10 November) "Les obsèques du yin (yang enterre yin (4))", was recalled and put back into perspective yesterday: it is derision of what is felt (on an informal level) to be "feminine", and which is therefore the object of a "visceral" reaction of rejection, by equating (equally informal) the "feminine" with "impotence".

- man alone, in his triumphant virility, is supposed to be the bearer of 'power', of creative force. I have also emphasised the fact that such visceral assimilations, the product of conditioning, are completely incompatible with common sense and reason, when the ideas and images that they give rise to are felt with such conviction and evidence that they are commonly taken as their own justification.

There is one aspect, however, which appeared in a sudden flash with the final word in the note 'Les obsèques du yin' (The funeral of yin), which has not yet been taken up. Here are the lines that conclude the reflection in that note:

"These are no longer the funerals of a person, or of a work, or even of an inadmissible dissent, but the funerals of the 'mathematical feminine' - and perhaps even more profoundly, in each of the many participants applauding the Eloge Funèbre, *the funerals of the disowned woman who lives within himself.*"

It even seems to me, now that I think about it, that this aspect was more or less overlooked in the case of my friend Pierre himself, about whom I have no shortage of first-hand facts! If this aspect was present at all, and perhaps felt by an attentive reader, it must have been between the lines, when attention was mainly absorbed by the different angles of the 'reversal of yin and yang' aspect.

- (an aspect which, at first sight at least, seems specific to the person and particular role of my friend in L'Enterrement). This omission reminds me that I still have to talk (in a few days' time?) about my friend's last visit, from 10 to 22 October (mentioned in the note of 21 October, promising to come back to it 'in a few days' . . ). It will be

It seems to me that this is the best time to examine one last (?) angle of the 'reversal' - the reversal of the original yin-yang balance *in* my friend *himself*. This is yet another *burial* of certain original yin traits in him, under the rule of yang traits that appeared later and took possession of the place. Here I find myself, in a new and deeper perspective, faced with the startling realisation that had already occurred to me on more than one occasion (\*): in believing that he was burying the man who had been his master (and who still remained a friend), it was none other than *himself* that he was actually burying with his hands!

So if I return once again to the 'third plane' or 'background plane', to this 'Congregation' alias 'mathematical community', the few lines quoted earlier would suggest that what I felt so strongly in the case of my friend Pierre, might well also be true for 'each of the many participants applauding the Funeral Eulogy'. It is this aspect, it seems to me, that I still have to examine a little, before I feel fully satisfied and can consider the 'background' (as well as the foreground) of the picture of my funeral to be (provisionally?) complete.

(25 December) Yesterday I used the fact that it was Christmas Eve as an excuse to give myself a real 'high', staying on top of my notes until just after 3am (for once!). It's true that the whole day had been scattered with other tasks, and (having re-read the previous day's notes) there were only a few hours of the night left if I wanted to continue the same day. As so often happens, in the end I didn't even manage to tackle anything I had in mind when I sat down in front of the white paper! Instead, I took stock of where I was in the 'picture' of the Burial, and highlighted an aspect, in both the 'foreground' and the 'background', that was still unclear: that of the '*burial of the disowned woman*' who lives in each of the participants in my funeral.

Clearly, in this quotation, the expression 'burial' is used as an image to designate an act of *disavowal* and *repression* (or 'repression', to use a received terminology). For there to be any question of disavowing and repressing something (in this case, something that 'lives' within oneself), we first have to make sure that this 'something' is indeed present, 'alive' (even if miserably). This involves 'the

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(\*) This "observation" appears for the first time in the reflections in the note "L'Enterrement" (n° 61).

'woman' in every being, whether man or woman, that is to say, the 'side' of the person made up of traits, qualities, impulses or forces of a 'feminine' or 'yin' nature. This simple and essential fact, that in every being, woman or man, lives *both* 'the woman' and 'the honroè', is an extraordinary fact that is still generally ignored today. I myself only learned it eight years ago, when I was in my forty-seventh year (\*).

Of course, 'psychoanalysts' have 'known' about it and talked about it for a long time now. There are certainly plenty of books about it, and everyone has heard a little about it, just as I had heard about it. In fact, 'everyone' is quite prepared to admit that there must be some truth to it, as long as it's people who are known to know about it who say so, and there are books written about it and so on. However, having heard about it and being 'all ready to admit...', and even having read a book or even ten on the subject, or even (I'd venture to say) having written one, or even several, does not in itself imply that you 'know' the thing; at least, not in a stronger and, above all, less useless sense than that of simply memorising ready-made formulas, like 'Freud (or Jung, or Lao-tzu...) said that...'. Such formulas constitute a certain amount of cultural baggage, a kind of visiting card for someone who is 'cultured', 'in the know' about this or that, or even sometimes (with diplomas to match) an expert in this or that, and as such they can even be accepted as having a certain 'usefulness'; what's certain is that everyone is very attached to it, to the baggage they've accumulated this way and that, at school and in books, in 'interesting conversations' etc., and which they carry around with them, and that they carry with them against all odds, like a flashy, cumbersome trophy, for the rest of their lives. When I irreverently suggested earlier that this precious baggage was 'useless', I meant that it was useless for something that nobody cares about anyway, and which is even shunned like the plague by everyone: learning about oneself. Or to put it another way

That this baggage is useless if you want to *take charge of your life*, i.e. if you want to digest and assimilate the substance of your own experience, and thereby mature and renew yourself...

If I had to sum up in a few words the essential content of my long reflection on yin and yang, it would be by 'recalling' this 'simple and essential fact', which I have just recalled. If there is a reader who has followed me this far, and if he has not yet felt, in terms of his own experience, this fact: that there is in him 'the woman' even though he is a man, and that there is in him 'the man', even though he is a woman - it is that in doing so, he is 'the man'.

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(\*) On this subject, see the note "Acceptance (the awakening of yin (2))", n° 110.

In this vain effort to 'keep up' with me, he would have wasted his time overloading his baggage, which was no doubt already heavy, with yet another weight, labelled 'Harvest and Sowing'. And if he is a man, and even though he would not be one of the participants in this funeral, of which he would not have had any knowledge or suspicion before reading me, it would be a safe bet that he too, day after day and without his own knowledge, is 'burying a disowned woman who lives within himself' (just as I myself had done in the past and for most of my life).

There are a thousand and one ways for a man to 'bury' the woman who lives within him, just as there are for a woman to 'bury' the man who lives within her (\*), in other words to disown and repress him. One of the most common ways of 'burying' something that lives in oneself is by attitudes or acts of rejection of that same thing, when it is apparent in others. This rejection is none other than the 'visceral reaction' I was talking about yesterday in a specific case. What gives the reaction of rejection its strength ('visceral') is *not* really (as I seemed to imply yesterday) because the thing rejected in another person simply goes against a set of 'values' to which we would have full and undivided support. Those who know they are 'strong' are not offended by the sight of 'weakness'. The strength of the reaction comes, on the contrary, from the fact that this thing, observed in someone else and "which has no place", *challenges us ourselves*. It is like an insidious *reminder*, immediately rejected, of something that concerns us, that deep down *we know*, even though we would like to hide it from ourselves and from others; a reminder that from then on takes on the tones of a silent and formidable challenge. In such a context, a benevolent attitude of tolerance towards the 'flaw' apparent in others would appear to us as a perilous admission of complicity, which must be avoided at all costs. By rejecting, on the other hand, we unequivocally dissociate ourselves from the other person, in short, we give convincing proof (first and foremost to the inner Censor within ourselves) that we ourselves are free of any reproach, that we are and remain in conformity and 'good complexion'. At the same time as it is an *act of unconditional obedience* to certain value *norms*, distinguishing between what is honourable and what is inadmissible, the reaction of rejection is also a *symbolic act of burial*, by which the thing in ourselves that 'does not belong' is eagerly 'classified' as something that '*does not belong*'. *Not in us*, anyway!

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(\*) The same goes for a man who "buries the man who lives inside him", or for a woman who "buries the woman who lives inside her", attitudes which are far from being as rare as one might think.

In this picture, the form that rejection takes, a form that is infinitely variable, does not appear to be without consequence. It can be outraged rejection, with all the signs of indignation or disgust, or it can be rejection through irony or "delicately measured" disdain. It can be expressed in clear and unequivocal words, or it can be merely suggested, by allusive or double-entendre words, or even without words, by the appropriate smile (or absence of a smile. . . ), placed where it is appropriate. The rejection may be fully conscious, or it may be confined to the penumbra of what is barely visible to the eye, or take refuge in the complete shadow where the eye never penetrates.

The intensity of the rejection reaction is also infinitely variable, depending on whether the 'issue' in question is perceived as relatively innocuous, or as fearsome in fact. Perhaps the ones that provoke the strongest reactions are those that directly concern *sex*. This extreme susceptibility "has diminished somewhat over the last few generations. I have noticed, however, that things as universal in nature as the so-called 'homosexual' and 'onanistic' (or, to put it more kindly, 'narcissistic') aspects of the amorous impulse are as strongly rejected today as they were in the past. This is the case, at least, if we are confronted with it, not in an 'interesting conversation' about Roman customs or deep-seated psychology, but in our everyday lives. Even just between the eyes, it's rare for people to talk about the ways in which these aspects of the sex drive manifest themselves in their own person (generally experienced as rather embarrassing 'burrs', to say the least).

In the case that interests me here, the reactions of rejection to which I was confronted before I left the mathematical scene were certainly not of a strength comparable to those I have just mentioned. It's true that the object of this rejection, namely 'feminine' ways of being and doing things when we're supposed to be 'among men', does have a 'sexual' connotation, in a broader sense of the term than that linked to the mere mention of actions and gestures revolving around 'the buttocks' and the rest. I have no doubt that this connotation was generally felt, at an unconscious level (\*). However, it was sufficiently discrete and indirect in nature to exclude any slightly brutal reactions, going beyond a simple 'reservation' about my 'seriousness', my 'solidity' as a mathematician. What's more, the fact that my 'flaw' was purely intellectual helped to make it seem relatively innocuous and far removed (what would you do if you were a mathematician?)

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(\*) On this subject, see the note "Les obsèques du yin (yang enterre yin (4))", no.° 124.

so look there... ) from any disturbing and scabrous association of a man-woman doing her belly-dance while rolling up her skirts! Nevertheless, after my first contacts with the mathematical world (in 1948), it took almost another ten years for the reservations that my style aroused, even within a benevolent microcosm, to finally disappear - from my sight, at least. The situation changed again after I left, however, because an atmosphere of benevolence, friendship and respect for me was suddenly altered (without my realising it for the next six years) by what was felt by that same microcosm to be 'dissidence' and disavowal.

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To be honest, I'm not sure whether this change of atmosphere was really as 'sudden' as I've just said. Or to put it another way, I don't have enough facts to give me any idea of *how*, after I left in 1970, the change I was suddenly confronted with (this time I'll say it) came about in 1976 (\*). It's true that during all that time I'd had little contact with the world I'd left, which might have given me a sense of the 'temperature' and its evolution. What is clear to me is that in this evolution, the attitude of the group of all those who had been my students, and their undisputed leader Pierre Deligne, played a decisive role. The Burial could only have taken place, and the atmosphere that gave rise to it could only have been created, by a 'unanimous agreement' (\*\*) that encompassed the 'three plans' of this Burial: The "heir" (alias Grand Officiant at the Funeral), the group of "co-heirs" or "close relations", formed by the eleven other "former pupils", and finally "the Congregation" (perhaps not "all of it" - we'll have to come back to that... ). How this perfect harmony came about remains unknown to me, and perhaps will remain so. At present, I don't feel prompted to investigate it, and I doubt that anyone else will do it for me (well

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(\*) It was, I recall, during my unsuccessful efforts to get Yves Ladegaillerie's thesis published. This episode is mentioned in the two notes "On n'arrête pas le Progrès" and "Cercueil 2 - ou les découpes tronçonnées", n° s 50, 94.

(\*\*) For the first appearance in the discussion of this observation of "unanimous agreement", see note of the same name (with capitals!), n° 74.

on the contrary!).

This reminds me that when I was writing the previous note "The providential circumstance - or the apotheosis", the question had occurred to me *which of* the two, "The Congregation" or "the priest in the chasuble", represented the main force at work in the Burial, of which the other was in a way the "instrument" (\*\*\*) . I didn't dwell on it then, as I wasn't sure whether the question even made sense - it seemed to me to resemble the famous chicken and egg question! What is certain is that neither of them (the 'priest', nor the 'Congregation') could do without the other's help to carry out the Burial.

Another question, however, which seems to me to have a clearer meaning, is which of the two was more strongly committed to this work. It is true that "the Congregation" is not a person, and it is improper to speak of "his" investment in a task. But it is also true that for me, this personified entity takes on a concrete form in the form of ten or twenty *people* whom I have known well, with each of whom, for a decade or two or more, I have been in close and friendly relations. So when I speak of the "investment" of the Congregation, what I have in mind is the "sum" of the investments of all those former friends who were involved in my funeral. Thus clarified, it seems to me that the question is no longer rhetorical.

The answer that comes to me, without any hesitation or doubt, is that *there is no comparison* between the investment of the "heir" and that of the Congregation.

- This is all the more true because the inheritance is important to the heir (whereas no one in the Congregation has anything to gain from it for himself), and because the ties (of attraction or conflict) that bind him to the deceased are strong and play a vital role in his life. If there is any doubt in such a situation, it can hardly come from anything other than the presence of 'co-heirs' among those close to the deceased. (We are therefore talking here about the 'background', rather than the 'background' formed by the bulk of the Congregation). In the case that interests me, the only one of these "relatives" and co-heirs

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(\*\*\*) I recall that in the May reflection, in the note "Le Fossoyeur - ou la Congrégation toute entière", I realised that my friend had been an "*instrument* of a *collective will* of unfailing coherence". The lines that follow do not really contradict this intuition, but rather complement it, by leaving open the possibility of a certain symmetry in the relationship between the "Congregation" and "the priest in the chasuble".

whose part in my funeral could be comparable in weight to that taken by the main heir Pierre Deligne, seems to me to be Jean-Louis Verdier, playing the role of Second Funeral Officer. This appellation is not gratuitous, because more than once during the funeral, I saw both of them officiate with perfect harmony.

! But as I have already written elsewhere, apart from some of J. L. Verdier's public acts, I know very little about him since we lost touch; too little, no doubt, to be able to form any idea whatsoever of the ins and outs of his relationship with me, or of his relationship with his prestigious 'protector' and friend.

(<sup>153</sup>) (26 December) In yesterday's reflection, I tried to clarify this intuition, which appeared 'in flash' on 10 November, that in 'each of the many participants' at my funeral, it represented the symbolic burial of 'the disowned woman who lives within himself'. When I spoke and spoke again here of 'each' of the participants, it was a rather sweeping expression, which it is perhaps better not to take entirely literally. I am convinced, at least, that this intuition is indeed correct for each of those (and there are certainly many of them) in whom this 'visceral reaction of rejection' towards my particular style of mathematics takes place, a reaction that has been at the centre of my attention over the past three days.

On the other hand, it is clear that such a reaction is *not* present in my friend Pierre, or at least that there was no trace of it, quite the contrary, in the five years preceding my departure. It is the deep *kinship between* my style of approach to mathematics and his own style, which gave rise to such perfect communication during those years, and which was also the cause of that uncommon affinity between us on the mathematical level, an affinity that he and many others must have felt, as I myself did. This kinship was also the cause, no doubt, of the fascination that my mathematician persona and my work exerted on him, not only in those years (when it was expressed 'positively'), but also in the years that followed and right up to the present day (when it has been expressed mainly 'negatively', but just as eloquently (\*i. I have no doubt that if he had had the slightest reservations, the slightest discomfort with my style of work and approach to mathematics in those early years, I would not have failed to sense it.

It's true that from those years onwards, my friend did his utmost to erase

my role with him, if only as the person who had taught and passed on something important to him, and from whom he had drawn important ideas for his work - and a fortiori, to erase this relationship of affinity, even fascination. After I left, there was a gradual escalation in the disavowal of my person, not only through silence, but also through an affectation of disdain towards my style of work, and towards many of the ideas and notions I had introduced. The first trace of such an affection that I know of was in 1977, on the occasion of 'Operation APG 4 1/2' (\*). I haven't tried to follow the progression of this escalation step by step, and I don't feel inspired to do so (as I said yesterday, on a related issue).

This disavowal of a style of approach closely related to his own, and of a body of work from which his own emerged, is very similar to a *disavowal of himself*. When I thought about this disavowal of my style and my work (while I am still mostly under the impression of the five years of close mathematical contact before I left in 1970), I was inclined to play it down, to give it only a kind of *tactical* significance, as a particularly tempting *means* of supplanting and satisfying antagonistic impulses, by seizing the windfall of a certain 'providential circumstance'. Indeed, that was the tone of the note from three days ago, "La circonstance providentielle - ou l'apothéose" (N° 151). And what I have just remembered, that in the years before my departure there was *no* trace of rejection of his own style or of mine, is also along these lines, and not along the lines of the situation examined yesterday: that of a disavowal of 'the woman who lives within oneself' (if only, among other things, through a certain approach to mathematics), a disavowal that would have *pre-existed the implementation of L'Enterrement*.

This does not prevent the person who chooses such means, and whether he likes it or not, from *paying for them*. To be operational, this affectation of disdain for 'a certain style' had to be played out, not only in relation to others, but also and above all, in *relation to himself*. But one cannot disavow, before others and oneself, a 'style' that is also profoundly one's own, *while practising it* as if nothing had happened. This 'tactical disavowal' of others, through logic

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(\*) Or at least, this fascination must originally have been the force in the 'positive sense' (that of *identification* with someone who is felt to be *similar*) of the two forces that played a part in establishing this ambiguous, conflicting relationship of identification with me.

(\*) See in particular, on this subject, the notes "Two turning points" and "The clean slate", n° s 66, 67.

of things, involves a disavowal, a *repression* of a part of oneself - in this case, by repressing the style of approach to mathematics that is his, because of the original nature of the creative force within him.

This observation is not the result of a direct perception of a fact. It is the result of a short reflection, making use of known facts and drawing common-sense 'conclusions' from them. I've learnt to be cautious about conclusions of this kind (especially outside mathematics!), and to rely on them only if they are confirmed after the fact by other facts. But I recall here, very opportunely, that I had been led, in terms of what I knew of Deligne's work, to note that there is no trace in this work of certain inclinations (of a 'yin' nature) in my friend, which were nonetheless quite apparent in the years before my departure, and which I also recognised in myself. I wrote in some detail about this in my notes of a month ago (26 and 28 November): 'yin the servant and the new masters', and 'yin the Servant (2) - or generosity' (\*). Perhaps the most important of these things is a certain humility, which allows us to see (and describe, without fear of looking stupid) things that are so simple, so silly, that no one has ever deigned to pay attention to them before. The best things I have done in mathematics (\*\*) are precisely of this kind. Most of my work, and that of my most brilliant pupil, would not have been written if I had disavowed this inclination of my nature, which was not to everyone's liking.... . This propensity (or 'inclination') is intimately linked to another, without which its effect would remain very limited. It is also an attitude of humility, and of 'service': when it comes to getting to know and describing with delicacy and from every angle this new thing scorned by everyone, not to find one's time too precious to devote ten pages to it if necessary (instead of being content with two lines: here's the thing - you can do what you like with it!), or even ten thousand; to spend a whole day on it (for a man who has plenty of other things to worry about...), or a whole life, if need be.

When I spoke of 'new worlds' to be discovered, in a somewhat haughty tone perhaps, that *was* all I was talking about: seeing and receiving what seems infinitesimal, and carrying it and nurturing it for nine months or nine years, the time it takes, in solitude if need be, to see....

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(\*) These are notes n° s 135, 136. The sub-note to the second cited note (n° 136<sub>1</sub>) should also be added.

(\*\*) See sub-note no.° 136<sub>1</sub> cited in the previous footnote.

to develop and blossom into something vigorous and alive, made to beget and conceive.

If this propensity, which could be called 'maternal', is nowadays the object of drift, it is to the 'benefit' of attitudes felt to be 'virile', which tolerate only *one* possible type of approach to mathematics: that of 'muscle', to the exclusion of 'guts'. Real maths', also known as '*hard* maths', as opposed to the (unappetising) 'soft maths' (not to say 'softened maths', boo!), which are the ten- or fifty-page demonstrations of contest theorems (of proverbial difficulty, or it's not a game!), using all the wood they can find - all the 'well-known' theories and no- tions and all the facts available on the right and left. As for the 'wood', it just has to be there, that's what it's there for! And as for the people who have patiently cleared the land, who have sown, planted, smoked and pruned throughout the seasons and over the years, to make these spacious, slender-trunked forests grow and spread out, so much in their place (where there was thick, impenetrable bush) that you'd think they'd been there since the creation of the world (as a backdrop, no doubt, and as a reserve of 'all wood' . . .) - these people, who are only good for producing fluffy articles (or even fluffy books or series of fluffy books, if they can find publishers foolish enough to print them), and unreadable to boot, are 'soft maths' retard, not to say 'flabby' - but no matter how virile we may be, we are no less polite...

With this beautiful flight of fancy, I suddenly think I'm back where I started this long meditation on yin and yang - at the very first note in early October, 'Le muscle et la tripe (yang enterre yin (1))' (n° 106). It's the same burial again, at parade pace and to the sound of a bugle, of what is 'feminine', buried by the male disdain of Bras-de-Fer aka Cerveau d'Acier aka Superman. This burial is not only taking place in the small mathematical microcosm, that's for sure, and its scope goes beyond any specific case, which could nevertheless be used to smell it a little closer. And that smell is one of the main lessons I have learnt from Burial, in which I appear to be dead before my time.

When I narrow the focus of my attention even further, to focus on the special role played by my friend Pierre, I see in Burial yet another meaning. Once again, I see a *reversal*. As I said yesterday, without thinking I would come back to it so soon, it is no longer a reversal in a *relationship* (real or fictitious) that links him to another, but a reversal that takes place *in his very person*. It is not sought

for its own merits (as the object, perhaps, of an 'insane desire'...), and it is no longer limited to being purely symbolic (whereas, at the end of a magnificent conjuring trick, the person who felt 'dwarfed' does not cease to feel just as dwarfed, as if he had not just persuaded himself that he had become 'giant'...). It's a reversal, I wouldn't say irreversible, but at least perfectly *real*. It starts from a state of harmonious balance between 'feminine' and 'masculine' creative impulses, with a dominant feminine note. It ends up in a state of war and repression, where *attitudes* and *poses* (egotistical, like all attitudes and poses), flying the 'virile' flag, obstinately repress the *creative force*, mocked and symbolically 'buried', in the form of a grotesque, flabby effigy, with the features of the 'Superfemale'.

In less nuanced terms, but more vivid and striking perhaps: a '*feminine*' being, slender and vigorous, supple and *alive*, has been metamorphosed, by a permanent trick of prestidigitation, into a '*virile*' being, indemoluble, stiff and *dead*.

(<sup>154</sup>) (1 January 1985) Five days have passed, taken up by various occupations. The end of the year was the perfect opportunity to write letters that had been outstanding for weeks or months, not to mention a few cards of good wishes in response to those received around Christmas. We also had to build compost heaps with manure that had already been brought in two or three months ago, and plant waste from the garden and land-clearing, or brought in from the municipal dump, to have good compost ready for the garden in early spring. As the land is on a slope, we had to build an additional terrace next to the one already provided for the day-to-day composting of household waste.

With all this going on, I've hardly found the time to work on my notes, apart from some housekeeping work. I reread with great care, making a few more alterations here and there, the whole of the reflections from the 'Masters and Servants' section onwards (i.e. from the note of 24 November 'The reversal (3) - or yin buries yang' (n° 133)), adding the footnotes already planned for the notes of the last fortnight. The main aim was to have a manuscript ready for typing, but quite apart from any practical issues, this re-reading was useful for regaining an overview of the thinking that had gone on over the last four or five weeks. As is also the case in long-term mathematical reflection, when the particular 'moment' of reflection in which I find myself from day to day is

is placed under the strongly focused beam of intense attention, the 'thread' of reflection and the sinuous line it has followed over the past weeks, or even months, tends to get lost along the way, to drown and dissolve in a vague penumbra. I can't say whether this is a general phenomenon in all long-term research work, or whether it's linked to the systematic 'burying of the past' mechanism in my life, to which I've already alluded (\*). In any case, as the days and weeks, even months, of long reflection go by, I lose touch with the earlier stages of my thinking, resulting in a growing malaise in my work. This discomfort is eventually resolved by a more or less in-depth retrospective of all the work that has just been done, which re-establishes the contact that had gradually been loosened. I have observed that these retrospective 'halts' play an important role in my work. Each time, I leave with a new wind in my sails, relieved of the 'malaise' that had signalled a gradual loss of an overall perception of *continuity* in the work I was pursuing. In my mathematical work, it is not uncommon, not to say the rule, for such a step backwards to lead me to rethink the work already done from top to bottom, and to see both the work done and the work still to be done in a new perspective (\*\*).

But whether it's mathematical work or a meditation on my life, the 'discomfort' I'm talking about is always the sign of an understanding that remains imperfect, not only (and for good reason) that of the work still to be done, but also the understanding of what has been done in the course of the past work. This imperfection is by no means reduced to a faulty memory of each of the various stages of reflection, and of their chronological order (aspects which are relatively incidental when it comes to mathematical reflex-ion, where the object of attention is a mathematical situation, alien in itself to the psychic particularities of the person examining it, and to the events of this ex- amen). It seems to me to be more a sign of a lack of *unity*, of insufficient *integration* of all the partial understandings that have emerged as a result of the successive stages of

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(\*) This mechanism was set in motion at the moment of the 'changeover' that took place in my childhood, which I place in the summer of 1936 (when I was in my ninth year). This crucial episode in the structuring of the ego is alluded to in the note "The Superpère (yang burial - yin (2))" (n° 108), and in the sub-note n° 1081.

(\*\*) For other, similar reflections on the role of occasional retrospectives in long-term work, see also the second part of the note "Retrospective (1) - drinking in the three parts of a picture" (n° 127), and more particularly the footnote referring to it.

reflection. These partial understandings also remain imperfect, even hypothetical, until they are integrated into an overall vision, where they shed light on each other. To use the image of a *jigsaw puzzle* again, investigating an unknown substance is akin to putting together a jigsaw puzzle whose pieces are not given in advance, but have to be discovered in the course of the work. What's more, each piece uncovered appears at first only in a vague and approximate form, even grossly distorted in relation to the 'correct', as yet unknown, form. The 'local' work of reflection consists of identifying the pieces one by one, and trying as best we can to guess at the contours of each one, guided mainly by assumptions about the internal coherence of the piece examined, or of this one and others that are thought to be close. But each of these pieces only reveals its true nature and its precise, final form once they are assembled in the as yet unknown overall picture from which they come. The 'uneasiness' I was talking about is what signals to me, in the presence of a multiplicity of perfectly well-spotted pieces, presented in a more or less shapeless heap, that it is time to assemble them finally - or also, if there has already been (more or less partial) assembly, that this is still too fragmentary, or that it is awkward and needs to be completely redone. To find the right assembly, the chronological order in which I came across the pieces of the jigsaw puzzle is probably often incidental. But taking the pieces in hand one by one (and in that order, while we're at it), in the attitude of someone who knows that they have to fit together and who is waiting for each one to be placed in its proper place, is undoubtedly an essential stage in the work, to see them finally fit together.

The 'final word' in the previous note (from six days ago) tried to capture in words a certain strong impression in me - that of a metamorphosis that had taken place in my friend Pierre over the years, in the fifteen years since I left the mathematical scene. I had seen scattered signs of it here and there over the years, which sometimes left me dumbfounded, but at no time (as far as I can remember) did I dwell on them to get an *overall* idea of what was happening. It has to be said that, while I sensed a certain 'wind', and a particular role played by my friend (with the burial of the motifs in particular, which I was dimly aware of (\*)), I was very far from suspecting the large-scale burial of myself and my whole family.

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(\*) (20 February) for echoes of this feeling, which remained in an informal and diffuse state (until the discovery of 'l'enterrement dans toute sa splendeur' from 19 April last year), I refer in particular to the

It was the gradual discovery of this burial over the past year that was finally enough of a shock to shake up the inertia within me, and to motivate me to finally 'put down' the work. It was the gradual discovery of this burial over the past year that was finally the *shock* strong enough to shake the inertia in me, and to motivate me to finally 'put down' a situation that had seemed drowned in the mists of a distant past. So it was also in a very different frame of mind from the somewhat 'routine' frame of mind that had been mine during our past encounters, in a frame of bemused attention, that I received my friend during his recent visit in October. It was during this visit that this impression appeared, or rather this sudden perception of something that had surely been present for a long time, and that I had been happy to ignore until then: the perception of this 'metamorphosis' - the same one that I returned to by a different route in the reflections of the previous note. If I have rediscovered this impression, this time through what I know of my friend's mathematical work, it is certainly not by the greatest of coincidences, but guided by what direct contact with him had taught me over the last two months. The force of evidence of this impression of a metamorphosis, culminating in a 'virile' being, indemoluble, stiff and *dead*, could certainly not come as the result of a reflection comparing and assembling facts (or partial impressions of another nature), but only through an immediate experience, which remained unspoken. And this experience is still unspoken at this very moment (\*).

In the previous note, I wrote that this 'reversal' (in the very person of my friend), or this 'metamorphosis' (to use the expression that appeared in the 'final word'), was not 'sought for its own merits', adding more, in brackets:

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occasional allusions in the first part of Récoltes et semailles (written in February and March last year), to the fate of the notion of *motif*, notably in Introduction, 4 ("A journey in pursuit of the obvious") and in the section "The Dreamer" (n° 6). The formulation of this sentiment becomes considerably clearer in the final pages of the final section of this first part, "The Weight of a Past" (no.° 50), beginning with the passage "I might consider the 'Letter to. . .'" "(read: Daniel Quillen), which represents a sudden turning point in our thinking. The first 'notes' to emerge from this latest stage of reflection, and above all the double note 'My orphans' and 'Refusal of an inheritance - or the price of a contradiction' (n° s 50, 51), written at the end of March, take stock of what was previously felt in a diffuse way, about the fate of my mathematical work and a certain 'wind' of fashion towards it and myself.

For a description of a particular form that this "diffuse feeling" had taken in relation to the motifs, see the note "The tomb" (no.° 71) and the following one, "A foot in the merry-go-round" (no.° 72).

(\*) (20 February 1985) It's still unspoken at this very moment, even though I've just done it at last the account of my friend's visit, in the note "Duty done - or the moment of truth", n° 163.

"as the object, perhaps, of an 'insane desire'..." (of this desire for reversal, therefore, mentioned in the note "Le nerf dans le nerf - ou le nain et le géant"). However, on re-reading the reflective notes the next day, I wasn't so sure, or whether *the deliberate opposition of* these two 'reversals' that I had discerned in Burial was really well-founded. After all, in this image of the dwarf and the giant, the 'giant' embodies - as I've stressed more than once - 'virile' values, and the 'dwarf' is overwhelmed by 'female' de-values. And even though this image *is located* outside the person of my friend, plastered as it is on his relationship with another person (me in this case), that doesn't prevent it from having no 'objective' existence outside his person, that it is on the contrary the projection onto the outside (onto his relationship with so-and-so) of a conflicting reality that is played out in *no-one else but himself*. To put it another way, this image of the dwarf and the giant appears to be the symbolic *staging of the real conflict at play* in deeper layers than those in which the image lives, which conflict is none other than the eternal *conflit between the yin and yang 'sides' of his person*.

Such an *externalisation of* an inner conflict, which must remain rigorously hidden, is one of several all-purpose procedures used by the unconscious to 'evacuate' the original real conflict as far as possible, substituting another that seems more 'acceptable', or at least less disturbing. In this case, the image-paratonnerre chosen remains itself unconscious (I presume so, at least); and even, I would tend to believe, it remains confined to relatively deep layers of the unconscious, but closer to the surface than the knowledge of the real conflict (which is none other than the 'place' of this 'two-faced knowledge' referred to in the note 'The two kinds of knowledge - or the fear of knowing', no.<sup>o</sup> 144).

This suggests that this "insane desire" mentioned in parenthesis in the previous note, that "*to be that giant himself*, or at least to *pass for him*", - that this desire is only the "exteriorised" *transposition*, in terms of the lightning rod image of the dwarf and the giant, of the desire for a "metamorphosis" in himself; a metamorphosis that is if not real, at least apparent - where a predominance in one's being felt to be unacceptable, the predominance of 'yin' tones (felt to be 'soft' and despicable), would be 'reversed', metamorphosed into a predominance of 'yang' or 'virile' tones (felt to be 'heroic', and the only ones worthy of envy). Far from being in any way opposed by their intimate nature, these two desires now seem to me to be inseparable, one being like the shadow, like the 'hero'.

the *symbolic* and tangible *expression* of the other. As for the 'metamorphosis' that I finally perceived during my friend's visit (better late than never), it now appears to be the realisation or fulfilment of this 'senseless' and imperious desire; The fulfilment, not through the intervention of a providential grace, but as a long-term effect of the obstinate will of the 'boss' to 'put things right', to *reshape* himself according to borrowed traits, and to impose these same traits on the worker-child (who, as you can imagine, is never consulted for this kind of operation, typically 'boss').

In the previous note, I emphasised the *reality* of this 'reversal' (or 'metamorphosis'). I can now see more clearly the nature and limits of this "reality". It is the reality of a *pose*, striving to mould itself according to a model, felt to be the ideal to be attained. The choice of model, i.e. the type of pose adopted, no doubt predates our meeting. But it seems to me that the energy invested and dispersed in this pose was minimal at the time of our meeting, and in the years that followed. There was, I think, a sudden and drastic change in the dimensions taken by this investment, by the extraordinary 'occasion' created by my departure; first of all, my departure from my institution (where overnight my friend had had to appear to himself as having surreptitiously *substituted* himself for *his 'rival'*), and shortly afterwards, my departure from the mathematical scene. A second and even more important aspect of reality is that, by virtue of an inordinate investment, this pose ended up becoming '*second nature*'. And that's exactly what this '*second nature*' is, as I perceived it during our recent meeting. It is weighed down by an immense inertia - just as it was for me. In my case, that didn't prevent a renewal from taking place; and the fact that it took place in me doesn't take anything away from the inertia in my friend, opposing a renewal in himself.

This 'new' reality that has gradually crept up on him has not 'resolved' the conflict within him, any more than the occupation of a country by a neighbouring country 'resolves' a conflict. Rather, the conflict in my friend is 'frozen' in a certain 'balance of power', and the chances are that it will remain so for the rest of his life. We can no doubt say that the structure of the ego, that is to say the mechanisms of behaviour, have indeed changed, sometimes in startling ways. Such changes, however, imposed by the will of the 'boss', change nothing of the original nature, that of the creative forces of the worker-child. They are simply like shackles imposed on the worker, who has to manage as best he can to work anyway, under the mistrustful eye of the 'boss', when the latter does not take the tools away from him.

hands, to show the worker what he has to do!

That doesn't stop the business from running and making money, and the boss, by and large, is happy. There's a bad atmosphere, that's for sure, but like most bosses, he's got a thick skin and doesn't let it get to him, as long as the returns stay good.

(<sup>155</sup>) (2 January) It's been more than a week since the note of 24 December "Le désaveu (1) - ou le rappel" (n° 152), that I feel I've just about finished with the foreground of the Burial painting. And then no - three times in a row now, I've had to come back to one point or another that didn't seem quite clear, just three words to be added, no doubt, to put the final dot on the final 'i'. And each time, this 'final point' kept me busy for an entire evening, when it turned out that what had seemed 'not entirely clear' had remained rather obscure, and that it was by no means a luxury to return to it and find its own light. I suspect it will be no different again today, as I propose to return to a (final?) point, touched on in passing in the note 'Le désaveu (2) - ou la métamorphose' (n° 153). It concerns one of the aspects specific to a relationship in which I play the role of 'adopted father' - the aspect of my friend's ('ambiguous') *identification* with me. This aspect is mentioned in three or four lines, in a footnote to the note quoted. There was no further mention of it that evening, but the next day, rereading the previous day's notes, I felt I had to come back to it. When I started thinking about it again last night, I thought I'd follow up on that, but in the end it was another of the 'last points' left unresolved from the previous thought that kept me busy late into the night.

On the many occasions in the course of Harvest and Sowing when I was led to note, in the relationship with a particular friend or pupil, an aspect of adopted or adopted father", it was each time on the occasion of the appearance of conflictual traits in this relationship. So, without any deliberation, it was the *conflictual* aspects of such a relationship with a 'parernal' connotation that were at the centre of my attention and were underlined. I was well aware that in such a relationship there is always a more or less strong component of *identification with the father*, with the only reservation that this identification can sometimes take a 'negative' form, through identification with the 'negative' (or opposite) image of a repudiated father (\*). This concept remained in the background, without intervening in any visible way in the reflection, while

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(\*) This was particularly the case in the relationship between me and three of my sons, who were in no way 'adopted',

However, it also contributes to a diffuse apprehension and to the formation of a still vague, unformed image of this or that relationship. I express myself only once, I think, and in general terms, in the sense of identification, at the end of the section 'The enemy father (1)' (n° 29):

". . . it was the reproduction of the same archetypal conflict with the father: the Father both admired and feared, loved and hated - the Man you have to confront, defeat, supplant, perhaps humiliate . . but also the One you secretly want to be, to strip him of a strength in order to make it your own - another Self, feared, hated and shunned. . . "

It hardly needs saying that in these lines, written on the occasion of a 'retrospective on my past as a mathematician', if there was one precise case in point that guided my pen as I wrote, it was my relationship with my occult 'heir' and ex-student-who-doesn't-say-his-name, Pierre Deligne - at a time, however, when I had no suspicion, at least on a conscious level, of the Big Show Funeral orchestrated by him! As I reproduced these lines, written more than nine months ago, I was struck by the extent to which they seem to prefigure and 'call forth' (as it were) the image of the dwarf and the giant, which seems to have been formed and materialised for the sole purpose of giving tangible form to the intuition that has just been expressed. However, I have little doubt that the image was not formed by me, the chronicler-researcher, but by my friend himself, and I have it from none other than him (\*\*)!

The conflictual identification appears clearly in the words "the one you secretly want to be" and, even more strongly and unequivocally: "another Self". In the image of the dwarf and the giant, as it occurred to me on 18 December (in the note "Le nerf dans le nerf - ou le nain et le géant", n° 148), there is talk of the "insane desire to *be that giant himself*, or at least to *pass for him*". These lines seem to come in response to the "Celui qui secrètement on voudrait être" (The one we secretly want to be) quoted just now. But this time I'll stop here (enough's enough!), one step short of the 'another Soi-même' that came nine months earlier as a matter of course! It's true that

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let alone "adopters"...

(\*\*) On this subject, see the final footnote to "The nerve within the nerve - or the dwarf and the giant", n° 48.

This time, when we're talking about a 'piecemeal approach', in a very specific case, we need to be much more careful and circumspect than in a context where we're pretending to make a general statement that doesn't concern anyone in particular. ...

But considering the matter, it's true that it's a very small step indeed, for the unconscious hungry for *symbolic* satisfaction, which it can buy with mental images of its own making, between the 'insane desire' (and of considerable visible strength) to be this or that, and the *act of identification* with that mime we want to be. For identification, however unconscious, to be even remotely credible, and for the satisfactions it brings to be savoured with a minimum sense of security, it undoubtedly needs to be backed up by certain 'objective' characteristics of resemblance to the person (in this case) with whom we identify. I presume that in the case I'm dealing with, my friend's relationship with me, the first 'objective characteristic' likely to promote a feeling of resemblance, and an act of identification, was the strong affinity between his approach and mine to our common subject, mathematics. This would be the force 'in the positive sense', 'that of identification with the one who is felt to be *similar*', mentioned in passing in the footnote quoted at the beginning of today's reflection.

However, as I've already had occasion to point out several times in the course of reflecting on the relationship between my friend and me, from the very first years of this relationship, he didn't fail to perceive the 'superyang' aspects of imbalance in the character I'd played as a child, which had long since become my 'second nature'. I can't say whether, at the level of conscious perception, my friend was able to distinguish clearly between these two entirely distinct aspects of my person (I'd tend to doubt it). I can't say whether, at the level of conscious perception, my friend was able to distinguish clearly between these two entirely distinct aspects of my person, (I would tend to doubt it.) The fact remains that the superyang aspect of the 'boss' in my company must have aroused in him two very distinct types of reaction. One, the only one I perceived until the last few months, and the only one conscious in him (I presume), was expressed on occasion by a slightly pained\* attitude of regrette, which I've had occasion to mention, an attitude which never left the friendly or affectionate tones. On closer inspection, the other reaction itself appears 'ambiguous', made up of two apparently opposing components. The first, 'positive', was an unreserved *appreciation of* me as the embodiment of heroic, 'larger-than-life' 'values'; generally accepted values, to be sure, which you assimilate in your early years like the air you breathe, but which your immediate environment does not accept.

diate in his childhood had probably not provided him with any kind of inspiring 'model'. This component, like the feeling of *affinity* (of a completely different nature) mentioned earlier, was in the direction of *identification* with me, without any antagonistic element. This antagonistic element, on the other hand, is part of the other component, or rather, the other side (or '*reverse*') of this identification I've just described '*the right side*', and it remains more enigmatic for me. This is surely where the 'parernal' role my friend has assigned me, by virtue of my conformity to a certain ideal 'profile' supposed to embody such values, plays a crucial role. In groping my way, using the few tenuous elements at my disposal, to fathom the root cause of the strongly antagonistic content of this identification with an 'adopted father' (with very 'Superpère' J features), I came across (a fortnight ago) a plausible, but still hypothetical, 'scenario' in the note of 20 December 'Rancune en sursis - ou le retour des choses (2)'.

This is not the place to revisit this scenario. It seems to me more interesting to revisit the image of 'the dwarf and the giant' (which had just appeared in the note of the day before), from the point of view of this conflicting identification of my friend with myself. It then becomes clear that the two protagonists in the image, the dwarf and the giant, *are none other than himself*, or rather, *two distinct aspects of himself*. "The dwarf" represents what my friend feels to be *the original* and 'unchanging' aspect of his being, the one rooted in his childhood as far back as he can remember, and no doubt even further... it is also what is felt to be the banal, insignificant, not to say derisory aspect of his person, *the disowned aspect*, and by the same token, the one also felt to be 'irremediable', as 'acca-blant', as the *shameful* and despicable *pole of his being*. "The Giant", on the other hand, represents *the dizzying ideal* that we despair of ever attaining, to which we can at best hope to resemble in the slightest, even if it means giving the lie to ourselves and to others, by all the means at our disposal. One of these means has been to supplant the One who appears to be the prestigious and envied incarnation of this ideal, and to 'prove' his superiority over the Rival by every conceivable means. As for the Giant himself, he now appears as distinct from the Rival and father, he is *the pinnacle aspect*, the *ideal, heroic pole of the self*. The supreme gratification of the "boss" is anything that feeds the illusion that you *are* indeed this ideal pole, this projection of a spirit eager to expand. But the very craving for this gratification reveals a concern, "a deeply buried doubt" - it tells us that the person concerned "is not fooled, deep down inside, by these factitious signs of importance,

of a "value"..." (\*).

At a more superficial level of the psyche, these "factitious signs" (\*\*) are nevertheless part of the "objective (more or less) characteristics" mentioned earlier, which are supposed to "make credible" an act of identification with an ideal model (whether this model remains in the imperceptible form of a faceless "Giant" who lives within oneself, or takes on the familiar face of the enemy Father, the Rival).

(<sup>156</sup>) (3 January) Yesterday afternoon, taking advantage of a little free time while waiting for friends to come round, I leafed through C G Jung's autobiography, which a friend had just brought me by chance. I was hooked by the little I read. It was the first time I'd held a text by Jung in my hands, and until then I'd had only the vaguest idea of him - a dissident student of Freud, who had managed (according to the scattered echoes that had come back to me) to reintroduce the moving light and shade of mystery into the straight paths of the Master. That was about as far as it went. What I got was the impression of a living person like you and me, who doesn't waste his time bringing it up again, and above all: someone who goes straight to the real questions, the ones he feels are essential because of his own insights, and who isn't content (when the question is as old as the world) with the ready-made answers of learned people.

The 'biography' aspect (intended for publication) was of course of particular interest to me, since the notes I am writing are very similar to a biography, and in a spirit very close to that of Jung: the external event remaining constantly subordinate to the inner adventure, of which it is both a revelation and an occasional stimulator. I was struck by the fact that Jung did not write an autobiography (or, more accurately, contribute to one) until he was 83, and, above all, that at no earlier point in his life did he take the trouble to examine his own childhood in depth. It would seem to me that for Freud's students, it must have been self-evident that one of the first things, if not the very first thing, to familiarise themselves with the ways of the unconscious, would have been to explore those ways in their own person!

There is even no doubt

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(\*) Quotations in quotation marks are taken from the section "Infallibility (of others) and contempt (of self)", n° 4.

(\*\*) These signs may be 'fake', but they often end up forming a 'second' sign.  
nature' of unfailing solidity, 'indémolissable' (to use the expression in the concluding note in 'Le désaveu (2) - ou la métamorphose', n° 153)!

I believe that a so-called 'knowledge' of the unconscious that is limited to what is taught in a university curriculum (even by a prestigious master such as Freud himself), and to the analysis of a certain number of 'clinical cases', remains a non-integrated knowledge, a fragmented, 'dead' knowledge - a knowledge that by itself does not provide, or even promote, an understanding of oneself, or of others, or of the world.

But it is also true that an exploration of one's own person is an undertaking which, by its very nature, cannot be the subject of an institutionalised 'programme' - any more than the restoration, at its very root, of a disturbed psychic equilibrium (in a 'patient', let's say) can be the fruit of the intervention of an 'ogue', whoever he may be, limited to applying boilerplate techniques. Disturbed equilibrium' is by no means limited to the socially unacceptable stage of the onset of a nervous breakdown or neurosis, but can be observed in practically everyone (to a *greater* or lesser degree). Psychologists themselves (or ethnologists, sociologists and other 'ogues'), of all persuasions, are no more an exception than others. And a genuine restoration of the disturbed equilibrium is by no means in the nature of a simple 'medical act' intervening in a third person. It is an *act of the person himself* and of no one else - an *act of love*, which he is free to do or not to do. It is not the result of the inexorable unfolding of psychic mechanisms (with or without the intervention of an expert in psychic mechanics), but an *act* in the full sense of the word, a *creation*, a *rebirth*.

Before I'd finished writing the peremptory sentence above, about "so-called 'knowledge' of the unconscious", I realised just how overstated the context can make it seem. Without knowing anything about Jung's work (which had just been mentioned), I seem to be dismissing him and his 'so-called' knowledge of the unconscious - given that he had apparently not taken the trouble (before the age of 83) to explore the soil in which his own unconscious had grown. I presume, however, that if you read his biography, it will become clear that, without having devoted himself to such an 'exploration', Jung must have had *other* ways of contacting his own unconscious (ways which themselves no doubt remained unconscious for a long time). Surely the premises of the statement in question do not apply to him.

I was puzzled by something quite different when I leafed through the glossary. Under the term 'quaternité' (NB this is the French edition), Jung insists on the 'total-ising' character of the number four. Until about ten years ago, I was very resistant to the idea of

of a philosophical or 'mystical' use of numbers - any speculation or discourse along these lines seemed to me to be nonsense, childish, 'Hokuspokus' (as we say in German, for fourpenny magic tricks). The little I've learnt about the Yi-King (or 'Book of Transformations') has made me less peremptory. Yesterday I drew a connection between the 'cosmic' character attributed to the number four, and the spontaneous grouping that had taken place, when writing 'The Key to Yin and Yang', into 'packets' generally of four or eight notes, brought together under a common title. The first group is reduced to a single note, it's true, but (I noted this with satisfaction when I finished the sixth group, 'La mathé- matique yin et yang', which has seven notes instead of eight) if you combine it with a later group, into which this isolated note seems to fit most naturally, you still find a package of eight notes (718), so again a multiple of four. This pattern has continued to the present day, the last group to be completed being Group 10, "Violence - or games and the goad" (<sup>156</sup>). It has to be said that from group 7 onwards ('The reversal of yin and yang') I allowed myself to be guided by this 'pattern' which had just emerged without my looking for it, and without seeking or assuming any 'meaning' other than that of a certain mathematical 'regularity' in the form, felt to be harmonious.

This reminds me of the only other text I've written on a theme that can be described as 'cosmic', again centred on the dynamics of yin and yang in human life and in the creative act (\*). This text came together, apparently without any initial deliberate intention and certainly without any effort at any time, in a rigorous numerical order. I'd forgotten what it was, but when I looked it up just now (either you're curious or you're not!), it turns out to be seven 'stanzas' of four 'stanzas' each. So once again, they were grouped by four. It is true that the number of stanzas is seven, which is not a multiple of four - so according to the Jungian criterion, the character of totality would not be satisfied for the work as a whole (\*\*), but only for each of the seven 'stanzas' that make it up. But here I still have something to fall back on, given that the famous 'poetic work' (\*\*) is not a multiple of four.

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(\*) This is the "In Praise of Incest", discussed in note no.° 43 (referring to the section "The Guru-not-Guru - or the three-legged horse", no.° 45), and especially in the note "The Act" (no.° 113), pp. 507 - 509. See also the beginning of the note "The dynamics of things (yin-yang harmony)", n° 111.

(\*\*) The projected work (under the provocative name "In Praise of Incest") was in fact to comprise three parts (Innocence, Conflict (or the Fall), Deliverance (or Childhood regained)), of which only the first was completed. That's what we're talking about here.

tique" also had a providential "epilogue", (not to mention an interminable prologue, which I had the good sense to ditch), we still have  $7 + 1 = 8$ , we're saved!

It's time to return to yesterday's reflection where I left off. I had tried to understand the image of the dwarf and the giant in my friend, in terms of his identification with me. It turned out that 'the dwarf' and 'the giant' represent (or '*stage*', to use the expression in the note preceding yesterday's) the two extreme '*poles*' in my friend's person (I mean: what the 'boss' has *instituted* as 'extreme poles').

one 'shameful and despicable pole', and another 'ideal, heroic pole'. To tell the truth, with a difference of emphasis or lighting, I'm returning here to the interpretation I found the day before for the same image-force of the dwarf and the giant, in the note from the day before yesterday "La mise en scène - ou la "sec- onde nature"" (n° 154). This was the 'staging' of the conflict instituted by the boss, the ego, between the two 'sides', yin and yang, of being. This formulation of the original conflict, in terms of the two 'sides', would correspond to an undistorted knowledge of this conflict - and I am convinced that this knowledge must indeed exist, in deep (but by no means inaccessible) layers of the psyche. Yesterday's formulation in terms of two 'extreme poles' represents a *distorted vision of* the conflict - distorted by a deliberate statement by the boss, valorising one of the 'sides' to make of it an ideal, heroic 'joy', and devaluing the other to make of it yet another pole, the extreme opposite of the previous one, a shameful, contemptible pole. I presume that this intermediate image lives in shallower, intermediate layers, perhaps partially cohabiting with the external image, the 'staging' of the dwarf and the giant, even closer to the conscious surface, and partially encroaching on the superficial layers (\*). In these layers, I would remind you, there is the idyllic image of the 'sugar daddy' who is a little soft around the edges, of a respectful son full of thoughtfulness, with his velvet clearly visible and his invisible claw flush with the velvet...

Compared to the day before yesterday's reflection, yesterday's seems to me to be more of a nuance to it, and by the same token to sharpen its contours somewhat, without yet bringing anything essentially new to it. It's true that when I stopped thinking about it because of the prohibitive time, I didn't have the impression that I'd reached the end of the path I'd set out on.

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(\*) This presumption concerning the image of the dwarf and the giant stems, of course, from the very explicit expression of this image in the last word of Pierre Deligne's biographical note written by himself (alluded to in the last footnote to the note "Le nerf dans le nerf - ou le nain et le géant", n° 148).

the 'ambiguous identification'. Thinking about it afterwards, I realised that, no doubt as a result of an inveterate habit of 'seeing myself as a yang', it seemed to go without saying that, when there is identification with my person, it can only contain my yang traits. In this case, in this stage image of the dwarf and the giant, it was the *giant* that I had so far recognised myself in, in a distorted but still clearly recognisable form. Although I am insistently presented as '*the. dwarf*' (\*), this assimilation (with obviously malicious intent) was immediately rejected by me, by a reflex of universal naturalness and great strength: to be confronted with a desire for derision, targeting traits (*yin*, in this case) which are perfectly real in me, while ignoring complementary traits which are just as real (and which, for their part, benefit from a rewarding consensus) - such a situation provokes in me the never-ending reaction, if not to deny the incriminating traits entirely, at least to tacitly minimise them, by putting forward, as if to *oppose* them, the traits which have been unjustly ignored.

With this 'visceral' reaction, I'm really entering into the round of conflict, just as I'm supposed to! It's a reminder of the endless 'hook' that's being used to drag me into the circle. My own vision of reality" is also distorted, in response to a provocative distortion. So it was in vain that yesterday I wrote with my lips (or the keys of my typewriter) that

"the first "objective characteristic" likely to encourage a feeling of resemblance and an act of identification, was the strong affinity between his approach and mine to our common teacher, mathematics".

When I wrote it, I was more likely to forget that this 'strong affinity' consisted of a *feminine*, *yin* approximate in the discovery and knowledge of things - that this was precisely the aspect through which, as 'similar' to him, I also appeared as a *dwarf*, just like him: it was the secret, vulnerable, shameful side that he reserved for himself to bring into play, when the right moment appeared, to supplant and 'overthrow'. This 'providential circumstance' (\*\*), the predominance of *yin* in my drive for knowledge, it was not

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(\*\*) this "dwarf" himself being nothing other than a metaphor for the "Meganana" with the features of a "false" giant, with flabby and ramomo forms... (Feb. 85)

(\*) See note of the same name, n° 151.

*not just a weapon* in the hands of a dubious friend - it was also and first of all a kind of 'objective foundation' for her identification with me; not, this time, like identification with the *father*, but like identification with an *older brother*, not to say an 'older sister'. When I

use the word 'objective' here, it's to express that this time it's a question of an 'identification' rooted, not in one of the fictions of the 'boss' wanting (or fearing...) to be this or that, but in a profound, tangible, indubitable reality - that of a *kinship* between the original nature of the one and the other. In any case, this kinship could not fail to be perceived by him as by me, and I have no doubt that at some deep level, the *meaning* of this kinship was

also perceived. And I presume quite

At least, without being totally convinced, that this perception must indeed have served as material for his identification with me. This identification would therefore have taken place on *two distinct levels*: on the one hand, the 'ideal' level, in which I appear as the embodiment of *values* of which he would like himself to be an exemplary embodiment (even if only in appearance, when the model appears to be out of reach, and is supposed to actually realise the ideal); on the other hand, the 'real' level, where the identification is established thanks to a *de facto kinship that is* correctly perceived, but a kinship in common traits reputed to be redhibitory, pitiful (\*).

This is a good time to remind myself that at the time of our meeting, and for more than ten years afterwards, the same repression of my 'feminine' traits was rife in me as I have recently come to notice in my friend. It seems to me, with hindsight, that at the time of our meeting, this repression in my friend already existed to a certain degree, but that it remained mostly latent, and in any case, was much less strong than it was in me. As I have pointed out on more than one occasion, my person had long been marked by a superyang imbalance, whereas his gave off an impression of harmonious balance. Since then, he and I have *developed in opposite directions*: my friend has moved from a state of yin-yang balance to a strong yang imbalance, and I have moved from a strong yang imbalance to a state of (relative) yin-yang balance.

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(\*) These two 'levels' therefore correspond to two distinct 'archetypes', and here in opposition to each other, in the identification with my person: that of the *father* (alias 'the giant'), and that of the Brother, or even, that of the Sister (alias 'the dwarf'). The latter is also to be found in the image of the 'sugar daddy' - suggested by the father in the flesh 'as he is', alas, and not 'as he should be'.... .

The idea that immediately arises is that my friend, perhaps by virtue of this double identification with me, has followed (some thirty years later!) the evolution, in the sense of a deterioration of an original balance, that I myself had followed since the age of eight. It's possible that a moderate over-valuation of 'virile' values to the detriment of 'feminine' values was transformed, through contact with me or the environment to which I belonged, into an over-valuation of a bit of zinc. But as I have stressed elsewhere, the 'nerve' (the 'living force') in the Burial orchestrated by him, and the nerve also in his own metamorphosis (which is also the burial of the child in him by the boss) - this nerve can hardly reside in the mere adoption of this or that other value system, more or less extreme (even demented!). And the same applies to the 'nerve' in my identification with myself, and the disproportionate role that this identification has played in my friend's life. There's no doubt that one and the same 'force' is at work, and that its roots go far back into his childhood (\*\*).

Another strange idea comes to mind here. It's as if the heaviest burden I've carried for forty years of my life, this repression of the 'feminine' in me by the 'masculine', which\* was also similar to the repression of the child in me by 'the Big Boss' - that this burden was '*taken up*' by my friend, at precisely the moment when it might seem that he himself was free of a similar burden. It was around the time when my value system shifted in the yin/evolution direction that foreshadowed the moment of the reunion with the child, some fifteen years later, when I suddenly felt relieved of an immense weight (\*). The association that immediately comes to mind is with the Hindu idea of *karma*. It's clear to me that over the last eight years I've been relieved of a substantial part of the karma I've been carrying around with me since childhood. I would have thought (and I still tend to think) that this lightening has not been 'at the expense' of anyone, that it is beneficial not only for me, but 'for the whole world'. I can even say that I *know* very well that this is the case, even if it turns out that someone else chose (or even *had to* choose) to take it over. It's also true that I don't see the karma I've been relieved of as an 'evil'. It was for me the substance

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(\*\*) For a more precise intuition along these lines, see above all the note "Rancune en sursis - ou le retour des choses (2)", n° 149.

(\*) This "shift" in the value system is discussed in the note "Yang plays the yin - or the role of the yin". de Maître" (no.° 118), and "retrouvailles", in the note of the same name (no.° 109).

I know that it is good, for me and for all, that I ate and was nourished by it. I know that it is good for me and for everyone that I ate and was nourished by it, that knowledge was formed in the nourishing matrix of ignorance (\*\*). It seemed to me that this substance or this karma, once transformed into knowledge, left no residue, that it disappeared. To tell the truth, I don't know what the Hindu or Buddhist tradition teaches on this subject - if there is for them a law of 'conservation of karma' (similar to that of the conservation of matter), which would be unaffected by the vital creative processes of ingestion, digestion and assimilation.

For the sake of propriety, I have just omitted *excretion* from these 'vital processes'. Yet excretion (just like the death of the entire organism) is a key process in the recycling of what has been absorbed, returning to the infinite cycle of transformation of 'dead' organic matter into living organic matter, whereby life is eternally reborn from death (\*\*\*)�.

(<sup>156</sup> 1) (20 February) this 'pattern' finally broke down with the final group n° 12 which, alas, contains *six* notes, bringing the total number of notes making up 'The key to yin and yang' to 62. I had anticipated that there would be *eight* notes in this 'Conflicts and Discovery' group, which would have been in keeping with the criterion of totality, and would have brought the total number of notes to  $64 = 8 \times 8 = 4 \times 4 \times 4 \times 4$ , which is also the number of hexagrams in the I Ching! I was sorry that my expectations were not fulfilled, but I didn't want to 'cheat' and include in 'The key to yin and yang' the two notes devoted to Pierre Deligne's visit to my house, whose natural place seems to me to be in the continuation of 'The Funeral Ceremony', *after* 'The key.... . '.

However, I'm still left with a feeling of dissatisfaction about this group n° 12, the only one of the twelve parts of 'La clef. ...' that doesn't leave me with an impression of unity of inspiration and purpose. ." that does not leave me with an impression of *unity of* inspiration and purpose. This lack of unity seems to me to be due, not to the theme of 'Conflict and Discovery' itself, but to the irruption of extraneous (and at times disturbing) events in the course of the reflection.

(7 March) Last night I reread my thoughts of 14 January, which I had grouped together in

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(\*\*) For thoughts along the same lines, see the end of the note entitled "The cycle" (no.° 116<sup>✉</sup>), particularly the last paragraph.

(\*\*\*) On the subject of the cycle of life and death, see also the note "The Act", n° 113.

a note n° 162) called "conviction and knowledge - or the passing on" (\*), I felt a dissatisfaction with this name. On the one hand, the 'main' title and the subtitle did not seem, 'at a glance', to fit together - in fact, they correspond, one to a first and the other to a third 'movement' in the reflection, which by themselves are without any apparent link description of the process of the blossoming of knowledge (in the form of a sudden *conviction*), and evocation of the endless chain and 'passing on' of karma, from one generation to the next, and from one person to the next. What's more, the most intimately personal content, the 'neuralgic' content for my own person, which was the substance of the 'second movement' of the reflection (and had in fact been the 'bridge', leading from the first movement to the third) - this crucial content did not appear in the name chosen. (I have no doubt, moreover, that this surreptitious concealment is by no means the effect of pure chance...) As each of the three themes seems important in its own right, and as I could not think of any 'appropriate' name or double-name that would evoke all three, I finally realised that the best thing would be to split the note into three, with a suggestive name for each one separately: 'Conviction and knowledge', 'The hottest iron - or the turning point', 'The endless chain - or the handover (2)' (n° s 162, 162<sup>2</sup>, 162).<sup>22</sup>

It was afterwards that I suddenly realised that this operation, dictated (so to speak) by the very substance of the reflection, had at the same time resolved the 'aesthetic' dissatisfaction that I had been carrying around for nearly two months, while this twelfth and final part of 'The Key to Yin and Yang' (which I had called 'Conflict and Discovery') stubbornly refused to allow itself to be completed (naturally, that is) in a sequence of *eight* notes, and only wanted to include the six that had already been written. And I got my reward for not giving in to the easy temptation to 'cheat' and 'stick' two notes at the end of 'La clef' that were 'random' and belonged elsewhere! This last part of 'The Key' (which will eventually be called 'The Enigma of Evil - or Conflict and Discovery'), takes on a beautiful symmetrical structure, with two packets (of three notes each) on the central theme, grouped around the two 'digression notes' on Fujii Guruji and on my monk friends.

(<sup>157</sup>) (4 January) In yesterday's and the day before's reflections, I tried above all to get in touch with the reality of my friend's identification with me, and in so doing to dis-

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(\*) This was also the last note in "The key to yin and yang".

the scope and implications. I'm still groping in the dark, not to say in the dark of night. Or perhaps I should say that my eyes remain closed, and my eyelids are opaque to a light that I am unable to perceive. The fact remains that I don't remember at any point in my relationship with my friend 'feeling' or 'seeing' this identification, any more than I 'felt' or 'saw' his antagonistic disposition towards me. Yet I *know*, without any possibility of doubt, from a rich body of corroborating facts, that this identification with me, and this antagonism which is like its shadow, are *realities* - just as a person born blind 'would know' that the sun, daylight, colours, light and dark, exist, even though he has never seen them. He knows this without having any knowledge of these things. Or if he does have a very diffuse knowledge of them, perhaps through a more refined tactile sense (or through a 'memory' rooted not just in his own life, but in those of countless generations of sighted beings before him), this knowledge remains indirect and fallible, like that of a warm, sonorous voice coming to us through a distant and uncertain echo.

The work done over the last two days has again been like a stopgap, like a substitute for an immediate perception that is lacking. This is more or less the case in any work of 'meditation', in the sense that I understand it. The work constantly *pushes* against the current of *inertia* - the inertia of leaden eyelids! Certainly, in those moments when the eyes are fully open and awake, there is no need for meditation or work: all you have to do is look, and see. As these moments are rare, rather than sit back and wait for them, I prefer to take the lead, without worrying that the work will be clumsy and 'slow'. It may be slow, and sometimes even slower than usual - but that doesn't mean it's ever stagnant or going round in circles. When there is work, real work by which I mean, driven by a real desire, then there is progress: something is done, takes shape, is transformed, imperceptibly at one moment, visibly at another... . And sometimes, at the end of a clumsy and stubborn progression in a half-light without shape or form, continuing for hours or days, even months or perhaps years, the miracle happens: the blind man *sees!* And what is seen is not a fleeting vision that disappears as if it had never been, leaving only the faint trace of a memory. It is a knowledge born of these obscure labours, a new knowledge, as intimately ours as the taste of the things we love.

I wrote in the reflections of the day before yesterday that if there was a case in point whose thought had

"guided my pen" nine months ago, writing the final lines of the note "The enemy father (1)" (which I had just quoted) was that of my friend Pierre in his relationship with me. However, other 'cases in point' even closer to me must have been present in my mind at the time, in the background of my thoughts. When I speak of a 'father who is both admired and feared, loved and hated' and then of 'another Self, feared, hated and shunned. . .', the terms "feared", "hated", "hated", and no doubt even the term "fled", do *not* apply to the relationship between my friend Pierre and myself. Neither by direct perception, fleeting and slight though it may be, nor by cross-checking the facts known to me, have I ever had the slightest indication that my friend *feared* me, *hated* me or even harboured *animosity towards me*. The opposite is true, as I have already pointed out on more than one occasion. And it is precisely this circumstance that has made so disconcerting this flawless antagonism, seemingly gratuitous, which has manifested itself in crescendo throughout the past fifteen years, under the guise of "thumb!", alias "velvet paw" (\*), to finally reach the diapason of a quiet impudence, sure (provided certain forms are respected) of total impunity...

This disconcerting, enigmatic progression is immediately associated with the equally 'disconcerting' and 'enigmatic' progression (and these are euphemisms, to be sure!) in the deterioration that continued, also over a period of fifteen years, in the couple's relationship with my wife, and by the same token, in the family we had founded. In the absence of any sign that my wife had a tendency towards hatred or chronic animosity towards me, it took me ten years of inexorable deterioration in the relationship (while most of my energy was taken up by mathematics, playing the role of the famous pile of sand for the ostrich....), before finally acknowledging the presence, in the woman I continued to love, of a tenacious, mysterious and unstoppable will to destroy, working against me through those who were dear to me. That was in 1967, five years before I left home, and ten years before the resolution of a conflict that I felt was the heaviest burden of my life. With the hindsight that comes from a relationship that I've been living with for a long time, I can't help but notice what continues to remain a mystery for me: an insatiable desire to destroy, and at the same time an *absence of hatred*, or only animosity, towards those, adults or children,

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(\*) See the two notes "Pouce !" and "Patte de velours - ou les sourires" (n° s 77, 137), as well as the notes that follow the latter, forming the part "La griffe dans le velours" of "La clef du yin et du yang".

who are beaten mercilessly, given the right opportunity.

It's the same mystery, all things considered, as the one I'm now confronted with in my friend's relationship with me, with the difference that this 'will to destroy... exerted against me through those who are dear to me' has been rigorously confined to the world of mathematicians, and that its instruments and hostages have been, not my children 'in the flesh', but those who symbolically took their place.

the students and those like them who, in some small way, 'carried my name'. In both cases, not only do I not detect any hatred or animosity, but *there are also* feelings of sympathy, and often even affection, towards me that cannot be doubted.

These are not the only situations in which I have been confronted with a desire to hurt, or even a desire to destroy (in the strongest sense of the word (\*)), without detecting any trace of hatred or animosity. The one that had the strongest impact on my life was in 1933, in my sixth year, with my mother as the protagonist - the year in which *the family* we formed, my parents, my sister and I, was destroyed forever (\*\*).

The various situations of this kind that I have experienced at close quarters, of a desire to destroy, or a desire to hurt as deeply as one can, without my detecting any trace of animosity, seem very different from one another. I doubt I could find a common 'explanation' for them, or at least a common trait in the protagonists' distant antecedents that would suggest a deep causal link (\*\*\*)�. Perhaps more important than an explanation, and in any case more essential, is to *recognise* that such a thing exists: *the will to destroy in the absence of hatred*. Here I come back to the theme of 'gratuitous violence', which I touched on earlier in a different way (\*\*\*\*). Here, we're talking about gratuitous (and sometimes destructive) violence against someone *close to us* or someone we consider a 'friend'. The only existenc e, in everyday life,

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(\*) By "strongest sense", I mean here a will, not to cause suffering for the sake of causing suffering, or to destroy some limited thing that is dear to the other, but the will to psychically (if not physically) destroy the other; the will (when possible) to implant an indelible and devastating despair in the face of "that which is beyond comprehension". Behind the brilliant and affable exterior of the 'Colloque Pervers', it seemed to me that this extreme dimension was to be found in two of the most brilliant of its actors. ...

(\*\*) On this episode, see "Le Superpère", note no.° 108.

of such violence (which rarely says its name), is an important *fact* in everyone's life. — one of the important facts of human life. Acknowledging this fact, by going against the inveterate mechanisms that constantly push us to try to hide it, is the first step towards accepting it. No theory, no reasoning, no 'approach' can save us from taking this step.

I don't know if I'll ever understand this fact, but it seems to me that understanding it also means 'understanding the conflict'. What is clear to me is that such an understanding cannot come from 'theory' any more than from 'experience' (by virtue of experience alone). It is not some "sum total" of an accumulation (of "knowledge", or of "experience"), just as it is not of the order of the intellect alone, nor even of the order of the "intelligence" alone (\*). I'm not sure I know anyone, even by name, in whom such an understanding lives. But it seems to me that anyone who, after a hundred and a thousand evasions in the face of an irrefutable reality with a thousand faces, has finally come to the sole *understanding* of this fact, humbly, without bitterness or revolt, without resignation or indignation

— as the realisation of a formidable *mystery*, perhaps, the meaning of which escapes him, but the extent and depth of which he senses; a mystery that intrigues or challenges him, without frightening or worrying him - he has not lived in vain.

(<sup>158</sup>) (5 January) Without it being premeditated', the final accents of yesterday's reflection were very much in the tone, again, of a Funeral Eulogy - but this time delivered (or sung) by the deceased himself. You only get what you pay for!

Yesterday I was confronted once again with one of the most puzzling aspects of the "mystery of the

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(\*\*\*) However, a deep-seated and virulent self-contempt is surely common to all these situations. Perhaps such virulence (when it is not resolved by an act of grace, by a profound inner transformation, i.e. as long as it is not 'assumed') must find an outlet and express itself through destructive acts, through a will to destroy, which turns against its own person when it does not seek and find its target in others. In many people, including those close to me, I've seen the simultaneous action of a desire for destruction, directed both against oneself and against some external target chosen from among those close to me (mother, father, spouse, child, etc.).

(February 1985) See also the reflection in "La cause de la violence sans cause" (n° 159), three days after the one in this note, which obviously prepared it.

(\*\*\*\*) See the note "La violence ingénue", n° 139.

(\*) (5 March) I know in any case that such an understanding will only come to me through an understanding of this violence *in myself*.

conflict": the will to destroy, without hatred or apparent motive, exercised in the shadows, stubbornly and relentlessly, against a loved one, or such loved ones or friends. Sometimes this kind of will gets out of control, leading to an all-out destructive frenzy in which anything vulnerable becomes a welcome target. It's like an irrepressible bulimia for backwards 'action', the repetitive nature of which (like clown games), and the consummate mastery in the art of pulling the strings, can be of the most comical effect, when the observer (or even the one who has just paid the price) has a sense of humour, and the Actor-Marionettist has only modest powers over others. The situation is more serious, and of consequence, when there are children among those who bear the brunt of the circus games, even if they are only 'bloody' in the figurative sense; and also when the person possessed by a thirst for destruction finds himself or herself invested with considerable, even discretionary powers over some of his or her fellow human beings. History records the names of some despots possessed by such a madness of indiscriminate destruction, turning their fiefdoms into vast mass graves. We think of Ivan the Terrible, or Stalin, or some Chinese emperor (whose name and millennium I've forgotten) who ended up being slaughtered by his own cornered subjects armed with sticks and stakes (\*). There's no doubt that there have been similar cases in our own countries, perhaps on a smaller scale, and on which 'History' has a role to play.

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(\*) This emperor, fearing a popular uprising, forbade the people to use any metal objects (such as knives, pitchforks, etc.) that could be used as weapons, with the exception of one knife per village, tied with a strong chain in a public place.

What all three characters had in common was that, in addition to their thirst for destruction, they were also possessed by *fear*: fear of being murdered, and beyond that, no doubt, fear of their own inevitable *death* - as they sowed death all around them. This coincidence is surely not fortuitous. I also note that Stalin (the only one of the three about whom I have any detailed information) began his political career as a great master in the art of pulling strings, of manipulating people by playing on their vanity and greed. His first acquired style was, it seems, that of the 'velvet paw', until it became unnecessary for him to bother hiding his claws.

If I have not included my (former) compatriot Hitler among the examples cited, it is not because I have any particular sympathy for him, but because I do not detect in him the mania for '*all-azi-mut*' destruction that has been mentioned. The targets of contempt, and then of destruction, were those designated as 'the others' or 'foreigners': first of all 'the Jews' (and the Communists and other 'Judeo-Bolshevists' dear to Nazi jargon), then 'Asians' and other non-Arian metatics. The good, non-Jewish German was all v e r y well under Hitler, at least until the first major Allied air raids, when the war really started to go badly for them.

was more discreet...

When I wrote yesterday, without any false modesty, that I didn't understand the 'fact' I had just observed, that of the thirst for destruction in the absence of hatred, that in no way meant that I had no ideas on the subject, quite the contrary. In fact, I have much more than just ideas", I have some very strong intuitions. They were born and grew out of the soil of my life, rich in the conflicts that had sometimes seemed to devastate it, like endless storms raging across a still winter landscape, ruthlessly tearing away what needed to be torn away (\*). But all is belly for the sleeping earth that waits in silence. When spring comes again, in the hollows of the great dead trunks lying there inert, an intense life swarms, and the following spring (if not the year itself) we can already see grasses and flowers blooming there.

These 'strong intuitions' all concern, I believe, the 'ingredients' of conflict. I've talked a bit about some of them, and spoken about them again, first and foremost '*self-contempt*', and its links with the repression of certain aspects and essential forces of our original being, such as the yin or yang 'sides', one of which is often denied. I've also often had occasion to talk about *vanity*, which is like a visiting card, the most universal of all signs, and the most apparent, of the presence of conflict within us, and which seems to me to be *the front of the same coin*, the 'back' of which is self-contempt. There is *contempt for others*, an outward projection of self-contempt, for which it is at the same time a cover, or to put it better, a diversion and an exorcism. Basically, contempt for others is nothing more than deliberate ignorance of their existence as sentient beings who share in this world in the same way as ourselves. Gratuitous violence can only germinate and proliferate on the soil of such contempt. There is the *fear of knowing*, the fear of reality, a fear whose nerve centre, this 'Black Point', the epicentre of a whirlwind of anguish ready to be unleashed at the drop of a hat.

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(\*) As soon as I jotted down this image, it occurred to me that it was only partially appropriate - it would almost have an aftertaste of 'cliché'! As I pondered this aftertaste for a moment, I rediscovered the old deliberate intention to 'see my life as yang': movement, arrows and storms...

Without even taking the time to pose, but sensing that the image wasn't right (and yet it was the one that had come to me, nothing to do!), I 'corrected' it in the text by going on to the 'sleeping earth that waits in silence' - and there's yin! It was the agreement that 'resolves' a 'false agreement' (or 'dissonance'). In many ways, a more accurate image than that of the storm, "tearing away what needs to be torn away", and in more yin tones, would be that of the worm gnawing away "what needs to be gnawed away" - and which finally collapses - but everything goes to sleep for the earth that waits in silence, and when spring returns... (continued without

change!).

The lesser alarm is the fear of getting to know *ourselves*: the fear of becoming aware of our own poses and subterfuges, even the crudest ones; and the fear of becoming aware of the creative force within us that day after day we reject and bury through these same poses and subterfuges.

In my life, fear appeared at the age of six, when (it seems to me) there was still no vanity. It must have only appeared later, at the moment (I presume) of the 'changeover' which took place around the age of eight (\*). And it was fear, too, that disappeared first and without trace, as soon as a curiosity appeared that was both benevolent and irreverent, intrigued of course, but in no way impressed by the abracadabra and macabre big-show montages, such as 'Point Noir' and the like. The mechanisms of vanity, on the other hand, have remained in place with no apparent change in the eight years since the fear of knowing disappeared. It's only the hold these mechanisms have on my life that has changed, because they are defused by the presence of an awakening curiosity that doesn't let itself be fooled!

I have in my hands a whole range of ingredients for conflict - which I know at first hand, without a shadow of a doubt, are indeed essential ingredients. And for years I've also had everything I need to 'assemble' these ingredients, carefully explaining their links of contiguity and dependency in the light of what I've observed in myself and others. It's a job that will take a few days or a few weeks, not even a month, I presume, and it's sure to be very instructive and useful. If I haven't taken the trouble to do it yet, giving priority to other more directly personal directions, it's no doubt because I was well aware that it's not from such an 'assembly' of ingredients, in general terms from which my person is absent (if only as one 'example' among others), that I could gain an 'understanding of conflict'; any more than the mere fact of placing side by side, 'assembling' or even mixing a certain number of simple bodies, 'ingredients' in the composition of a compound body, reconstitutes the latter. For 'reconstitution' to take place, a 'chemical reaction' must first take place - something that brings the ingredients into contact and into play in a much more intimate way, and by forces of a completely different order, than simple 'assembling' or mixing could do.

The same applies to an understanding of the things of life. Intelligence alone

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(\*) On the subject of this "tipping point", see the note "Le Superpère" (n° 108).

can, at a pinch, identify the ingredients of something like 'conflict', and it can in any case, in the presence of ingredients already known and with the help of facts about them (known at first or second hand), put them together in a plausible, even 'correct' way. Such work can be useful in recognising oneself from time to time in a given conflict situation, and in identifying a more or less precise 'etiology' - but this is not yet an 'understanding of the conflict'. On the other hand, I would say that I moved a step closer to such an understanding the day my *relationship with conflict was* transformed. When I speak here of "my relationship to conflict", I am referring first of all, of course, to the conflict in my own person, and (from there) the conflict that occasionally pits me against this person or that person; and lastly, the conflict that I see acting in close or less close beings in my everyday life, which often expresses itself in conflicts pitting one against another among them.

Over the past eight years, there has indeed been such a progression towards an understanding of conflict, which also means: a transformation, or rather, successive transformations, in my relationship to conflict. I've had occasion to mention two or three episodes (\*). Perhaps a full understanding of conflict is equivalent to a full acceptance of its existence, wherever and however it manifests itself (\*\*). I'm obviously a long way from that! And perhaps a full understanding of conflict also means resolving the conflict completely within oneself. I'm even further from that!

I think I know one more thing, though, about the nature of the force that, from a combination of ingredients, suddenly gives rise to an understanding that renews the person. It is precisely this force that is not 'of the order of intelligence'. I doubt that any intellectual work whatsoever, the reading of books let's say, however learned, profound or sublime they may be, in any way stimulates its appearance. When it does emerge, it is only in silence and in contact with what is most intimately personal in our person and in our experience; something, therefore, that no book and no person, be he Christ or Buddha, can ever reveal to us.

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(\*) On this subject, see in particular the two notes 'Acceptance (the awakening of yin (2))' and 'The slave and the puppet'.

- or the valves", n° s 110, 140.

(\*\*) The meaning of such "full acceptance" can give rise to countless misunderstandings. It is quite different from connivance. It does not exclude *refusal*, clearly and unequivocally - it contains it. On this subject, see the reflection in the note "Spouses - or the enigma of 'Evil'" (n° 117).

When I speak of "what is most intimately personal", this does not mean that these are things we cannot speak of, either to ourselves or to others - and sometimes it is good to speak of them. But even if we speak through the voices of angels and prophets, what is *said* is not the thing itself. This thing - already known, but buried perhaps, whose contact can suddenly bring forth a new knowledge - *this* thing is *known* neither to the angels nor to the prophets, nor even to the closest and best loved being, but only to *you*.

To come back to the conflict, and to 'destruction without hatred', which seems to me to be the hardest 'core' of the conflict, the most resistant to understanding, that is to say, to *acceptance*. I also think I know, in the next step I have to take to go deeper into it, what *is* that 'most intimately personal' thing that I first have to get in touch with! The thing that would play the role, in this case, of that famous 'Black Spot' so tenaciously evaded! It's the experience of situations of 'gratuitous violence', of contempt for others (and of 'destruction without hatred' too, perhaps), in which *I* was the actor - the one who did violence, the one who found it worthwhile to despise. It's by coming into contact with this reality, or never, that I'll be able to get to the bottom of this famous 'self-contempt', and finally *see*, beyond all the 'no doubt' and all the 'maybe', if it really is *I* at the deepest root of evil, and not just in 'everyone but me'!

(159) (7 January) The reflections in the previous two notes revolved around the mysterious existence of this strange thing: a will to destroy (or a will to hurt, or to humiliate, or to harm), in the absence of any hatred or animosity. The impetus for this reflection came from my friend Pierre's relationship with me, which immediately led to an association with my ex-wife's relationship with me. More than once during the reflection on Burial, I was led to realise, or to remember, that in these two cases as in others it was certain traits in myself, the 'super-viril' traits that I had cultivated in myself since the age of eight, that served as stimulators and 'attractors' for such antagonistic impulses. If I'm not mistaken, they were first mentioned in the note of 5 October "Le superpère (yang enterre yin (2))" (n° 108). This link is taken up again in the following note of 9 October "The reunion (the awakening of yin (1))" (n° 109).

In this note, I return to the moment when, for the first time in my life, I perceived this link. It was 18 October 1976, the very day I was reunited with the child in me, and

in the final lines of the notes that bear witness to that most important day of my adult life. In these lines (reproduced in the note quoted), I speak of the 'secret hatred and resentment' of three women I had loved, including the one who was still my wife at the time (even though I had not lived with her for five years). With hindsight, it seems to me that in each of the three cases I had in mind, this impression of 'secret hatred' did not, strictly speaking, correspond to reality - by which I mean to a direct perception that I would have had at any time (\*) of such hatred. What I had perceived, and what I had had

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(\*) (6 March) After writing these lines I remembered that in the course of my married life, there were two episodes, the first lasting a few days, the second a few minutes, when I felt assailed as if by two beams of hatred, shooting from the eyes of the woman who was then my wife.

The first time was when my wife suffered what is euphemistically called a 'nervous breakdown' in the fifth year of our marriage (1962). This episode had a profound effect on the couple's life and the family atmosphere. It is also the moment in my life, of all those I have conscious memories of, that was experienced as the most atrocious, and that marked me most deeply (as it was supposed to do).

Unless we have an exceptionally stable inner foundation (which, due to lack of maturity, I was far from having at the time), the hatred we are the target of, and even more so when it comes from loved ones close to us, has a devastating effect on our psyche when it arouses in us a similar and destructive hatred of ourselves. It would seem that something in us must, at all costs, find a 'meaning' in 'what passes understanding', and that this 'meaning' is even an outright condemnation and rejection of ourselves by ourselves: since we are hated (and even though the 'reason' for this hatred escapes us completely...), it is because we are hateable.... .

If I was so affected by this episode, which remained like a sword of Damocles hanging over my life for the next six or seven years, it was surely because it resonated violently with a traumatic experience from my childhood. This had disappeared from my conscious memory, but it was all the more active whenever I was suddenly confronted with a malevolence or an inexplicable hatred - all as sudden and inexplicable as the will to destroy that had assailed me at the age of five, coming then from the person of all people who, as far back as I could remember, had been the peaceful and safe centre of the Universe.

This is one of the important things I've come to learn in my life about the malevolence or hatred I'm sometimes the target of, even though I'm in no way the real and immediate *cause of* it (even if certain aspects of myself, which I neither disavow nor reject, help to attract it to me).- For years, however, this knowledge remained too epidermal to defuse this deep-rooted mechanism that comes into play when I'm confronted with apparently 'causeless' malice or violence. To defuse it, I first had to go back to its roots and retrace the steps of those forgotten days and nights full of anguish, when my mother suddenly, mysteriously and inexplicably, became a hostile and fearsome stranger...

I had *interpreted* this as a sign of 'secret' hatred, because it had never been expressed. In fact, I think that for two of the women in question, it was in these lines, for the first time since I had known them, that I realised what appeared to me to be a 'secret hatred'. At the point I had reached, it was impossible for me not to make the confusion I have just mentioned. This confusion in no way detracted from the importance of making this observation, involving myself in it just as crucially as these women to whom I was closely linked.

As for the 'resentment' referred to in one breath with the 'secret hatred', I sensed from that moment that if a 'certain force' superyang within me had drawn the resentment of each of these three women to my person, it was for grievances for which I was in no way responsible - for wounds and damage suffered 'long before they knew of my existence, in the distraught days of a childhood deprived of love'. This perception, which had decanted over the years as the fruit of an intense experience, must surely have had the effect of an invisible guide for my reflections of 20 December last, in the note "Rancune en sursis - ou le retour des choses (2)" (n° 149), where the intuition appears that this same process of displacement of an initial resentment, or of a "resentment in a state of vacancy", could well have taken place in my friend Pierre, around the time of our meeting or perhaps even earlier. The facts known to me make this intuition at least plausible.

There is, however, an important difference with the case of my ex-wife, and with the other two cases mentioned in the meditation after the reunion. I don't get the impression that my friend's childhood was in any way 'distressed' or 'deprived of love'. This difference seems to me to manifest itself in the tone of my friend's antagonism towards me, which at no time reached the pitch of *vehemence* so familiar to me in the other three relationships. Also, in my friend's relationship with me, the appearance of signs of antagonism was at first extremely discreet and sparse, and even after I left in 1970, it took another eight years before this antagonism expressed itself directly and unmistakably against me (\*). This seems to reflect the existence of an initial 'resentment' that remained diffuse and un-weightable, without the presence of a hard 'core' corresponding to the feeling (even if hidden from the public) that I had been a part of.

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(\*) See "Two turning points", n° 66.

conscious gaze) of an outrage or a wrong suffered, felt to be irreparable perhaps...

When I mentioned, in the penultimate note, the will to destroy, or the will to injure or harm, *in the absence of hatred and animosity*, the thought came to me (rather insistently) of an apparent contradiction, which I thought I would come back to straight away. This is it. In the two cases that were at the centre of my attention, involving the man who was my pupil (and my mathematical 'heir apparent') and the woman who was my wife, there had indeed been a question of an unconscious 'grudge' that they had transferred onto my person. The very idea of a 'grudge' or 'resentment' seems to be linked to that of 'animosity' or 'enmity'.

We'd be tempted to say that a grudge (or resentment) is one of the possible ways (and one of the most common) of feeding animosity. And this statement is certainly true in the case of what we might call a 'direct' grudge, a 'real' grudge, motivated by a *grievance* (real or imaginary) against the person concerned, a *wrong* or *damage* that that person has inflicted on us. But in the cases I'm dealing with, it's not such a grudge we're talking about, but an indirect grudge, *'by proxy'* so to speak, transferred from an initial potential target, inadequate for one reason or another (\*), to an '*adoption target*' or replacement, which appears to 'fit' the needs of the cause. The remarkable thing is that such 'misplaced resentment' (it's a case of 1 to say!), which acts as the 1 stubborn force at work behind attitudes, behaviours and acts of such a nature that they seem to be driven by 'causeless' hatred or animosity - that such a

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(\*) There are many such "reasons", which often mean that the person who (whether voluntarily or not) has caused harm or inflicted damage, is nevertheless "unsuitable" as the target of resentment or animosity, or even hatred or a desire to destroy, which he or she has indeed aroused. Perhaps the most common, especially in the case of a mother or father, or a person considered beyond their reach by virtue of their rank or social position, is the fear of breaking an authority taboo that has been internalised for a long time. These are very powerful barriers - (in my case, they have tended, over the last fifteen years or so, to disappear more and more. . .). ) In the opposite direction, it can happen that the person in question is 'no match' for a grudge on the scale of the wrongs suffered - that he or she appears too insignificant, too evasive or pusillanimous perhaps, to be up to the role that would otherwise be rightfully his or her.

Finally, I can also imagine that in certain cases, the wrong suffered is too imponderable, too subtle (and even 'non-existent', to say the least, according to the prevailing consensus, long internalised by the person concerned), to give rise to anything other than a diffuse resentment, incapable of being 'condensed' and taking shape and strength in a relationship that is itself in gentle tones, with no apparent angles. This is undoubtedly a simple variant of the previous case, which came up in the reflections in the note "Rancune en sursis - ou le retour des choses (2)" (n° 149).

It's the combination of these two aspects of "gratuitous violence" in the strongest sense of the word (the one I'm examining here) that makes it so disconcerting. It is, moreover, the combination of these *two* aspects of 'gratuitous violence' in the strongest sense of the term (the kind I am examining here) that makes it so disconcerting, something that truly 'boggles the mind' (\*) : the complete absence of any rational and tangible "cause" for this violence, both in the person who bears the brunt of it (without having provoked it by attitudes, behaviour or acts that are hurtful or prejudicial to the other), and in the person who exercises it (without being driven by feelings of hatred or animosity that he or she might harbour, "rightly or wrongly", against his or her target).

Perhaps the question of the presence or absence of hatred or animosity, in the cases that concern me (where we find ourselves confronted with violence that appears to be 'gratuitous', unprovoked), is relatively secondary here, surely, as was the case for me, in the experience of the person who suffers this violence, and from the moment that the violence suffered becomes conscious, there must appear an impression of 'secret hatred' or 'animosity' on the part of the person inflicting it. However, this impression is in no way the result of a perception (which would have suddenly appeared, as if by a wave of a magic wand), but rather that of a cookie-cutter *assimilation*: violence hatred (or animosity) (\*\*).

One thing that seems to me to be much more important, however, is not only *the existence of* something as seemingly aberrant, as insane, as contrary to the most inveterate reflexes of 'common sense', as 'grudge by proxy', displaced from its 'original target' (or targets) to a 'replacement target' (a target of pure convenience, almost!), but also the fact that this is one of the most common mechanisms, encountered at every street corner, whether in one's own person (the last person you'd think of going to look for it!), or in someone else's life (*the last person you'd think of going to look for it!*); but to note, *moreover*, that this is *one of the most common mechanisms*, encountered at every street corner, whether in one's own person (the last person you'd think to go looking for...), or in that of one's family and friends. I've

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(\*) On the subject of this violence "beyond comprehension" ("unfassbar" in German), see the note "L'esclave et le pantin - ou les vannes" (n° 140). When I speak here of gratuitous violence "in the strongest sense of the term", without immediately qualifying it as anything other than "beyond comprehension", the precise meaning I have in mind is identified in the explanation that follows, through the explanation of these "two aspects" that combine in it.

(\*\*) (6 March) In some cases, however, there may well be a perception of hatred that is very much present, (On this subject, see the other footnote dated today, earlier in this same note). What we have here is a hatred

which, apart from in exceptional circumstances, remains confined to deep layers of the unconscious, and which moreover remains there in a state of 'vacancy', without a designated target, even though it is the secret force which drives acts of violence (most often in insidious form) which, for their part, are well and truly and unfailingly aimed at the same chosen target. ...

I even have the impression that this mechanism is *universal in nature*, that it is part of the basic mechanisms of the human psyche, that it is one of those few all-purpose mechanisms that make up the *syndrome of flight* from reality: the refusal to acknowledge it, and the fear of facing up to it.

More precisely, I have the impression that I have put my finger, today, on the *spring common to all situations of 'gratuitous violence'*, without exception. This impression emerged, with the force of a sudden conviction, when I began to examine (three paragraphs above) an "apparent contradiction". I then had the feeling that a whole host of fragmented and heterogeneous impressions that I had accumulated over the course of my life, revolving around the 'sensitive point' of all this violence 'that goes beyond understanding', were suddenly coming into order, suddenly acquiring a perspective that was still lacking - a perspective that appeared there unexpectedly, at the end of a thought, just as I was about to put a very last dot on a very last i. ...

(<sup>160</sup>) (8 January) For the past week, there has been an unusual cold snap - temperatures of -15 and below, and when the wind blows from "Mont Venteux" (the name says it all 1), it must be even colder. It seems that this wave is sweeping the world (according to someone who listens to the news), and that in the south of France it hasn't happened since the famous winter and spring of 1956. When I was growing up in Germany, I experienced cold like that, but there was snow to protect the earth and make the air and things seem softer. With this snowless cold, the earth's surface froze like a block of ice. In the space of a few days, the garden has been razed to the ground - I don't know if there will be anything left in the spring from what we sowed and planted. The leaves of the leeks, celery, chard, lamb's lettuce, beetroot and chard that were left are like leaves of ice, frozen vegetables. We're hurrying to harvest as much as we can from day to day, to eat as we go, before it thaws and all goes to compost. And yesterday the water supply in the kitchen froze, so luckily there was still running water downstairs in the old garage, which is less exposed to the cold. Today a friend came over with a portable gas torch and managed to get the water running again. I'll have to leave a trickle of water running so that it doesn't freeze dry again. Luckily I've got a good wood-burning stove in the dining room, where I've moved my work. It's really nice sitting next to the stove. I warm myself with the vine stumps, which I chop up every day, a good grape crate...

full overboard in the cold. When the wind keeps blowing all afternoon, it's enough to give you hooves, just to stand there for fifteen or twenty minutes breaking wood in the wind. Not to mention the car outside that won't start.

- I've heard that cars don't stand the extreme cold very well, antifreeze or no antifreeze. The same complaisant friend put it back on the road earlier today, but will it still work tomorrow to proofread the typing of the secretary I gave the job to? In short, all it takes is a cold snap in winter, or a heat wave in summer, or a minor illness at any time, to remind us of some of the realities of life that we tend to forget when everything is humming along just fine...

Over the last three months, my work rhythm has gradually shifted towards the night hours. I work until around two or three in the morning, and sleep until around eleven or midday. With the weather the way it is, if I listened to myself once I was in bed, I'd stay up all twelve easy hours - and conversely, once I was at work, I wouldn't go to bed 1 I try to keep a reasonable balance. I don't worry too much about time differences, as long as I get a good night's sleep and don't lie in bed for hours on end with my thinking machine still running. Even now, when there's hardly any work to do in the garden, there's still enough to keep me busy every day, including the firewood, and a little gymnastics here and there. I have the impression of a satisfying balance in my life, where the work of discovery doesn't seem to devour everything else, but without being on the small side. Since I went back to work on 22 September, I must be spending an average of five to six hours a day on it. It's modest, but the 'output' seems to be only slightly less than before. "The 'slaughter' (around a hundred pages a month) is more or less the same as for writing the first two parts of Récoltes et Semailles. But from a qualitative point of view, there's no doubt in my mind that this third part is the most profound, the one that has taught me the most about myself and others.

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Na mu myo ho ren ge kyo!

Just as I was finishing this short retrospective on the rigours of winter and the evolution of my life balance, I received a phone call from one of my Buddhist monk friends from the Nihonzan Myohoji group, telling me that their revered 'preceptor' had died.

(\*), Nichidatsu Fujii, better known as Fujii Guruji, or 'Osshosama' to those close to him. My friend in Paris has just received the news in a phone call from Tokio, and I assume that Fujii Guruji died today (\*\*). He had just turned one hundred on 6 August, physically weakened but in excellent mental condition.

By a strange coincidence, 6 August is the anniversary of two other important events, one of historical significance, the other of a personal nature for me. It's the anniversary of the atomic bombing of Hiroshima (6 August 1945) - remembered by the Japanese as 'Hiroshima day'. (This is why the festivities for Fujii Guruji's birthday took place towards the end of July, to keep the days around 6 August available for pacifist and anti-atomic demonstrations). On the other hand, my father was born on 6 August 1890, six years to the day after Fujii Guruji's birth.

After the death of Claude Chevalley, that of Nichidatsu Fujii is the second death of a person who played a not inconsiderable role in my life, occurring during the writing of Ré-coltes et Semailles. In view of this passing (which doesn't really come as a surprise), I'm particularly pleased that just last year there was a warm exchange of letters with him. I had been invited to attend the ceremony for the hundredth birthday of the old Naître, which was to be held with exceptional pomp in Tokyo (a small book of testimonies about him had even been hastily published, to be given to him for the occasion). This had been an opportunity for me to write (as I do almost every year), a few words of early congratulations, apologising for not being able to attend the ceremony on 30 July, as I myself was still more or less bedridden at the time of writing. (It's also true that I'm not much given to big public ceremonies, but I didn't think it necessary to mention this in my letter. In any case, I must have disappointed and saddened more than one of my monk friends, by stubbornly abstaining from attending any of the 'great occasions' (\*), which they never tired of.

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(\*) 'Preceptor' is the English word for 'teacher'. Nihonzan Myohoji is the phonetic transcription of the group's Japanese name, which translates as "Japanese Mission". It is a "missionary" Buddhist group, with a primarily pacifist vocation. See below for more details.

(\*\*) It turned out that he had only been dead for a few hours. The news spread quickly!  
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(\*) The most important of these "great occasions" was the inauguration of the "Shanti Stoupas", or "Pagodas" of Peace". The construction of these Pagodas, or places of meditation for peace in the world, dates back to

but to invite me). I had to add a few words about the beneficial side of an illness, which forces us, in spite of ourselves, to 'unplug' from our occupations and to give the body what it needs. Fujii Guruji himself had been bedridden a lot during the past year, which must have weighed heavily on him, given his temperament for action and his uncommon energy. Although it had been more than seven years since I had received any personal communication from Fujii Guruji, I was surprised to receive a letter from him, dictated by him while he was still bedridden. The letter (which I have just reread) is dated 13 July 1984. It's a very thoughtful letter, in which he worries about my health, and is distressed that he won't be able to send someone to take care of me. He also talks about his health and how he is coping with his forced inactivity. He ends with these words, in very 'Japanese' style, which should be taken with a (large i) grain of salt, and which showed me, perhaps even more than the rest of the letter, that my tone was as good as ever (\*\*):

"Indeed I am a very old decrepit man of no use even if I may get back to normal life. Yet still, I would like to live and see how the world turns."

There he was able to watch the world go round for almost six months...

My links with the Nihonzan Myohoji group go back to 1974. There's no point in even sketching out here the many and varied episodes of this relationship - it would take a volume. They are among the richest 'spin-offs' of the 'Survive and Live' episode(\*J that followed my departure (between 1970 and the end of 1972). It had

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a very old tradition in the Buddhist world (initiated by King Ashoka in India), and was one of Fujii Guruji's main preoccupations. It inspired the construction of a large number of Shanti Stoupas around the world, including three in Europe and one in the United States.

(\*\*) The letter was dictated in Japanese (the only language Guruji spoke) and translated directly into English. French translation of the lines quoted: "Certes je suis un homme très vieux et décrépit et d'aucune utilité même si je puis retrouver une santé normale. And yet, I would like to live and see how the world turns out."

(\*\*\*) This episode is alluded to several times in "Fatuity and Renewal" (the first part of Récoltes et Semailles). "Survivre et vivre" (which was originally called "Survivre" but nothing more) is the name of a group, initially pacifist, then also ecological, which was born in July 1970 (on the fringes of a "Summer School" at the University of Montreal), in a milieu of scientists5 (and above all, mathematicians). It rapidly evolved into a "cultural revolution", while broadening its audience outside scientific circles. Its main means of action was the bulletin (more or less periodical) of the same name, whose successive directors were Claude Chevalley, myself, Pierre Samuel, Denis Guedj (all four of them

In a Japanese newspaper (or newspapers?) in 1972 or 73, there was some mention of this group, and of the bulletin (not very regular!) of the same name, and also of my 'departure from maths' and my 'trajectory'. The 'criticism of science' and denunciation of the military apparatus, and also, perhaps, the 'criticism of a civilisation' aspect, must have 'passed' to some extent in some article, attracting the attention of one of the monks at Nihonzan Myohoji. He spoke to others about it, and in particular to a younger monk from the same town (Kagoshima), who had become a monk under his influence and was something of a 'pupil'. He was the first missionary monk from the group to arrive in the 'West', in Paris to be precise, in the spring of 1974 (\*). He came to see me a few weeks later, unannounced, in the remote village where I was living at the time, about fifty kilometres from Montpellier. Ever since that memorable day in May when, in the midday sun, I saw a strangely dressed man, singing on the road to the accompaniment of a drum and heading (there was no mistake...) towards the garden where I was working alone - ever since that day I've had the feeling that I was going to see him.

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of mathematicians) - not to mention an English-language edition, maintained at arm's length by Gordon Edwards (a young Canadian mathematician whom I had met in Montreal and who was among the initiators of the group and the newsletter).

The first bulletin, written entirely by myself (naive and full of conviction!) and printed in a thousand copies, was distributed at the International Congress in Nice (1970), which brought together (as it does every four years) several thousand mathematicians. I was expecting a massive turnout - there were (if I remember correctly) two or three. Most of all, I sensed a great deal of discomfort among my colleagues! By talking about the collaboration of scientists with the military, which had infiltrated scientific life from all sides, I was putting my foot in it... . It was in the 'big world' of science that I felt the greatest embarrassment - the echoes of sympathy coming my way from there were limited to those of Chevalley and Samuel. It was in what I have elsewhere called the 'swamp' of the scientific world that our action found a certain resonance. The bulletin ended up with a print run of around fifteen thousand copies - an insane amount of work, by the way, when distribution was done by hand. Didier Savard's juicy drawings undoubtedly contributed greatly to the relative success of our canard.

After my departure and that of Samuel, things ended up turning into a leftist groupuscule, with sharp jargon and unanswerable analyses, and the bulletin ended up dying its own death. What needed to be understood and said, at a certain point close to the effervescence of 1968, had been understood and said. After that, there was little point in spinning a record over and over again...

(\*) He assured me that he was the first Buddhist missionary monk in the history of the West. of Buddhism - but I cannot guarantee that this information is reliable! Moreover, it's not true that becoming a missionary has really been a great 'advance' for Buddhism. Right from the start, this aspect of the Nihonzan Myohoji group aroused reservations in me, which have only been confirmed over the years.

I have had the privilege and pleasure of seeing many followers and sympathisers (\*) of Guruji pass through my house. Their contact has been of great benefit to me. At the beginning of November 1976, I even had the great honour and joy of welcoming Fujii Guruji in person to my rustic home, at the age of 92, accompanied by a group of seven or eight monks, nuns and disciples. I had already met him the previous year, at the solemn inauguration of the group's temple in the eighteenth arrondissement of Paris. Over and above the customary words of courtesy, there was a strong sense of contact and immediate sympathy. The more intimate and personal context of a visit of several days to my home gave me, of course, a much richer understanding of Fujii Guruji as a person, and of his relationship to the group of which he was the head and soul. Interestingly, this visit to Fujii Guruji followed very closely, by just two weeks, the crucial turning point in my life that took place between 15 and 18 October of the same year, mentioned elsewhere (\*\*). The weeks that followed those days of crisis and renewal were among the most intense of my life, with each day bringing its own unexpected harvest of inner events and discoveries. To tell the truth, this visit, planned and prepared for weeks, of a whole group of monks and nuns around their venerated master, seemed to come as a kind of strange interlude, like a diversion in the adventure that was absorbing the whole of my being. It was my respect for my hosts, and especially for Fujii Guruji who had come to honour my home, that allowed me to be available for these few days as the occasion demanded. As has often happened to me, it was only when I got to the heart of the event that I realised that it was in no way an 'interlude' or a 'diversion', but part of the adventure I was living. Underneath its very 'tales from the Orient' exterior, with its perfect delicacy and unusual charm, this so-called 'interlude' brought me into the presence of men and women just like me and the men and women I had always known in less exotic, less extraordinary contexts. It was because I felt this kinship that I also felt that my guests were friends and brothers, and not characters straight out of a tale of a thousand and one nights, as must have been the case.

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(\*) It was one of these people who had the honour, as an "illegal alien", of being the occasion for the first literal application, in French case law, of a certain quite incredible article of a certain "Ordinance of 1949". I had the honour of finding myself in the Correctionnelle (Magistrates' Court), for having given 'free lodging and accommodation' to such an outlaw. On this episode, see the section "My farewells - or foreigners" (n° 24).

(\*\*) See the section "Desire and meditation" (no.° 36) and the note "The reunion (the awakening of yin (1))" (no.° 109).

for more than one astonished villager. And Fuji! Guruji himself, who spoke to me so familiarly, while those 'close to him' kept the distance demanded by the respect due to the revered master, I felt very, very far away (from me as well as from those close to him), and yet close at the same time, as if he had been my father, or a benevolent elder brother.

And as is not uncommon with a father or an elder brother, even the most benevolent, he had an expectation of me, which he didn't hide, an expectation shared by those who accompanied him and who were all my guests. And I also knew that I couldn't meet that expectation. My adventure was linked to that of Fujii Guruji, by links that I could only dimly discern, perhaps deeper than I could see, and to that of his disciples who followed him with their eyes closed. But it was no more than of my prestigious and benevolent host than it was that of my father, also prestigious and benevolent to me, very close and yet different: another person, another destiny.

It wasn't easy to 'get across' that I wouldn't be one of them in an undertaking that was theirs, and that I didn't feel was mine. According to the picture of me that Fujii Guruji and his followers had been given, this was the last thing they would have expected - and all the more so as the relationship on a personal level, between the group or the various members of the group and myself, was like a real honeymoon. It was also during this visit that certain long-standing resistances, due to my upbringing, vanished, and I joined my hosts in chanting their mantra, accompanied by the drum:

"Na mu myo ho ren ge kyo!"

This mantra is the foundation, the alpha and omega, of their religious practice. They usually chant it to the accompaniment of a prayer drum, one hour in the morning and one hour in the evening. Following the teachings of the Japanese prophet Nichiren, this drum chanting is in itself the sovereign good, the dispenser of peace in and around the person who sings it. So for my Japanese friends, this chant is what is commonly called a 'prayer'. The meaning they give it, in accordance with Nichiren and their direct 'preceptor' Fujii Guruji, is that of an *act of respect* for the person being addressed, and through him, for every living being in the universe - as a being promised (according to the Lotus Flower Sutra) to become Buddha, the incarnation of perfect wisdom. These seven syllables also serve as a greeting for any other person, or even for any other being whom we might wish to greet, with this connotation of respect for what is of divine essence in the other. They also serve as a thanksgiving before the meal. To tell the truth, it seems to me that there are no

There is hardly an occasion, be it a moment of surprise, emotion or contemplation, when a Nichiren follower cannot say the sacred words. As for me, without sharing the religious beliefs of my monk friends (\*), it is with joy that I join them, when the occasion arises, to do Odaimoku - to sing on the drum what they call "the Prayer". It is in their memory, and as an act of loving respect to their master, Nichidatsu Fujii Guruji, that I have also made 'the Prayer' part of my daily life, singing it before each of the two main meals of the day, at least when I am at home, or with friends, or with people I know will not mind (\*\*). This is one of the great things I owe to Fujii Guruji and to those of his disciples whom I have known and who have given me their affection, without tiring of my reluctance to associate myself in any way with their missionary activities.

There are several million Nichiren Buddhists in Japan, divided into numerous sects of very different physiognomies. The Nihonzan Myohoji group is one of the smallest in terms of numbers, comprising a few hundred monks, nuns and active sympathisers. Yet it is well known in Japan and elsewhere, distinguishing itself from all traditional religious groups by its unequivocal political commitment, the main focus of which is the struggle for peace, anti-militarism and, more particularly, anti-nuclear action. At the time of the Vietnam War, it was the only Buddhist group (unless I'm mistaken) to take a clear stand against the Americans, and to fight against the presence of American bases in Japan (which served as logistical support for the continuation of the war in Vietnam). In recent years, Fujii Guruji has also been in close contact with the leaders of the Indian liberation movement in the United States, the AIM (American Indian Movement). Monks from Nihonzan Myohoji have taken part in marches organised by the American Indians, not to mention other Peace Marches in various parts of the world. Indian leaders have

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(\*) I don't feel I belong to any particular religious denomination. My parents brought me up as an atheist (with a hint of anti-religion) until the age of fourteen. A remarkable talk by my natural science teacher on the history of the evolution of life on earth made me understand, without the slightest possibility of doubt, the presence of a creative intelligence at work in the Universe. This understanding, which at the time remained at the level of the intellect alone, broadened and sharpened in the course of my subsequent maturation, continuing after I left the mathematical scene in 1970.

(\*\*) In particular, I refrained from singing the prayer at the weekly meal I had at the Faculty, in the company of a few pupils or colleagues, not being sure that one or other of them would not feel some kind of constraint, which I would impose on him or her by virtue of my position as elder or 'boss'

were visibly attracted and impressed by Fujii Guruji's unusual personality. The fact that this man of indomitable energy, approaching a hundred years of age, was a great missionary of a religious faith different from their own, did not seem to bother them in the least. On the contrary, the religious dimension of the venerable Master's 'anti-American' options with a touch of zinc was surely, in addition to his age, one of the reasons why they welcomed Guruji as they would have welcomed one of their own, like a highly respected father or grandfather in whom they could see themselves (\*).

I'm sure that this religious dimension worked in the same way for me - it brought Fujii Guruji closer to me, even though I don't claim to belong to any particular religious faith. If I ask myself what attracted and struck me most about him, I see several things. The most obvious is an inner *joy*. This joy seems to flow spontaneously from a *unity* in his person, or rather perhaps from a *fidelity* to himself. You can feel that this man is happy, because all his life he has done without hesitation what he felt he had to do. He does not appear to me to be free of contradictions, but he is devoid of ambiguity. The meaning of some of his acts or omissions escapes me, but at no time has it occurred to me to doubt the total integrity of the man. If this is so, it is not as a result of an analysis of what I know about him through intermediaries. You only have to have met him once to know that he is a man who knows no ambiguity, a man in deep accord with himself. This is what the Indian chiefs of the AIM must have sensed, in order to give him the place they have given him among them. This is surely also where his extraordinary influence lies over those who claim to be his followers, men and women whose ideological and philosophical options range from hard-line Marxism-Leninism to the good-natured conformism of the CEO of a department store chain. What brings them together is not the

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(\*) To give an idea of the bond of trust and respect linking the Indian chiefs to the person of Guruji, I would like to point out here that during the great annual initiation festival, held around the "sun dance", the monk disciples of Guruji took part, beating the great prayer drum from sunrise to sunset, to the throbbing rhythm of Na mu myo ho ren ge kyo! These large drums, hollowed out of a single trunk and stretched with ox skins, are unusually powerful, and (I presume) hard to bear for twelve hours at a time (I tried it for two hours when the temple was inaugurated in Paris, and it was conclusive...). In any case, Robert Jaulin (who, along with the monks, was one of the few non-Indians invited to take part in the festival) told me that the Indians stoically endured Grandfather Guruji's sacred drum from the beginning to the end of the initiation, of which the Guruji tam-tam was one of the many trials...

It is not only the veneration of a certain Sutra which perhaps none of them had the effrontery to read (\*), but also a certain prayer of Palei origin, restored in Japanese through the intermediary of the Chinese translation, which professes the veneration of this Sutra. What unites them (or should we say, what brought them together?) is one *man*, exerting over them an ascendancy that he no more sought to exert than the sun sought its planets.

I also saw that this man was *alone*, and that solitude did not weigh heavily on him. It was his natural condition, perhaps always had been. This solitude, and this integrity, or this agreement with himself, appear to me as so many different aspects of one and the same thing. Yet another aspect of the same thing is that of *strength* - a strength without violence, and that doesn't worry about being or appearing 'strong'. Again, this is the force of the sun, which is sufficient in itself to create this field of forces around itself, and the orbits that the planets travel in.

Surely this is also the strength I spoke of more than once in Harvest and Sowing, as '*the* strength' in us - with the difference that in one man it is fully apparent and sensitive to all who approach him, and in another it is buried more or less deeply, sometimes to the point where it might be thought non-existent. But if some of my monk friends seem to deny it in themselves, yet this Sutra that they profess to venerate, and the very Prayer that they chant day after day, clearly proclaim that such a force lives in every living thing in Creation, promised like them, and like their venerated master Osshosama himself, to the destiny of the Buddha.

(<sup>161</sup>) (13 January) (\*) It's been another four days since I've had the peace and quiet to

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(\*) More than one of Guruji's disciples has made it clear to me that he would consider it impudent to pretend to read the Lotus Flower Sutra, even though a Japanese translation exists. Only a man of great depth of mind, such as his master Fujii Guruji himself, would be capable and worthy of reading this sacred text, which is infinitely beyond the intelligence of the layman. Clearly, the faith of these men and women is not in some more or less deified historical figure, such as Buddha, or the perfect Bodhisattva and prophet Nichiren, but in Fujii Guruji himself.

(\*) (23 January) The whole of the first part of this note was written against strong resistance to mention any disturbances that interfered with my work. These took on a vaguely ridiculous appearance, and to even mention them was a bit like graciously handing over the rods to be beaten! On the other hand, these disturbances, 'which can literally saw you off', had become so grating and invasive in my work, especially during a week or two, that it would have been a kind of cheating, an inauthenticity in the testimony, to pass them over in silence as if nothing had happened. I've just come back from

work - to continue the notes, I mean. The main reason for this lies in the quite incredible difficulties I'm having getting this third part of Harvest and Sowing typed up. In the thirty-plus years I've been in the habit of getting typing work done, I've never experienced anything like it. Clearly, having this highly personal, not to say intimate, text in my hands triggered (surely unconscious) reactions of considerable force in the people in charge of typesetting, each time going in the direction of sabotaging the work entrusted to them. In the space of a few months, the same scenario was repeated three times in a row, with some variations, with three secretaries in a row, all of whom had not given each other the word (\*\*)! This third time, moreover, a sordid note was added, as the secretary, Mrs J., pretended to use the rather unusual manuscript that had been entrusted to her care, as a means of blackmail to extort some sort of ransom. She was a former executive secretary with extensive experience in the profession. The first eleven pages of typing were impeccable and almost without a typo, just to show what she could do; and in the next fifteen pages alone, there were eleven lines skipped - it's rare that I've seen such a crippled text.

! I didn't ask what the ransom was (over and above the price agreed for the text already typeset) to get my manuscript and typesetting back, as I have no desire to encourage this kind of procedure. This means that I will probably have to resort to legal action.

Fortunately, I still have a draft of the manuscript, which I can use if need be. All the same, this kind of circus, especially when it becomes repetitive, can literally 'saw you off'. When I imagined the difficulties and antagonisms that my modest meditative and autobiographical paving stone would undoubtedly raise, I certainly didn't imagine that it would be from this side, from the brotherhood of secretaries-typists (instead of that of my honoured mathematician colleagues) that the first trouble would come, and in the nature of things

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on my setbacks ten days later, in the note "Jung - or the cycle of 'evil' and 'good'".

(7 March) This last note, the first of a whole series of 'notes de leclecture' on the autobiography of C. G. Jung, was finally rejected in the last part of Harvest and Sowing, which consists of the part of the reflection prompted by this autobiography.

(\*\*) those who wish me well will have no trouble accusing me of delusions of persecution - after the brotherhood I See, for the previous ones, the note "The massacre" (the name of the note already says enough about me. . . ) p. 538, about the removal of my friend Ionel Bucur...

a kind of war of attrition! I'm not too keen on entrusting this same text (once it's been recovered) to a fourth secretary, when there's nothing to suggest that she'll have any more sympathy for it than those she'll be taking over from. And to do the job of secretary myself would require a time commitment of well over a month, which I am absolutely not prepared to make.

Perhaps I'll have to give up typing this third part of *Récoltes et Semailles*, which I'll hand over directly to the publisher in the form of a draft manuscript (I don't expect the same kind of trouble with the professionals responsible for typesetting the text for printing!) Above all, this would mean that I would forgo including this third part in the limited pre-edition of *Récoltes et Semailles* to be produced by my university, USTL, for personal distribution among colleagues and friends. Or maybe I'll have it printed later, if I end up finding a secretary who does a decent job. I will only send out this part (surely the most 'difficult' of the three) on the express request of those really interested in receiving it, among those who have received the first two parts. I'm really looking forward to having these printed and sent out (although I'm in less of a hurry for the third part). The typing of these two parts was completed months ago, and was carried out (without any problems) by the secretaries at the USTL. They could have been printed a long time ago, if I hadn't wanted to include a table of contents of all three parts of *Récoltes et Semailles*, although I think I've been on the verge of finishing this interminable third part for more than three months. I'm going to give myself until the end of this month to finish, or if not, to take care of the printing of the first two parts (Fatuity and Renewal, and Burial I, or the robe of the Emperor of China), without including a complete and definitive table of contents for the third part (Burial II, or the key to yin and yang).

And now, after all these unpleasant incidents, I have to find my way back to a line of thought that was cut short.

The death of Fujii Guruji in his one hundred and first year, on the ninth of January, was an opportunity to evoke, with him, an aspect of my life that I hadn't touched on before. As I did not have the opportunity to see Guruji on his deathbed again, and to take part in a funeral vigil in the company of his relatives, I spent the night after his death in a solitary vigil, jotting down until the morning some of the reminiscences and thoughts provoked by the event. Afterwards, I thought it would be a good idea for me to try, on this occasion too, to say what I thought.

brought me the encounter with Fujii Guruji, and with those of his disciples with whom I became familiar.

In my notes of five days ago, I already mentioned the chant Na mu myo ho ren ge kyo, which has been part of my life for many years, and which is a blessing. There is also the affection received by Fujii Guruji himself, and by several of his disciples, young and old. It is this affection, surely, that gives its price and its beauty to the chant I received from them, which is itself an act of respect and affection for all living things in creation, including them and myself.

Also, my contacts with the monks and nuns of Nihonzan Myohoji were my first and only close contacts with men and women whose main, if not total, investment was in religiously motivated tasks (just as for a long time my own investment was in mathematical discovery work). This was an opportunity for me to realise that, as elsewhere, beyond a certain affinity through a common vocation (called religious) and allegiance to the same strong and attractive personality, the differences in temperament, conditioning and even profound *choices* remain just as marked, and just as effective in person-to-person relationships. To put it another way, the efforts of some people to *mould* themselves according to some religious ideal (in this case that of the 'Boddhisatva', the tireless propagator of the Buddhist teachings) result in *attitudes that* are more or less on the surface, rather than in a process of inner *transformation* or maturation. Furthermore, the adoption of a 'credo' (no matter how sub-lime) and the total investment in a so-called 'religious' activity seem to have no essential impact on the play of the usual egotistical mechanisms. Conflict is no less present in monasteries, convents, temples and other religious communities of all denominations than anywhere else in the world. And often the religious vocation is taken as one means, among others, to evacuate the conflict, by convincing oneself that it has disappeared by the virtue of the creed.

It's also true that on different occasions, in one of my monk guests there was an inner peace and joy that radiated from him, sensitive to me and to all those who were close to them, and beneficial to themselves and to everyone else. Visibly, such a state of harmony and fulfilment, of profound agreement, is alien to any effort to be this or that - it is an 'effortless' state, a state of perfect naturalness.

For four of the monks in whom I felt such a radiance, I have the impression that

This has been their custom for many years, even decades. This is particularly true of Fujii Guruji himself. For two other friends of mine, I have seen them on other occasions as knotted and as torn as anyone else, it was as if the state of harmony in which I had known them, and a certain spontaneous understanding of things that was one of the signs of it, had become null and void - as if they had left no trace of themselves. I am convinced, however, that there is an indestructible 'trace', deeper than a simple mark recorded in memory - a trace in the nature of *knowledge*. Like everyone else, these friends are free at any time to take account of the knowledge deposited in them at the creative moments of their existence, to let it act and bear fruit.

Just as they are free to ignore it, to bury it, to 'play the fool', in short. It is, after all, the most common thing in the world...

The thought came to me that this state of perfect naturalness, of profound agreement with oneself, and the radiance that accompanies it, are *not* very common things, by contrast. It's quite remarkable that in the rather small group of monks I've been able to welcome into my home, whether for a few days or a few weeks, there have been so many in whom I've found this state of inner harmony, of strength in the full sense of the word, where humility and fortitude, the gentle and the incisive, come together. After all, isn't that really what a creed does, or the prayer that expresses it? Even if it is clearly unable on its own to create a state of grace, perhaps it nevertheless tends to *encourage* the appearance of such a state, and its renewal day after day? After all, the mere fact of singing a beautiful song and putting our whole selves into it is already to some extent a "state of grace" - and the mere beauty of a song (or a prayer) already encourages us to "put our whole selves into it".

It is also true that the most beautiful of songs, when we dwell on it with our minds elsewhere, remains inactive unless we open ourselves to it. Or to put it another way, what we rehash in this way *is not* the song we think we are singing, and our soul is not nourished by it, any more than a paper or plastic rose is a rose and a bee would come to feed on it.

(<sup>162</sup>) (14 January) At the end of the week's reflection, I had the feeling that I had 'put the mustg' on something important. That very night, I wanted to express this "*something*" succinctly in the name given to this note, "The cause of causeless violence" (note n° 159). I also knew that this sudden flash of understanding was in no way the culmination, or even the end, of a process of reflection that had been going on for more than a month (\*).

The new 'perspective' that had suddenly appeared was more like a new starting point. On the contrary, this new 'perspective' that suddenly appeared was more like a new starting point. The mechanism of 'displacing' a grudge or resentment for wrongs and damage suffered in earlier days, towards an *acceptable* 'target' in place of the person or persons actually responsible, felt to be out of reach or 'taboo' - this mechanism, which I had first recognised sporadically, in this and that isolated case in the course of my life, and tacitly taken for some kind of strange and erratic aberration of the unconscious, is finally recognised as one of the 'basic mechanisms of the human psyche'. At the same time, it appears to be responsible for innumerable and disturbing manifestations of 'causeless violence', whether between wife and husband, lover and lover, parent and child, or the 'anonymous' violence that reaches its climax in times of war or great social upheaval.

I don't know whether these links have long since become part of the ABCs of psychological or psychiatric science (assuming there is such a thing as 'science'), or whether what I say about them here will come across as the fantasies of a 'psychoanalytic dilettante'. Since my aim is not to present a doctoral thesis in psychology, or even to break new ground for some old or new theory, but to understand my life through the situations in which I am involved, I don't care what 'status' I happen to put my finger on, or what 'perspectives' I suddenly see opening up here and there. I'm well aware that in any case, if I want to understand anything at all, I can't do without personal reflection, whether it's in mathematics, or in my life and the lives to which my life is linked in one way or another. And this is all the more the case when what needs to be understood seems to defy reason from the outset, and when I see everyone, around me and elsewhere, avoiding it like the plague, using reassuring clichés. (And it seems to me that psychology professionals are no more adept at this than anyone else, at least when their own person is directly involved).

I was well aware that the 'sudden conviction' that appeared with 'the last dot on the last i', namely that 'I'd just put my finger on the spring common to all situations of "gratuitous violence"', in no way relieved me of the task of examining, from every angle, this new intuition that had arrived in the field of vision.

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(\*) Specifically, since the memo of 7 December "Velvet paw - or smiles" (n° 137).

conscious, not yet free of the diffuse halo of what had just emerged from the mists. On the contrary, this was precisely the first job to be done, and I could already see a host of new questions arising, both specific to particular cases and general. If there was any certainty in this sweeping 'conviction', or to put it more accurately, a kernel of certain knowledge, it in no way told me that the formulation I had just given to this conviction was 'true', 'correct', without any reservations or major alterations perhaps; but rather, that I had indeed put my finger on a *new* (for me) *and essential fact*, that a *new perspective* on violence had indeed just been established (\*). The precise and nuanced meaning of this new fact and this new perspective, its ex-act scope and also, perhaps, its unforeseen extensions and repercussions, cannot fail to emerge, as soon as I put the necessary work into it. The 'knowledge' that had just come to light told me, in particular, that the time was ripe for such work, for entering into the 'new world'.

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(\*) As I was writing these lines, the comparison with the "standard conjectures" on algebraic cycles, which I presented at the Bombay Colloquium in 1968, came to mind. They seemed to me then (and still do today) to be, along with the resolution of singularities, one of the most burning problems in algebraic geometry. In working out these conjectures, I felt that a 'new perspective... had just been established' this time on algebraic cycles, their relationship to Hodge's theory and Weil's conjectures. What struck me above all was that I saw the beginnings of an approach to Weil's conjectures that would be 'purely geometric', I mean, without having (at least in appearance) to go through the medium of a cohomological theory.

As I have already pointed out elsewhere (in sub-note no.° 106<sub>1</sub> of the note 'Muscle and guts'), the reality of this 'new perspective' and its scope is entirely independent of the question (which remains in the nimbus of the future) of whether this conjecture will prove to be true or false. A conjecture, for me, is not a *gamble* (that we win or lose), but a *test* - and whatever the answer, we can only come out 'winners', by which I mean: with renewed knowledge. (Compare with the reflection in the section 'Error and discovery', n° 2.) Assuming that the conjecture turns out to be false, I can already see two or three "less optimistic" variants that refine it, the weakest of which is practically equivalent to the existence of a "reasonable" theory of semisimple patterns over a body.

Identifying these variants is an exercise that takes an afternoon or two (and perhaps the starting point for a long journey into the unknown...). Coming up with the first statement (inspired, as usual, by an idea of Serre's, set out in his article 'Kahlerian analogues of Weil's conjectures'), was not an exercise, but a *discovery*; or again (to use the expression from Zoghman Mebkhout's letter, quoted in the note 'Failure of a teaching - or creation and fatuity', n° 44<sup>12</sup>) a *creation*. And it was an understatement when Zoghman timidly ventured to say that 'my students don't really know what a creation is' - or rather, I'd say that they knew but forgot a long time ago, busy as they were pushing the wheels of a funeral cart...

that every hour and every day that I would devote to this task, in order to get to the bottom of what had just appeared, would bring me further into this understanding. I don't remember that such a feeling of the appearance of something new and essential (even though it would still remain diffuse and approximate), and the intimate conviction of being able to penetrate further into the understanding of this thing, ever deceived me. If there has been a sure guide in my research to 'place' my investments in this direction or that, it is the feeling of the appearance of the *new*, and this intimate conviction that tells me when the time is ripe to enter further into this 'new' glimpsed and to know it (\*).

That doesn't mean that every time the time is ripe for me to embark on such and such a direction, and to find out such and such a thing, I actually do it! It was impossible even when I was investing all my energy in mathematics, when I gradually found myself with ten irons in the fire, then with a hundred! (\*) And it was the same in meditation, that is, in self-discovery. Unfortunately, when it comes to conscious work, we can only do one thing at a time (which is not bad, even so, if we take the trouble to do it properly. . .). This work on *one* of the 'hundred irons in the fire' can, it is true, following the mysterious paths of the unconscious, also benefit all the others, or at least several of them - it can 'warm them up', make them more receptive to the hammer blows on the anvil of conscious attention, from the moment we turn our attention to them. We still need to know how to choose 'the right' iron from among the hundred - the one whose shaping will also advance the work on the others, which are in the process of heating up like it.

(<sup>162</sup>) In the course of reflecting on Burial, I came across many 'irons' that wanted me to work on it, more or less hot depending on the case. It seems to me that they all warmed up in the course of the work, some more, some less. The very first of these 'irons' was the question of *self-contempt* in the case of my own person, first raised as a matter of conscience, on the fringes of the first embryo of Récoltes et Semailles (\*\*). It remained rather tepid, until the reflection of 13 December (a month and a day ago), in the

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(\*) Compare with the note "L'enfant et la mer - ou foi et doute", n° 103. (\*)

See the note "Cent fers dans le feu, ou: rien ne sert de sécher!", n° 32.

(\*\*) See the note (n° 2) referring to the section (of June 1983) "Infallibility (of others) and contempt (of oneself)" (n°

note "La violence du juste - ou le défoulement" (*n<sup>o</sup>* 141). It was the first time in my life, I think, that I devoted any thought, however brief, to the few cases in my life where I myself have practised and caused to be practised 'violence without cause', violence 'that is beyond comprehension'. I've thought about it from time to time over the last few years, but always in passing, without dwelling on it, and above all, without giving it any written thought.

Yet violence-that-doesn't-say-its-name had profoundly marked my life - it was one of the crucial things, if not *the* crucial thing of all, that I had to understand as deeply as I could\* in order to understand my life, and 'life' in general, human life. But the fact that this is so, something that is obvious as soon as I take the trouble to think about it, had remained hidden. It finally emerged, as if by chance, on the fringes of the reflection in the days leading up to that of 13 December, and continued in the set of four notes brought together under the title 'The claw in the velvet'<sup>1</sup> (nos. 133-136). It is in these notes that, for the first time in *Récoltes et Semailles*, '*violence*' is named and becomes the object of attention. It has remained the focus of attention until now, or at least until the note of 7 January (a week ago), 'The cause of causeless violence'.

This promising title might give the impression that this latest note is a sort of culmination of the reflection on violence that has been going on all month. And it is true that it is one of the main fruits of that reflection. However, I am well aware that if this new perspective suddenly appeared, and this feeling of intimate conviction about a certain link suddenly glimpsed, it is because *my own person* was also directly involved in what had just appeared, among this "crowd of fragmentary and heterogeneous impressions stored up over the course of my life". The last and freshest of all these impressions, felt at the time to be very 'fragmentary' and indeed insufficient, was precisely that reflection of 13 December on the *violence in myself*. This reflection, which to the superficial reader may seem like a digression among many others in the investigation of the Burial, seems to me, on the other hand, now and with hindsight, to be a key moment and a crucial turning point (in potential at least) in my reflection on myself. That very day, in fact, I felt that I had finally taken the first step in a direction that I had been avoiding until then, and which would lead me straight to the heart of the conflict within myself. This 'lukewarm iron' that had been there as if for memory for ten months

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was suddenly red-hot - all I had to do was stop and blow and knock, for it to turn red-white and reveal a shape and a message to me. And so it remains today.

But it's clear that this is not the place to work on that iron. Of all those that appeared in the course of Récoltes et Semailles, it is certainly the one that is the most burning for me, and after it, the closely related one that appeared with "La cause de la violence sans cause". If the child didn't have a terribly adult boss on his back, stubbornly riveted to long-term tasks and the 'priorities' they impose, it is certainly in this direction, leading me to the heart of the conflict in myself and in others, that I would now be launching out, without having to fathom myself! But as the name suggests, it's usually the boss, not the child, who takes the orders and decides what to invest in. The 'Enigma of Evil' will therefore wait until the boss is on holiday (which is a rare occurrence), or when he is not too busy with top 'priorities', such as finally finishing writing Harvest and Sowing!

(<sup>162</sup>  ) But before returning to the Burial, I would at least like to note one of the associations of ideas aroused by the reflection of a week ago - an association which is perhaps less obvious than others, and which for that reason risks vanishing without a trace if I do not note it now. It is linked to the Hindu idea of karma, and goes in the same direction as the association that appeared in the note 'The Enemy Brother - or Passing' (n° 156): in the sense of the tenuous intuition of a kind of 'law of *conservation of karma*'.

This original diffuse resentment in a person, which later translates into apparently "gradual" impulses of aggression and violence, does not arise from nothing. It is the response to deep-seated aggressions that have indeed been suffered, especially those suffered in early childhood. It is true that many of these attacks, which are repressive in nature, are not "acts of violence" in the strict sense of the term, i.e. they are the result of an intention to hurt or harm, particularly on the part of parents towards their child. It is also true that such an intention (almost always unconscious) is present in many more cases than is generally accepted. But perhaps, from the point of view of the creation or transmission of karma, the question of *intentions* or motivations (overt or covert) is secondary, when 'violence' does indeed take place, inflicting 'harm', causing 'damage'. I couldn't say.

The fact remains that, in most cases, a superficial look can give the illusion that the 'harm' suffered is null and void, that it has been absorbed and that, once absorbed, it has 'disappeared' without a trace. And it's a fact that it's not very often that those who have sown their anguish and powerlessness to be themselves in their children end up reaping directly, in the dwarfs of those same children, what they have sown; or at least, we have the impression that they only reap a tiny part of it! Or to put it another way, of the diffuse resentment they have aroused in their children, only a tiny portion is condensed into a 'hard' resentment, directed at them - and which they complain about loud and clear, as if it were the blackest of ingratitudes, it's a given! But the rest of this accumulated resentment or 'karma' is not lost for all that. It is put to effective use, in a way that may seem inexplicable, by the mechanism of 'displacing' the resentment towards makeshift targets; sometimes erratic targets, and sometimes specially matched, appointed, pampered targets, so to speak, nurtured for a long life!

In ordinary times, this intense work of karma, like an abscess deeply implanted in the lives of men, takes place in the shadows, and everyone makes a point of ignoring it, only agreeing to see it as an occasional 'blip' here and another there, in relation to what is considered normal and proper.

It is in times of exception, when war or misery are raging (or in places of exception, such as penitentiaries and asylums), that this underground work erupts and spreads out freely in the full light of day, in a frenzied blaze of contempt and murderous madness, exalted by the grandiloquent flags flying over heroic mass graves and naked, cold cities.... .

## Doors to the Universe

(Appendix to The Key to Yin and Yang)

### 1. Rock and sand.

(March 17, 1986) For the past two days I've been putting the finishing touches to my repertoire of yin-yang couples, making a few last-minute adjustments. I've tried to be as exhaustive as possible, including all the couples I've noticed and noted since my first reflection on this theme seven years ago. Most of my current list (perhaps four-fifths) had already been noted at that time, in the spring of 1979. Since those early days of my thinking about the 'masculine' and the 'feminine' (when I still didn't know the consecrated Chinese names 'yin' and 'yang'), there has been a progression that is much more qualitative than quantitative: my understanding of the yin-yang dynamic has been particularly interesting, and terms have appeared that had initially escaped me, such as 'life - death', 'good - evil' (\*). But above all, as I explain elsewhere (in the note on "the dynamics of things" (n° 111)), I proceeded to group the yin-yang pairs more rigorously and more naturally into "groups of pairs", according to the affinities that link them. Each of the groups thus formed appeared to me to be a kind of 'door to the Universe', with the yin-yang pairs that make it up as different 'keyholes' through which to look (\*\*). These groups (or 'doors') do not naturally arrange themselves in a 'linear order', but (as I explain in the above-mentioned note) they can be represented by the vertices of a 'graph', whose 'edges' represent the most striking affinity relationships between a group and its 'neighbouring' groups. Readers will find below (\*\*\*\*) this 'vaguely Christmas tree-shaped' graph, and, following it, a description of the

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(\*) In accordance with custom, I most often speak of 'yin-yang' couples, and not 'yang-yin', which does not prevent me (unless otherwise stated) from naming a couple in the order yang-yin, as in the two previous couples.

(\*\*) This image of 'doors to the Universe' and 'keyholes' appears at the beginning of the note (from 21 October 1984) "L'Acte" (n° 113). This was eight days after I had resumed my earlier reflections on yin-yang couples, with the aforementioned note "La dynamique des choses" (n° 111).

(\*\*\*) (31 March) See page PU 110. Readers are well advised to familiarise themselves with this diagram, and to skim through the descriptive list of the different groups, before embarking on reading the comments that follow, which are followed by an unexpected reflection on the interplay of yin and yang in the movement of 'exploring thought'. Comments and reflection on the one hand, and diagrams and lists on the other,

twenty-two (\*) 'vertices' of the graph, by enumerating the yin-yang pairs forming the groups corresponding to each of the vertices.

In making available to the reader the provisional result of this ('combinatorial', or 'topological') aspect of my reflections on yin and yang, my intention is in no way to lay down some new 'canon' in the philosophy of yin and yang - quite the contrary! The aim is simply to provide the reader with rich, suggestive material, in a more or less raw state, to fuel his or her own reflection on this fascinating theme. Each of the two hundred or so yin-yang pairs lined up there without further comment, like so many terse names that follow one another on a civil status file, seems to me to be rich in all sorts of resonances, provided you take the time to reflect on them for a little while. Listening to, probing and noting these resonances would be a fascinating task in any case. I did it for two of these couples in *Récoltes et Semailles* (\*\*), in a few very brief pages. To do it for everyone would require a volume - and the person who writes it (if such a book is ever written) will learn a great deal about the world and about himself in the process! And he will also know that a whole library would not exhaust even the theme and the questions raised by a couple of innocuous appearances, such as (for example) "good - evil" or "creation - destruction"...

In the presentation that follows, there is an inevitable element of subjectivity, even arbitrariness. In saying this, I'm not thinking of *the existence of* each of the couples listed (as an authentic 'yin-yang couple'), nor of the *distribution of* yin-yang *roles* within each one. On the contrary, it's quite clear to me that the other, existence and distribution of roles, have a perfectly precise meaning that is '*universal*', by which I mean independent of everything.

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are likely to be mutually illuminating.

(\*) In the note 'The Act' (cited in the previous b. d e p. note), twenty-one vertices (or groups of pairs) are mentioned. In the interests of internal coherence, I've just added a twenty-second, the "space-time" group (reduced to this pair, plus the almost identical "extended" pair).

- duration"). Unfortunately, this had the slight disadvantage of slightly disturbing the symmetry of my graph.

(31 March) In the days that followed, I split six more of the groups in the initial diagram in two. This brought the total number of 'groups' represented by the vertices of my diagram to twenty-eight.

(\*\*) These are the "action - inaction" and "refusal - acceptance" pairs. I place some emphasis on the first of On the first of these couples, in the note "Les époux annemis" (n° 111'), and on the second, in the series of notes "Refus et acceptation" (n° s 116-118).

cultural context that decides and fixes the traits, attitudes and functions considered to be specific to either men or women (\*). This meaning is no less precise or universal than for a mathematical statement: the question of whether the statement is correct, and if so, whether it is true or false, is essentially independent of any cultural context (\*\*).

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(\*) As I write these lines, I am well aware that they are bound to give rise to a mass of objections and misunderstandings. It would be a hopeless task to try to dispel them. There is no question here of whether an aggregate of two vaguely opposed terms, such as 'beauty - ugliness' or 'intelligence - stupidity', for example, actually form a yin-yang pair, something that almost anyone who has heard the words 'yin' and 'yang' pronounced will tend to take for granted! But it's the *distribution of yin-yang roles*, interpreted (whether we like it or not) as an imperative assignment of feminine (for the woman) - masculine (for the man) *roles*, that will give rise to the most vehement disputes. The 'argument' most often used, and which would apply with irrefutable 'evidence' to all (real or fake) couples without exception, is that my interlocutor knows many women for whom the term 'yang', wrongly qualified, is dominant. The same thing would be true, of course, if we reversed the allocation of yin-yang roles, decreeing (let's say) that yin represents action, and yang inaction! This kind of 'argument' simply marks a refusal (which remains unconscious, as it should), to establish contact with the reality of the incessant marriage of yin and yang qualities. Entering into such arguments (to explain why and to what extent they are 'beside the point') is always a wasted effort.

The blockage always comes from the (often tacit, but always imperative!) valorisation of yang qualities to the detriment of yin. This valorisation is deeply internalised by everyone, including (and above all, I'm tempted to say) women, who are supposed to bear the brunt of it (when in fact *both* the woman *and* the man bear the brunt of it). So yang-yin pairs as innocuous as 'fast - slow', 'courage

- prudence" or "assurance - humility" are most often felt by women (or by well-meaning men who believe they should support them in their just cause) to be profoundly *unfair*: it's the term with the halo of prestige which, every time and as it should be, is infallibly attributed "to the man". And that's without even looking at pairs that are far more consequential, not to say catastrophic from a 'public relations' point of view, such as 'action - inaction', 'life - death', 'creation - destruction', or even (brace yourselves!) 'good - evil'! You really have to be a racist bastard and a delusional phalocrat to saddle half of humanity with all these unpleasant (sic!) qualities and infamous epithets. Thank you, sir, for your famous dialectic of yin and yang. We've felt the wind, and that's good enough for us. You can pack it in!

(\*\*) As I was writing this, I kept in mind that even in mathematics, where (in principle at least) all mathematicians accept the same 'rules of the game', the question of whether (let's say) a mathematical statement makes sense (in the purely technical sense of the term, i.e. whether it is indeed a 'mathematical statement', without prejudging either its interest or whether it is true or false), or whether the reasoning written down in black and white which is supposed to establish it makes sense.

This in no way prevents us from making a mistake in this question of yin and yang, just as we can make a mistake in mathematics (a very frequent occurrence), by hastily writing a statement that makes no sense or whose meaning is not the one we had in mind, or by believing we are proving it to be true when in fact it is false, or vice versa. But in either case, yin-yang dialectic or mathematics, as long as you go on, sooner or later the error will reveal itself through some obvious contradiction or inconsistency. It is spotted and corrected, leaving room for a deeper and more solidly based understanding.

So this is by no means a new 'sex of angels' (Oriental style), but a reality, just like that of mathematics and just as 'sure', provided only that we are sufficiently interested in it to allow the kind of attention, intuition and faculties that respond to it to awaken and develop within us. It's true that the delicate interplay of yin and yang cannot be grasped by means of 'definitions', 'statements' and 'demonstrations', like the interplay of shapes, numbers and magnitudes in mathematics. This does not mean that it is any less 'knowable' or any less 'real' - quite the contrary!

Moreover, I have a good presumption that each of the yin-yang pairs in my repertoire is indeed 'correct'. But I can't guarantee this with total certainty, any more than I could if I were working on a rather lengthy mathematical project and hadn't taken the greatest care to check everything down to the last detail (something, incidentally, that very few people do).

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does indeed constitute a demonstration, does not in any way bring people into agreement, even today. I know several eminent mathematicians with whom I have more than once felt myself to be in this strange awkward position, when it seems that we are not at all operating on the same 'logic'. What they call a 'definition' or a 'statement' often implies a whole vague cloud of presuppositions that are hard to explain, so as to give a precise meaning to what they are saying. The disturbing thing here is that they clearly don't even understand the meaning of the question, asking them for clarification, even though everything seems perfectly clear in their minds! It's a bit like a dialogue of the deaf going on between a modern mathematician, used to the canons of precision popularised by Bourbaki, and a mathematician from the last century - and in fact, I found this feeling of being at odds again when I looked at some of Riemann's work, the substance of which I was supposed to be familiar with! And I've found this feeling again, but in a sort of reversed situation, in my relationship with most of my students at university, when they obviously don't understand why I go to the trouble of explaining things in such a way, even though it's obvious to me that it's just mathematical 'common sense'. Needless to say, in such a situation, my 'explanations' go completely over their heads - or rather, the students in question 'drop out', just until things settle down and we finally get to the tangible recipes for calculation!

mathematicians ever take the time to do). What I do know without a shadow of a doubt, however, is that what I am presenting here is *substantial*, and that for the most part, this substance cannot be affected by any errors of detail that may have crept in here or there.

When I was about to speak of 'subjectivity' and 'arbitrariness' in my presentation, it was something quite different. On the one hand, I was thinking about the *choice* of yin-yang pairs included in my repertoire: there are surely some interesting pairs that have escaped my attention (\*). But above all, there is an inevitable arbitrariness in the constitution of 'groups' (of couples) that are 'significant', that is to say in the 'cutting' of the 'doors to the Universe' among the profusion of all those 'keyholes' that give us a glimpse of it. These groups seemed to me to form in a fairly natural way, through relationships of affinity between couples felt to be (more or less...) 'neighbours'. These affinities within a group will no doubt be obvious to any reader, at a glance, simply by browsing the list of member-couples. But such affinities continue beyond the group under consideration, towards the pairs in the 'neighbouring' or 'adjoining' groups (and it is precisely this fact that gives rise to the famous 'doors to the Universe' or 'Christmas tree' diagram). On the other hand, and to some extent in the opposite direction, the typographical arrangement used to describe each of the groups reveals, within most of them, different 'packets' or 'sub-groups', made up of pairs linked by some common 'meaning', around some common association. This shows that it would have been possible, perhaps just as 'naturally', to make a 'division' that would give us larger groups, or on the contrary (even more reasonably, it seems to me) smaller groups - or even ragged groups that overlap squarely with those I have identified and stopped at.

For example, I have included the two pairs 'south - north' and 'summer - winter' in the group 'light - shade', and the pairs (obviously related to the previous ones) 'east - west' and 'spring - autumn' in the group 'up - down' (\*\*). Another grouping, just as natural, would have been to use these four pairs to form a Sepae group, with the four cardinal points on one side and the four seasons on the other (\*\*).

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(\*) (31 March) This was confirmed by the reflections of the following two weeks, which brought to light many new couples.

I have made no effort to avoid the same yin-yang pair being included in two different groups - on the contrary. But in the division I've made, such overlaps are rather exceptional (\*). The couple 'high - low' is included in the group 'high - low', but I have refrained from including it in the group 'movement - rest', because the association between a 'high' note and a rapid movement (vibratory in this case), and between a 'low' note and a slow movement, is perhaps already part of a relatively sophisticated 'scientific' apprehension of sound (as a vibratory phenomenon), which is absent (I presume) from the unconscious layers of the psyche. The 'learning - unlearning' pair has been included in the two groups 'knowledge - ignorance' and 'up - down' (\*\*), but I have refrained from including it in the 'action - inaction' group, where it might also have been considered (\*\*\*)�.

I wouldn't be at all surprised if more judicious and more delicate groupings could be found than the one I've stopped at, so as to arrive at a clearer and finer apprehension of the overall structure (or 'pattern') formed by the profusion of all these 'holes'.

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(\*\*) (31 March) Among other reasons, the critical reflections in this section led me to make a few adjustments to my groups in the following days. Thus I detached from the old group "the top - At the bottom" (of prohibitive dimensions) a "rise - fall" group, which now includes the two previous pairs "east - west" and "spring - autumn". On the other hand, 'to make it look pretty', I've hung a sort of compass rose on the Christmas tree (in the shape of a cross) marked with the four cardinal points, and which represents the hypothetical 'cardinal points and seasons' group mentioned in the paragraph commented on here.

(\*) When a couple appearing in a given group also appears in another group, I follow them. (in brackets) of the Roman numeral (possibly with accents or subscripts or both) designating the other group in which it appears.

(\*\*) (31 March) It should read "the boom-bust group" instead of "the up-down group", see the penultimate footnote.

(\*\*\*\*\*) I didn't want to include the pair 'learning - unlearning' in the 'action - inaction' group, because I feel that 'unlearning' is itself an *action*, and in no way a state of inaction. In fact, apart from learning in the purely mechanical or routine sense (learning by 'forgetting' in particular), we only really learn the new by unlearning, by 'forgetting' the old that was holding us prisoner. And it is very often in this act of *unlearning*, of *separating ourselves* from something we feel we have already acquired, something we hold dear, that the difficulty lies in the act of learning and renewing ourselves.

keyhole" on the Universe.

This would then be expressed by a graph which would no doubt look rather different, and more fresh and convincing, perhaps, than my 'Christmas tree', which is a little out of place and has a collected air... .

## 2. Polyandrous things and polygamous things.

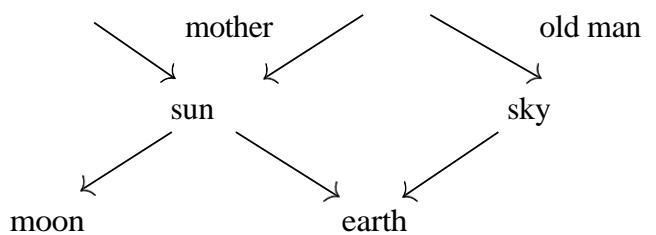
The yin-yang pairs we have dealt with so far usually concern *qualities*, expressed either by qualifiers (which I usually present in substantive form), as in "hot - cold" or "fast - slow", or by verbs, as in "to know", or by nouns, as in "passion - serenity". There are, however, a small number of cases where I have included two 'things' in a yin-yang pair, one playing the yin role and the other the yang role, and both having the value of an *archetypal symbol*, i.e. a symbolic image, originating in the deep unconscious layers of the psyche and having a 'universal' value, being found (in a multiplicity of possible forms) from one person and one culture to another. If I exclude the 'master-servant' couple (which is perhaps merely a personification of the 'authority-obedience' couple, rather than an authentic archetypal symbol), I have identified eight such couples (involving twelve archetypes (\*)).

These are the two couples

men → women

fire → water ,

and the two groups of three each, represented by the two diagrams below: father child

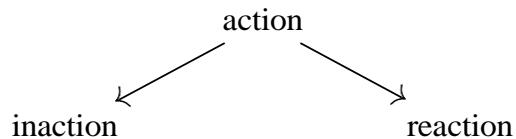


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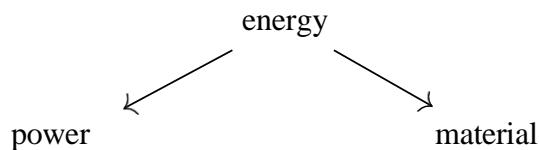
(\*) (31 March) In the meantime, I've added the two pairs of archetypes 'god - demon' and 'giant - dwarf'.

It is understood that in these diagrams, as in those that follow, an arrow linking two terms indicates that they are paired, and that the arrow goes from the yang term to the yin term.

These last two diagrams highlight an interesting fact, which we touched on in passing earlier. This is the phenomenon of '*polygamy*' and '*Polyandry*' in some of these archetypes: the child and the sun are polygamous (one pairing with the mother and the old man, the other with the earth and the moon), while the mother and the earth are polyandrous (one pairing with the father and the child, the other with the sky and the sun). Such phenomena, which are contrary to good morals in our country, are by no means restricted to the areopagus of archetypes, who enjoy the privileges that mythology reserves for the gods (including incest). In my repertory I found two other cases of patent polygamy, for the terms 'action' and 'energy', which fit into the two three-term diagrams

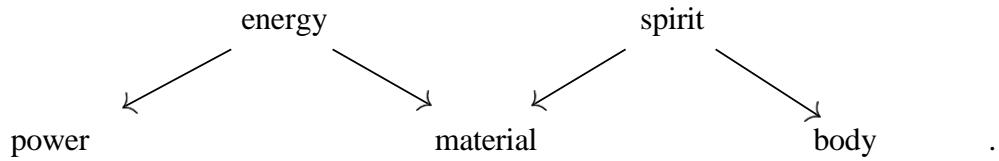


and



They give rise to four yin-yang pairs, which I have included in three separate groups (namely the 'action - inaction', 'forward - backward' and 'movement - rest' groups). As a result, this last diagram, by associating itself with the 'mind - body' pair, suggests a yin-yang pair (so very familiar) that I had forgotten in my list, namely 'mind - matter' (which I'm going to add straight away) (\*). So the diagram is completed into a beautiful zig-zag diagram with

five summits :



This provides us with another bigamist, namely the mind (who would have thought that of him!), pairing itself with both the body (which was surely waiting for this) and matter; and at the same time, another polyandra, namely lady matter, pairing herself with energy (which is still part of the same world as her, that of physical entities) and the mind (supposed to belong to a higher world). Incidentally, when I was looking for a place to insert this newcomer pairing of 'spirit and matter' (a mismatch, some would say), I noticed that it was practically already on my list, under the heading 'letter - spirit' (where 'letter' is obviously a symbol for 'matter' (\*), in the 'form - substance' group. So, bigamy or not, everything's back in order!)

### 3. Creative ambiguity (1): pairs, ribambelles and rounds.

(18 March) Last night it was getting prohibitively late. In a hurry to finish, I made a monumental last-minute misinterpretation, equating the 'letter-spirit' pairing (which, in my list, immediately follows the 'form-substance' pairing that gives the group its name) with the so-called 'matter-spirit' pairing (all I had to do was change 'letter' to 'matter' and that was it!). "Matter" would play the yang role, and 'spirit' the yin role (\*\*). In doing so, I didn't realise the 'mortal sin' of confusing yin and yang roles, even though it was clear in my mind that what I was trying to fit in was the 'spirit-matter' couple and not the other way round, with the spirit being male, as it should be, and matter female (also in accordance with the desiderata of grammatical gender). Reflection

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(\*) (18 March) This way of 'awarding' the couple 'spirit - matter' in the bend of a sentence is decidedly a bit flippant! If you take the trouble to look at it for even a few moments, you realise that it's a pair that 'carries the weight'. In fact, I still don't have a good 'feel' for it, even though I have little doubt that this couple does 'exist', as a yin-yang couple. This conviction does not have the quality of knowledge, it is not yet the fruit of an understanding.

(\*) (18 March) The deliberate flippancy persists! (See previous b. de p. note) Pressed for more To conclude, I've 'ended' with a gross misunderstanding, which I'm going to rectify in today's note.

In fact, its true place seems to me to be in the 'action - inaction' group, because 'spirit' does indeed embody the principle of action that animates matter, which is itself inert.

This confusion highlights an important feature of the dialectic of yin and yang, which I thought I'd come back to today. This is the essential *ambiguity* in the yin or yang nature of everything, including the qualities and other entities that are likely to fit into one or more of the yin-yang 'cosmic couples' discussed here. This ambiguity is exemplified here by the linear diagram

letter → mind → matter ,

comprising two yin-yang pairs, both involving the entity 'spirit', which is the *yin* term in the first pair, 'letter - spirit', and the *yang* term in the second pair, 'spirit - matter'.

To use a clever Greek name, we can say that the spirit is *androgynous* in nature, i.e. both 'male' and 'female', 'maculin' and 'femenin'. This is something that I find deeply satisfying (for the mind!), and which I have never considered until now. No doubt I was living on the unspoken conviction that the mind (as its grammatical gender indicates) could only be *masculine*. However, it's been a while (since I started paying attention to these things) that I've realised that *love* is androgynous too, as is *creation* (as an act and a process), or *God* (\*).

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(\*\*) Note that in each of the two neighbouring pairs

form - content, letter - spirit,

as if by design, the distribution of yin-yang roles is *the reverse* of that suggested by the grammatical gender of the two terms. We should not be surprised by these apparent anomalies. As explained below in another example, just because the entity 'form' is paired with the entity 'wave' and assumes the yang role in it, this entity in itself should not be seen as being essentially, or even exclusively, yang in nature. As the potential "enveloping matrix" of an infinite number of possible substantial "realisations", "form" can well be seen as something of a "maternal", yin nature. On the other hand, as a structural element that orders a substance, or as an 'abstract' quintessence extracted from a concrete reality (when we talk about the shape of a face, a vase, etc.), the same entity manifests its yang characteristics, expressed precisely in pairs such as 'form - background' or 'form - substance'.

This essential ambiguity in the yin-yang nature of everything is superimposed on (without contradicting) the essential *univocity* of the nature, either yin or yang, in each of the two terms of a yin-yang 'cosmic couple'. In the 'letter-spirit' pair, for example, there is no ambiguity about the fact that it is 'spirit' that has the yin role (grammar notwithstanding), whereas in the 'spirit-matter' pair, there is no ambiguity either about the yang role of the same 'spirit' entity. As to whether in the latter case it is the yang nature that prevails over the yin nature, or vice versa, I suspect that this is more a question of the sex of angels than of philosophy. In the three similar cases (love, creation, God), I don't even have any doubts on the subject!

It is very common for two things, notions or entities that find themselves in a relationship with each other to be perceived as establishing a 'couple' (\*), in which one plays the yin role, the other the yang role, without any 'essential ambiguity' in this distribution of roles. Thus, *the earth*, horizontal and nourishing, and *the tree* rooted in it by

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(\*) Note that the word "amour" is masculine in French and feminine in German ("die Liebe"), which is consistent with its "androgynous" nature. On the other hand, 'God' ('Gott' in German) is masculine in both languages. I suspect it is still masculine in all languages that allow for gender differentiation, and where the notion of 'God' (as opposed to 'a god' or 'a goddess') exists. This seems to me to reflect the cultural bias towards yang. As for 'creation' ('die Schöpfung'), this notion is expressed in both languages by the *feminine*. The reason for this, I believe, is that in both languages, the primary meaning of the word 'creation' does not refer to the creative act or process, but to the Universe formed by all created things, of which all these things, including ourselves, are a part. This meaning is therefore close to that of the 'Whole', or 'the Mother', which (in their relationship to 'the part', or to what is created or 'given birth to') are indeed of a *yin* nature. On the other hand, we spontaneously think of the creator (whether God or man) as 'the Creator' or 'the creator' ('der Schöpfer'), and never as 'the creator'. This seems to me to reflect the same cultural prejudice, in both languages, as for the notion of 'God'.

In couples

creation - destruction,

As the neighbouring principle of "birth - death", an understanding of which seems to me essential for an understanding of ourselves and of the nature of the creative processes within us and in the Cosmos, creation represents the yang principle, destruction the yin principle. Both principles are present in any creative process in the full sense of the term. As in the example examined in the previous note by b. de p., this yang role in no way means that "creation" is, in itself, something of a yang nature, or "more yang than yin". This is what becomes clear when we remember what the act par excellence is: the mating of male and female, whose embrace transmits and renews life...

all of them, even at the level of a perception that would remain unconscious. If, on the other hand, we focus our attention on the tree, embodied above all else by its trunk, and then on *the twig* of the tree, which is part of it as a whole, and which springs from the trunk and is nourished by it (just as it springs from the earth and is nourished by it), it appears that tree and twig also form a couple, in which this time it is the tree that plays the yin role, the twig being yang in its relationship to it. If, finally, we look at the branch as a whole, in its relationship to the *fruit* it bears and nourishes, we find yet another pairing, where this time the branch plays the yin, maternal role, and the fruit that comes from it plays the yang role.

These multiple relationships can be represented by a diagram, which this time is no longer "zig-zag", but "ribambelle":

land ←—— tree ←—— branch ←—— fruit .

This sibling diagram highlights the yin-yang ambiguity (or the 'androg- yne' character) of both the tree (yang in its relationship to the earth, yin in its relationship to the branch) and the branch (yang in its relationship to the tree, yin in its relationship to the fruit). At the same time, by virtue of the graphic design, we sense that the yin-yang ambiguity of everything is a *creative ambiguity*, that it is an essential aspect of the creativity inherent in everything in the Universe. In particular, it allows the thing to enter into couple relationships in a multitude of very different situations, and this as much as 'the husband' as 'the wife'.

As another instructive example, I offer the reader this other ribambelle with three pairs,

harmony ←—— silence ←—— noise ←—— singing ,

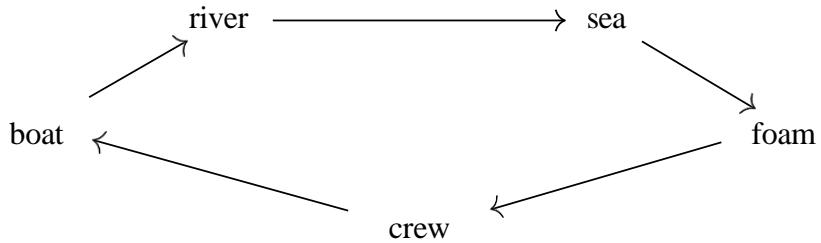
leaving him the pleasure of formulating in his own words, if he feels prompted to do so, how each of these three pairs actually forms a 'couple'.

To end this digression with a series of graphics on the ambiguity of yin and yang in all things, here at last is a ribambelle that closes, in other words a *round of yin and yang*.

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(\*) Subsequently, to avoid any confusion with so-called "cosmic" couples, it would seem preferable to speak of "pairs" rather than "couples".

yang :



This round (like the two previous ribambelles) is taken from the *Éloge de l'Inceste* (\*), the description of which I will limit myself to reproducing here:

"The river flows into the sea that welcomes it. The boat is immersed in the river that surrounds and envelops it. The crew is carried by the boat that surrounds and shelters it. The young ship's boy is a member and part of the crew that includes him. And the sea is reflected in his eyes; through his eyes it penetrates his soul, which welcomes it into itself. In this way, male and female - Eros and Mother - constantly intertwine in an endless round in which everything, at the same time or in turn, lives *both* its virile impulse *and* its maternal impulse".

#### 4. Creative ambiguity (2): role reversal.

The couples in the previous round and in the two ribambelles are by no means yin-yang 'cosmic couples'. Such a couple represents the two modes of existence, one yin, the other yang, of the *same* type of quality, which will be found in an infinite multiplicity of situations in every part of the vast Universe. To avoid confusion, perhaps it would be prudent to reserve the name of 'yin-yang couples' for 'cosmic couples' only, and confine ourselves to the term 'pairs' (yin-yang) for more occasional marriages, with no 'cormic' or 'universal' vocation. It is the former, of course, the authentic 'couples' or 'keyholes in the Universe', that are the focus of my attention here, with a view to drawing up a kind of 'map' of the multitude they form - a multitude so rich that it disconcerts us at first sight!

(\*) On the subject of the 'Éloge', see the note 'L'acte' (n° 113), especially pages 507-508. It goes without saying that in this highly literary text, I would never have thought of including something as unpoetic as a diagram De quel carcan me voilà débarrasser!

Several times, in my efforts as a methodical cartographer, I found myself confronted with unexpected contradictions that seemed to thwart me, sometimes insistently, before being resolved into a less superficial understanding. It is not my intention to use a 'list' or a peremptory 'map' to gloss over my perplexities of yesteryear. Such difficulties arise here, as they do with any other somewhat delicate substance with which we have to familiarise ourselves, be it (say) 'science' (or even mathematics), or 'philosophy'. It is only by confronting it in all naivety that an understanding can mature that is not entirely verbal or superficial, and that an intuition, a 'feeling', can develop . .

I have sometimes insisted on the unambiguous, univocal ('essential', I said) character of the distribution of yin-yang roles within each of the cosmic pairs - a distribution independent of any kind of choice, whether 'individual' or 'cultural'. Now's the time to disabuse the reader of the notion that once you've memorised the two hundred or so pairs on a list, everything else is just 'black and white'! Alongside this 'essential univocity' that I've taken such pains to emphasise, there are also what might be called '*inessential*' or '*secondary*' *ambiguities*, which (to repeat myself, or almost (\*)) 'superimpose on, but do not contradict', this fundamental univocity of the couple.

We have already seen an example of this, with the couple

refusal - acceptance,

where 'refusal' represents the yang term. I had observed that in certain situations, acceptance is 'born' from refusal, which serves as a kind of 'nourishing foundation' - that there is therefore a real '*reversal*' of the yin and yang roles within the couple in question (\*). This is what we might call a *creative reversal*, which I had likened to the one that occasionally occurs in the game of love or marriage. Such a reversal does not, however, call into question the 'essential univocity' of the biological sex of either of the two participants. But it does allow the impulse in both of them to express itself according to its own nature, with all the richness of its feminine and maternal, childlike and paternal resonances.

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(\*) See top of page PU 11

(\*) See the notes "Le cycle" and "Les conjoints - ou l'éénigme du "Mal"" (n° 116<sup>2</sup> , 117), and in particular the footnote on page 534. The latter will be alluded to tacitly in the sentence that follows.

We also noted in passing (\*\*) another case of reversal, partial and more discrete, in the case of the couple

the child - the mother.

When the mother is perceived as having the function of *protecting* the child, who is seen as "protected", this perception assigns a *yang* (protective) role to the mother, while the child (for this distribution of "secondary" roles) assumes a *yin* role. On the 'mother' side, this *yang* tonality in her relationship with the child must be seen as a '*yang in yin*' tonality (*yin* remaining the dominant). Symmetrically, on the child's side, his role as "protected" by the mother should be seen as a "*yin in yang*" tonality (while the dominant remains *yang*). (\*\*\*) Still referring to the same archetype of "Mother" or "Maternal". The "Mother" is universally felt as a dispenser of *warmth*, of a beneficial carnal warmth, transmitted by the intimate contact of her body, surrounding ours. This warmth is surely felt as forming a contrast with the 'outside', the 'elsewhere', perceived as 'cold' and (perhaps also) as vaguely hostile, or at least foreign. This couple

hot - cold.

is yet another cosmic couple, in which 'hot', without the slightest possible ambiguity (not at the 'essential' level, at least!) once again plays the *yang* role. In other words, the connotation of warmth associated with the archetypal image of the maternal (an image alive in every being) is yet another tonality of '*yang in yin*'.

At the same time, however, the image of the Mother represents the most complete and profound incarnation of *yin*, an incarnation that is present in every being and encompasses all the other archetypal symbols of *yin*, such as earth, sea and water. It is that which is *close*, *familiar* and *known*, that which *carries* us and that which *nourishes* us, that which conceived us and gave birth to us and that which gives birth to us again.

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(\*\*) In the note "Archetypal knowledge and conditioning" (no.° 112<sup>¶</sup>), in the footnote (\*\*\*)) on page 504 (dated a fortnight ago).

(\*\*\*) It goes without saying that these comments relate to the archetypal "mother-child" situation, and that they would be completely 'off the mark' in a large number of *real-life* situations" in a mother-child relationship. It is by no means uncommon for this "*yang in yin*" tone to take on an undue importance, so as to obliterate the low *yin* tone. This is the case with maternal *over-protection*, a sign of an anxious imbalance in the mother, which is passed on to the over-protected child.

yearn to return and rest. Above all, it is through all this that the knowledge of the Mother lives in us, that she assumes in us her distinctive and unique traits, which are very much yin. And in our relationship with Her, we are and remain eternally "the child", or "the begotten", the child Eros-à-la-arche - whether we leave Her, to encounter Elsewhere, or, at the end of our journey, to return to Her. And so it is, whether we are a child or an old man, a man or a woman, a mountain, a river or a sea, and whether we have just been born or are about to die...

##### 5. Creative ambiguity (3): the part contains the whole.

I didn't go all the way just now - in fact, I didn't go far enough - to probe the yang, or even 'phallic', aspects of the maternal archetype in us. All things are given birth by the Mother, and there is nothing in the Universe that is not already present in Her. But this is not the place to pursue this theme in these pages, which are only intended to shed light on a certain cartographic work that I propose to submit to the curiosity of an interested reader.

It has to be said that the maternal archetype, and the creature's profound relationship with the 'maternal', constitute a yin-yang couple entirely apart from all the others, and of a scope that surpasses any other such couple. (At least that's my profound conviction.) In this respect, it could be said to be 'atypical' in the extreme. As for 'yin-yang' couples in general, it's only for a small number of them that I've taken the time to examine the dynamics of the (occasional, or secondary, or 'inessential') 'reversal' of yin and yang roles.

Without being able to say for sure, I suspect that such a dynamic must exist for all yin-yang couples, or very close to it, and I'm sure in advance that I could at least highlight it in a good number of them.

Here is another example, that of the couple

the part - the whole,

where the part is yang in its relationship to the Whole, which is yin. But it seems to me that anyone with even the slightest inclination to philosophical reflection is quite familiar with the fact that very often the part faithfully 'reflects' the Whole, and thus 'contains' it, just as it is contained within it. Thus, man is a particle of the Cosmos, but some have understood and assure us that the entire Cosmos is reflected in us, and that each being contains it.

At the more down-to-earth level of the physiology of the human body, all the organs of our body are finely inscribed, whether on the sole of the foot, in the earlobe or in the iris of the eye. The expression on a face, the lines and shape of a hand, the lines of a handwriting, for those who know how to decipher them, all reveal the whole person. And the same is true of the sound of the voice, the way the body is held, and each of the hundred and one different ways in which we express ourselves, often unwittingly, through body language. The countless divinatory techniques that man has devised and discovered over the ages all seem to be based on the same principle, that the part (however imperceptible, however insignificant it may seem to a superficial eye) faithfully expresses, and thereby 'contains', the Whole.

And just one of our cells contains all the chromosomal information that we carry within us and pass on to our descendants. I'm sure I could go on for pages with more illustrations. But this is not the place!

#### 6. Creative ambiguity (4): extremes touch.

(19 March) I'd like to say a few more words about the couple

hot - cold (or lukewarm)

met in passing yesterday. "Cold" is associated with winter, with the long winter sleep of nature, with rest and silence. All aspects that highlight its "yin" character. "Hot", on the other hand, is associated with the heat of summer, with the exuberance of plant and animal life, with the movement and rumours that are part of this exuberance - and these associations reveal its "yang" character.

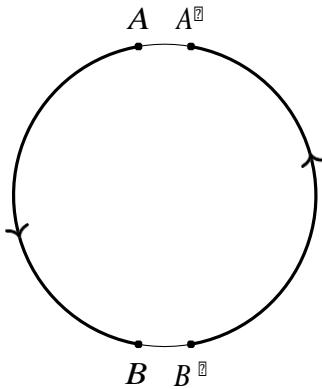
However, if the heat increases and becomes torrid, this exuberance of life falls into a torpor that resembles the sleep of winter, while the only audible sound, that of the tireless cicadas, seems to weave a sonorous shroud that surrounds us on all sides and encourages us to rest. So extreme heat takes us back to yin. This is the case, at least, when it manifests itself in a form that remains diffuse. *Fire*, which represents its concentrated form, remains the indisputable and universal incarnation of yang. But if the heat of the fire itself, and of that which is in immediate contact with it, increases and reaches extremes of intensity, the solids begin to melt and transform into liquids, and the liquids in turn begin to gasify, finally disintegrating into a confused chaos of yang and yang.

particles swirling in all directions, in which all form and structure seem to disappear without return. Thus, by intensifying yang-heat to its most extreme degrees, we move on to states that appear as yin, then as very yin, and finally to the extreme-yin of original chaos.

On the other hand, extreme cold seems to bring us back to yang. In the countries with which I'm familiar, the cold of winter alone can cause supple, lively water to freeze into hard, sharp, brittle ice - from being the yin element par excellence, it is now transmuted into yang! And those who know about harsh winters know as well as I do that intense cold 'bites' and 'burns' just like fire. That's why sparkling snow in the depths of a mountain winter can also appear 'fiery' to us. If the cold increases still further, the air itself will become liquid, then solid. For the physicist, the most extreme state of cold, the extreme-yin state in which all intermolecular movement comes to a halt, is at the same time an extreme-yang state, in which all gaseous or liquid fluidity disappears with no return. This is the state of the greatest concentration and the absolute solidity of everything.

Such 'anomalies' or 'paradoxes' are typical of the dialectic of yin and yang. Less than twenty years ago, when I hadn't even heard the words 'yin' or 'yang', they would surely have made me reject the whole so-called 'philosophy' of yin and yang as a vast, unresistable phantasmagoria, had anyone ventured to talk to me about it. It was only when I discovered my dual 'feminine' and 'masculine' nature that, in the years that followed, I also opened up to the reality of the interplay of yin and yang in myself and in everything else...

The kind of metamorphosis I've just tried to describe here, using a specific example, is certainly well known, and has always been. It is said that "*extremes touch*". For a mathematician like me, this immediately evokes the vision of a circle. It suggests the following geometric image:



The direction of travel on the  $ABB$  circle  $A\bar{B}$  represents the "yang to yin" direction. The  **$AB$**  arc represents a particular "realisation" of a yang ( $A$ ) - yin ( $B$ ) couple. When  $A$  varies towards  $A\bar{B}$  to occupy an "extreme-yang" position or  $B$  towards  $B\bar{B}$  to occupy an "extreme-yin" position, or both at the same time, the new "pair" (say  $(A\bar{B}, B\bar{B})$ ), represented by the shortest arc joining  $A\bar{B}$  to  $B\bar{B}$ , is this time *inverted*: the direction of travel takes us from  $B\bar{B}$  to  $A\bar{B}$  (and not the other way round), so that this time the new position  $A\bar{B}$  of  $A$  becomes the *yin* pole, and the new position  $B\bar{B}$  of  $B$  becomes the *yang* pole.

But whether this simplistic mathematician's image is capable of stimulating an understanding of the nature of the relationship between yin and yang is another matter. ...

#### 7. My "container - content" and "heavy - light" perplexities.

In the few yin-yang pairs above, the question of yin and yang roles does not seem to me to present any particular difficulties. I have introduced them here mainly to illustrate certain peculiarities in the interplay between yin and yang, which are found in a similar form in many other couples, if not in all of them. To conclude these preliminaries, I would like to mention a few more cases of couples where the distribution of roles has led me to certain perplexities.

We have already come across the case of the couple

container - content (or enveloping - enveloped) (\*),

neighbouring less problematic pairs

exterior - interior, surface - depth, shape - background,

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(\*) See the beginning of the note "Archetypal knowledge and conditioning" (n° 112 )<sup>12</sup>

where the distribution of roles (yang-yin in this case) is hardly perplexing, and suggests (with good reason) that 'the container' is *yang*, and 'the content' is *yin*. What misled me at first was the analogy with couples (yin-yang this time)

womb - embryo, vagina - penis.

In thesexi, the geometric exterior-interior relationship appears secondary to other more important aspects: the womb *nourishes* the embryo, which lodges and *takes root* in it; and the vagina *receives* the penis, which penetrates it (leaving aside even the direct sexual connotation, which leaves no room for ambiguity!)

In many other cases, for two things where one appears to surround the other, the yin-yang relationship is not determined by this configurational aspect alone.

A striking example is given by the two pairs

pod (of a walnut) - kernel,

and

pulp (from a peach or apricot) - stone.

In the first case, the function of the hard pod is to protect the interior, which represents the nourishing element, a yang-yin distribution of roles (in line with the configurational aspect). The opposite is true in the second case, where the pulp represents the nourishing element, the nucleus playing the role of the embryo nestling in the pulp-matrix.

In the two neighbouring couples

presence - absence, fullness - emptiness (or fullness - emptiness)

(neighbours also of the "affirmation - negation" and "positive - negative" pairs), the distribution of roles is yang-yin, and it is the same in the "affirmation - negation" and "positive - negative" pairs.

concentration - availability,

where concentration is perceived as a state of 'fullness', and availability as a state of 'emptiness', in accordance with the second of the two pairs introduced just now. However, the state of concentration can be seen as a state of *absence* (from anything other than the thing we are concentrating on), and availability as a state of *presence* (from anything that could

our attention). This pairing could also suggest the existence of a yang-yin pairing that would be

absence - presence.

This is indeed a couple, but a yin-yang couple (the opposite of the yang-yin couple of "presence" - absence"). This apparent paradox can be resolved, it seems to me, by observing that the translation of 'concentration' by the neighbouring notion of 'absence' is approximate and overlooks an essential aspect: this so-called 'absence' is only partial, and that in relation to the thing on which we are concentrating, there is on the contrary a 'presence' that is all the more intense, which compensates (as it were) for the absence in other directions.

This example, among others, shows us that the game of analogies, which is a perfect and visibly indispensable guide to the dynamics of yin and yang, is not infallible, and needs to be handled with tact and a certain prudence.

Here are three neighbouring pairs of "concentration - availability",

the heavy - the light, the dense - the diluted, the concentrated - the diffuse,

for which I had some difficulty convincing myself of the distribution of the yin and yang roles. (And yet I had the unmistakable feeling that they were complementary pairs). One of the reasons for my perplexity was that what is heavy, dense and concentrated, like water, tends to move downwards (which is a typical yin character), whereas what is light tends to move upwards (a yang character). A second perplexity comes from the comparison with the couple

the abstract - the concrete,

where it was quite clear to me that 'the abstract' is yang, and 'the concrete' is yin, in accordance with pairs such as 'mind - body', 'reason - sensitivity', 'logic', etc.

- intuition". Now, rightly or wrongly, I associate 'the concrete' with the idea of density and weight, and 'the abstract' with the idea of the diffuse and imponderable. These are all concordant indications, which at one time led me to presume (without total conviction, it's true) that the heavy or concentrated was *yin* in relation to the light and diffuse, which would be *yang*. But this is the opposite of what I've come to believe (and what's consistent with it),

has appeared, in the traditional Chinese conception). It was, I suppose, the associations with yet other pairs (which I ended up classifying in the 'group' I call 'the heavy - the light') that finally sorted out my perplexities. But I have to admit that, even now, I don't feel that I've really understood how the two analogies that led me astray are indeed fallacious.

## 8. The quest for Unity.

The couple I have just mentioned, 'the abstract - the concrete', should be confronted with the couple, which is similar in certain respects (\*)

the particular - the general

(which can be seen as a variant of the pairing already considered yesterday, 'the Part - the Whole'). It's still a yang-yin pairing, although at first sight it might suggest a simple reversal of the terms in the previous pairing. In other words, our push-button reflexes tend to make us equate 'the concrete' with 'the particular', and 'the abstract' with 'the general'. However, if we take the time to reflect for a few moments on either of these two pairs, we realise that they express very different relationships. The relationship of the 'particular' to the 'general', as I have just said, is that of the 'part' to the 'whole' - the general 'contains' or 'implies' the particular, just as the whole contains the part. This is by no means the relationship that exists between "the concrete" and "the abstract". The concrete thing can be seen as a "realisation", or an "incarnation" or a "manifestation" of some abstract notion that it reminds us of in one way or another. Thus a copper cauldron, or rather its rim, is a realisation of the notion of a circle, and the surface of a leather ball (or that of planet earth. . . ) is a realisation of the notion of a sphere. No one would dream of saying that the notion of a sphere, let's say, "implies" or "contains" the concrete object that is the football I'm pointing at, and whose (approximately spherical) shape is just one aspect among an infinite number of others, none of which, and no doubt all of them together, would be able to exhaust it.

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(\*) I had originally included both of these pairs "the abstract - the concrete" and "the particular - the general" in the same group "the part - the whole". Now the first of these two pairs is part of the group "the simple - the complex", which I ended up detaching from the initial group (see b. de p. note (\*) on page PU 2).

It is true that the very nature of thought is to apprehend as best it can 'the concrete' through 'the abstract', that is to say precisely through *thought*, the privileged (and perhaps unique) vehicle of 'abstraction'. That said, depending on one's temperament, thought will tend to follow forms with a greater or lesser degree of abstraction. Mathematical thought is certainly one of the most abstract. But within mathematical thought itself, there are many different degrees of abstraction (\*), depending on the kind of thinking being pursued. But whatever level of abstraction you choose, that level (it seems to me) is by itself neither 'general' nor 'particular'. In fact, it always includes both 'the general' and 'the particular'. Everything that is known as general applies ipso-facto to the particular. But in the particular, there are in addition 'individual' traits, different from one 'case' to another, which mean that it cannot be reduced to a simple 'carbon copy' (in smaller form) of the 'general'.

In a given science (such as mathematics), depending on the individual temperament of the researcher, and on the zeitgeist or fashion of the moment, his work may focus on things that are more or less general, or more or less particular. In all cases, this work will take place in the context of a necessarily "abstract" way of thinking.

But irrespective of any fashion or zeitgeist, it would seem that scientific thought, by its very nature, cannot help but return again and again to the quest for

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(\*) In mathematics, the degree of abstraction of a concept can be explained to some extent using the technical concept of "structure" (introduced by Bourbaki). Every 'kind of structure' has a natural integer associated with it, which we can call its '*rank*', and which expresses the 'rung' up the 'ladder of types' of (virtual) structures, associated with the 'basic sets' involved in describing the kind of structure under consideration. This rank can be seen as measuring the degree of 'complexity' or 'abstraction' of the structure. A mathematical notion (whether it concerns a type of mathematical *object*, or a *property* for objects of a given type) can then be considered to be all the more "abstract", the more it involves species of structure of a higher rank. This description seems to me to correspond roughly to the (subjective) impression of the 'greater or lesser abstraction' of a mathematical notion. However, it fails in the increasingly numerous cases where a mathematical notion is rooted in the language and specific intuitions linked to the point of view of 'categories' (where it is the 'equivalence' of categories, and not 'isomorphism', which constitutes the standard of comparison between different categories). To give just one example: the notion of a *topos* (as a category satisfying certain properties) would be subject to the notion of a "law of composition not everywhere defined", which no professional mathematician would dream of describing as terribly abstract. Yet there can hardly be a mathematician to whom the notion of topos (as the embodiment of a topological intuition, destined to replace the notion of space), would not seem terribly abstract!

of what is *common* in the bewildering multiplicity of particular situations, and thus to discern '*the general*' that links and encompasses the infinite profusion of the particular. To put it another way, it seems inherent to the very spirit of 'scientific thought' to seek *unity* through the inexhaustible diversity of phenomena. The same can be said, perhaps, of all reflective thought, striving to fathom and know the World in one or other of its aspects. This is perhaps even a universal trait of the drive for knowledge within us, constantly pushing us, whether we like it or know it or not, to seek *the One* through the many. And in the yang-yin couple that expresses this quest,

multiplicity - Unity

or

the many - *the One*,

I can't help feeling that I myself am this "multiple" in pursuit of unity, elusive, elusive - "at once distant and very close, at once well-known and full of mystery"...

#### 9. Generality and abstraction - or the price we pay.

(March 20) After stopping to make notes last night, my thoughts continued to linger on 'the abstract' and 'the general'. I had just declared (more or less) that they had nothing to do with each other - the proof being the two pairs into which they spontaneously fit,

the abstract - the concrete, the particular - the general,

are very different indeed, not to mention that 'the abstract' plays a yang role and 'the general' a yin one! And yet there remained in me a diffuse dissatisfaction, a feeling that I hadn't quite seen a certain situation, made up of these 'qualities'. I may have dismissed the connection between 'abstraction' and 'generality' as a 'push-button reflex', but it was still lurking in the back of my mind! As for 'the concrete' and 'the particular', all right, they seem to be very different qualities. But I couldn't help feeling an affinity, or an attraction (it's hard to say whether it's one or the other . . . ), between 'abstraction' and 'generality'. It is this feeling that I would now like to try to identify.

What's certain is that I'm *not* attracted by abstraction for its own sake, in my mathematical work let's say. Increasingly advanced abstraction, manifested by the introduction of increasingly 'sophisticated' notions, has never put me off, that's a fact. But that's an aspect of things that I never really paid attention to. More or less abstract, for me it's all the same (in mathematical work, I mean), and, to tell the truth, I don't even realise it. It's not me, nor any desire or impulse in me, that's in charge of this. But it's the things I'm probing that dictate what I have to do, and therefore what 'level of abstraction' I have to work at. It's like with the gears in a car - it's not the driver who orders the gears (according to his preferences and predilections), but it's the road that tells him  
Here you drive in fourth gear, there you drive in third gear and so on.

I know that my relationship to abstraction in my work is not typical among mathematicians. Almost all of them have a kind of personal 'threshold', a certain degree of abstraction that they are prepared to 'tolerate'. Beyond that, they 'drop out'. Depending on their temperament, they do so with feelings of regret, as if they've failed ("sorry, I can't keep up with you in this game..."), or with a more or less veiled tone of sullenness, implying: it's all very abstract and it can hardly be anything but smoke and mirrors, since it doesn't even make me want to keep up...".

In fact, today is the first time I've come to the obvious conclusion that this 'threshold' exists. So I would be hard pressed to say to what extent this 'threshold' is determined by *temperament*, and to what extent it is the consequence of a *choice* (in which the influence of the surrounding environment will, more often than not, be of great weight). I can say, however, that among the mathematicians I know personally, there are three in all for whom I have the impression that this threshold does not exist any more than it does for me (\*). In these three cases, however, I have noticed at a later date a deliberate disdain for an abstraction considered to be 'excessive', 'gratuitous', 'useless' . . . (\*\*). So there are choices here, linked (among other things) to a fashion of the moment

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(\*) The mathematicians in question are Pierre Cartier, Pierre Deligne and Olivier Leroy. I presume that they are not, with me, the only ones of their kind. But in the limited circle of mathematicians I have known personally, they seem to me to be alone.

(\*\*) It seems to me, moreover, that in such an attitude there is always the eternal confusion between "generality" and "abstraction".

(which I have already discussed). In these very special cases, these choices play, from a practical point of view, the same role as the 'threshold' I have just mentioned.

In my work as a mathematician, I have never sought or shunned abstraction. I can say, however, that if there is one thing that has always attracted and fascinated me, it is the search for *unity* in the multiplicity of phenomena. To put it another way, the force that constantly drives me, like an obscure instinct, is to constantly apprehend and identify what is *common* to situations that may seem dissimilar. To put it aphoristically: I've discovered, or I've always instinctively known, that 'difference' belongs on the surface, and that kinship appears in the depths. This is how the quest for unity has often led me, without my even looking for it, or even bothering to realise it, to dive deep.

Seeking the common in the disparate, or kinship in the dissimilar, is also seeking *the 'general'* through the particular. At a time when the mathematical fashion is to scorn generality (equated with gratuitous 'generalities', or even bombast), I can say that the main force manifest throughout my work as a mathematician has been the quest for the 'general'. It's true that I prefer to emphasise 'unity', rather than 'generality'. But for me these are two aspects of the same quest. Unity is the deeper aspect, and generality the more superficial aspect. These aspects manifest themselves, one by the perception of 'kinship', and the other by that of 'similarity' or 'resemblance'.

The preceding pages clarify for me the difference in nature between "abstraction" and "generality" (which represents the superficial "counterpart" of "unity"). I would add in this connection that I have never perceived in anyone a 'threshold' as regards the degree of generality they would be prepared to tolerate without cracking! It would be difficult (for example) to find a statement "more general" than the one which says that everything in Creation must be born and must die. Its meaning is clearly perceived by everyone, without the need to know how to read, write or count. Everyone has a certain apprehension, more or less superficial or profound, of the very simple *fact that* it expresses. On the other hand, the much less far-reaching statement "two plus one equals one plus two", because of its abstract nature (however modest it may be for a mathematician), is probably incomprehensible as it stands to the vast majority of human beings (unless it is painstakingly explained using a number of concrete examples).

But the remarkable thing I wanted to get at above all is that it would seem that, at *the level of scientific thought* at least, *the search for generality is necessarily accompanied*, whether we like it or realise it or not, *by increasing abstraction*. I see this here as a simple truth of experience, which I know first and foremost from my own work as a mathematician, but which is also confirmed by what I know about mathematics and the other sciences, and about the history of scientific thought. My purpose here is not to explore the reasons for this fact (\*), but above all to take stock of it.

In terms of a yin-yang dynamic in the progression of scientific thought, this observation could be reformulated as follows. The search for 'unity' through diversity, for 'the general' through the particular, is also the search for a certain *yin tone* in our apprehension and understanding of things. The pursuit of this quest would therefore seem to lead us towards an 'increasingly *yin*' modality in our understanding of things. On the other hand, this pursuit seems necessarily to be accompanied by increasing abstraction, i.e. an intensification of a certain yang aspect in our apprehension of things. In this same quest, the latter would become 'more and more *yang*'.

It would be tempting to see these two progressions in opposite directions, one towards yin and the other towards yang, as maintaining the yin-yang *balance* of thought. However, I doubt that this interpretation is relevant. For it to be so, 'generality' and 'abstraction' would have to form a yin-yang pair, which is by no means the case. The dynamic that links them together is clearly *not* that of a couple! On the contrary, one would be tempted to say that 'generality' (or 'unity') is *what we are looking for*, instinctively it seems, beyond the fluctuations of fashions and the spirits of the times; and 'abstraction' would therefore be '*the price*' we have to pay, whether we like it or not - at least, as long as we confine ourselves to scientific thought, or even to thought at all...

As I said, in my work as a mathematician, this 'price to pay' has never weighed on me. But it would seem that in this respect my case is rather atypical - and the fate meted out to my work, thanks to my premature 'death', is there to confirm it. In any case, I see many other 'prices' still to be paid, and which seem to me to be of a very different nature.

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(\*) (1 April) The reflection returns to 'abstraction' in sections 20 to 24. Without having looked for it, it seems to me that it also sheds light on the 'fact' noted here of a certain close link between 'abstraction' and 'generality'.

consequence than this one (\*\*). But this is not the place to examine them.

## 10. Tales of icosahedrons and Christmas trees.

(21 March) Last night I continued to turn the yin-yang pairs, which represent modes of apprehending reality through *thought*, *round and round in order* to get to grips with them. I particularly focused on the

the simple - the complex,

and its relationship to the couples already examined yesterday and the day before. This also led me, one thing leading to another, to bring a few other remarkable couples to the rescue. (I plan to come back to them shortly).

After that, my reflections took a rather different direction, driven by the desire to arrive at a global ('formal', or 'mathematical') apprehension of all these 'couples', revolving around this delicate and complex reality that is thought.

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(\*) There are 'external' prizes ('spin-offs' from science), and 'internal' prizes, which also deserve to be examined closely. The one I had in mind above all others is the *fragmentation of knowledge*, which is felt within a particular science like mathematics, and (a fortiori) in our overall scientific knowledge of the world. If I seem to be presenting this fragmentation here as the 'price to be paid' for our 'quest for unity', this may seem a strange paradox. I'm only now realising it, and so I've never thought to take a closer look. In any case, we are forced to recognise this phenomenon of the *fragmentation of knowledge*, even within a specific science such as mathematics. We would like to 'converge' towards an elusive unity, towards an understanding that is at the same time an overall vision, that would embrace the essence of what is known and sensed in mathematics. But I doubt that there is anyone today who has such an understanding and such a vision. On the contrary, one has the impression of a '*divergence*' in the process of progression of thought, mathematical thought in this case.

This phenomenon seems to me to go beyond any question of fluctuating fashions. We sense that it manifests a certain limitation inherent in thought itself, or at least in 'scientific thought', as a tool for approaching and knowing the Universe. That in the mind of a person, the 'breadth' of the knowledge that thought imparts, and the 'depth' of that same knowledge, can only grow together within certain limits, which it would be impossible to transgress in the current state of affairs. To claim to transcend these limits is to rely on the progression of a 'collective knowledge', replacing individual knowledge and the personal understanding it embodies. It is precisely this 'collective knowledge' that appears to me to be 'fragmented', 'piecemeal' and 'divergent' in essence. Such knowledge does not have the quality of 'knowledge', of understanding, of vision. That quality belongs to the individual, and is foreign to the group, and even more so to its 'data banks' and its computer parks.

I had previously divided all these pairs into six groups - the pair 'the simple - the complex' had just become autonomous, by splitting the group 'the part - the whole' (aka 'the precise - the vague', aka 'precision - generality'). This brought the total number of these 'doors to the Universe' open to reflective thought to six. The first thing I noticed was that any two of these six groups were linked by some unquestionable direct affinity - that's  $6 \cdot 5 / 2 = 15$  edges already, just to link the corresponding vertices of my Christmas tree diagram. As a result, I had to redraw this part of the diagram, to obtain a hexagonal star pendantive of the most beautiful effect, on the left side of the tree.

To get it right, I might even have had to draw a regular icosahedron instead of a hexagon, interpreting my six vertices as the six pairs of opposite (or 'an- tipodic') vertices formed with the twelve vertices of the icosahedron. The fifteen 'cormic' edges would then correspond to the fifteen pairs of opposite edges (i.e. corresponding by symmetry with respect to the centre of the icosahedron), formed with the thirty edges of the icosahedron. In other words, the part of the graph that interests me here (which could be called the 'Thought' sub-graph) can be interpreted as being formed by the vertices and edges of a polyhedral configuration that is very familiar to me, and which I call *the 'left icosahedron'*. This is the configuration deduced from the ordinary icosahedron (seen, say, as forming a 'paving' of a spherical surface) by identifying two 'antipodic' (or 'diametrically opposed', i.e. symmetrical to each other about the centre) points.

This interpretation would only be of philosophical interest if this representation of the graph that interests me (the "Thought graph") as the "1-skeleton" of a left icosahedron (\*) were "*canonical*" (in a sense that will be obvious to any mathematician who has developed the intuition of the "*canonical*" and the "*non-canonical*"). This also means that of the twenty possible 'triples' (or sets of three elements) of vertices that can be formed with the six vertices considered, there would be a natural way of choosing ten of them (which would be called 'faces'), which would correspond precisely to the ten faces of the left icosahedron (themselves corresponding to the ten pairs of opposite faces that can be formed with the twenty faces of the ordinary icosahedron) (\*\*). In fact, for a set of six elements, there are twelve ways of

(\*) The "1-skeleton" of a polyhedron is the configuration (of dimension 1) formed using only the vertices and edges, forgetting the faces.

(\*\*) Of course, the "triple" thus associated with a face (which is always a triangle) is none other than the "triple" associated with a face (which is always a triangle) is none other than the "triple" associated with a face.

choose a pack of ten triples, so as to obtain an icosahedral configuration (left). If I'm talking here about a 'natural way' of choosing one of these twelve icosahedral structures, that means, of course: a way that is linked in some 'obvious' and irrefutable way to the *meaning* of each of our six vertices and the set they form.

The first idea that comes to mind is this. A triple of vertices corresponds to three of our six groups of cosmic couples, and the union of these three groups itself forms a set (or 'grouping') of such couples. This unambiguously describes the triple of vertices from which we started. In other words, the twenty possible triples correspond well ('biunivocally') to twenty *different* 'groupings' of cosmic couples qualifying 'thought'. I presume that if we look at these twenty groupings one by one (which I haven't taken the time to do), some will appear, in view of the significance of the different pairs that make them up, to be 'artificial', like a grouping 'made of odds and ends'. Others, on the other hand, will look "reasonable", representing some interesting aspect (philosophically speaking) of the "discursive" apprehension of reality (i.e. apprehension by means of thought) (\*). Having said that, it is not unthinkable (but, as it stands, it's probably too good to be true) that this second favourable case, of a triplet of which

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formed by its three vertices.

Please note that any "packet" formed by ten triples among six "vertices" (which triples would be qualified as "faces") does *not* correspond to an icosahedral structure on this set of vertices. The number of such "packets of ten" is very large, of the order of a thousand billion, whereas there are only twelve icosahedral structures on a set of ten vertices. The characteristic property, for a "packet of ten faces" to describe an icosahedral structure, is that each "edge" (i.e. each two-element part of the set  $S$  of vertices) must be contained in exactly *two* "faces".

(\*) For example, this is the case for each of the two triangles inscribed in the hexagonal "pendantif", which are form the inscribed "Star of David". One, described by the three couples

part - whole,      multiplicity - unity,      effect - cause,

can be seen (in terms of the reflection that follows, "Desire and necessity" - or the way and the end", PU n° 11) as representative of "desire", and the other, described by the three couples

simple - complex,      structure - substance,      order - chaos,

as representative of "necessity". This already shows that the "it is not unthinkable" of the sentence that follows is indeed "too good to be true". For a triple and its complementary cannot represent faces for the same icosahedral structure.

that could be called 'significant' (philosophically speaking), occurs exactly ten times, and that the ten triplets or 'traingles' in question can indeed be interpreted as the 'faces' that correspond to one of the twelve icosahedral (left) structures on our set of six vertices.

It's a pity Kepler isn't here to read me any more, because surely this cosmic icosahedron story, hypothetical though it is (that's not what would bother him, quite the opposite!), would not fail to electrify him immediately! In fact, I've thought of him more than once since I started to draw my graph, telling myself that if he were in my place, he'd surely come up with an amazing graph that would include all the regular polyhedra at once, if that's possible. And now, unintentionally, I seem to have stumbled across an icosahedron. So I'm probably out of my mind...

But I didn't go on trying to put my finger on the hypothetical 'icosahedron of thought'. Yesterday and today, I've continued on my path, reviewing the diagram as a whole. I fleshed out the right-hand side of my Christmas tree, by separating into separate groups the two bundles of pairs, one revolving around '*'rise - decline'* (and also '*'birth'*) and the other around '*'death'*'.

- die", and "creation - destruction"), and the other around "*good - evil*". (Until yesterday, these packets were part of the 'up - down' and 'joy - sadness' groups). What's more, this has led me to create from scratch the new '*greatness - smallness*' group (a.k.a. my friend 'the giant - the dwarf!'), so as to form with the two previous new groups, and with the 'joy - sadness' group, another pretty pedantif, this time square. Suspended from this, as it were, is the bundle formed with the five groups relating to *the four directions* in space-time. The initial symmetry between the left (yin) and right (yang) sides of the tree has unravelled over the hours. On the other hand, it's looking more and more like a Christmas tree! For good measure, I've hung a sort of rosette in the tree, representing the four cardinal points (and at the same time, tacitly, the four seasons), linking the 'light - shadow' group (which includes 'south - north' and 'summer - winter'), on the trunk of the tree, to the '*'rise - fall'* group (which includes '*east - west*' and '*spring - autumn*'), at the end of the branches. It's just for show, I haven't given it its own number.

Finally, when I was reviewing my lists, I realised that I'd also do well, on the trunk of the tree, to autonomise a group called 'authority - obedience' (aka 'master - servant') which was included in the 'faith - doubt' group, and likewise the group called 'the strong - the weak' (aka 'intensity - finesse'), which was part of the 'firmness - giving' group. So that's eleven peaks on the trunk at

instead of nine, and seven on the left side, ten on the right, i.e.  $11 + 7 + 10 = 28$  vertices in all (\*).

I think I've finally got the hang of it, and that's as far as I'm going to go with my tree! So much for the icosahedron!

## 11. Desire and necessity - or the way, and the fin.

I would like to continue my exploration of exploratory and reflective thought, following the irreplaceable thread provided by the dynamics of yin and yang. In the course of last night's 'doodling' reflection, the following two 'bundles' of yin-yang pairs emerged. They seem to me to highlight two tendencies (or forces, or impulses...) that are in some way complementary, and which seem to me to be inherent in 'thought'. Here are the two packages:

the part - *the whole*  
the individual - *the general*  
multiplicity - *unity*  
effect - *cause*  
purity - *fertility*

and

*simple* - complex  
*abstract* - concrete  
*precise* - vague *order*  
- chaos  
*structure* - substance

In each of these ten pairs, I have italicised the one of the two terms that seems to me to constitute, in a sense that I will have to specify, a kind of 'pole of attraction' for the thought - a tone that it seems to seek out instinctively. Note that in the first

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(\*) (15 April) A 29th group was added at the last minute a week ago. (See the beginning of the "Gates to the Universe" section, n° 25.)

In the first package, it's the 'yin' terms that appear as 'attractors', while in the second, it's the 'yang' terms.

It is understood once and for all that in this reflection, when I speak of "thought", I am implying that it is thought "at work", as a tool in the hands of the worker-child who works through us. It is one tool among others that can be used to explore the world. I am well aware, moreover, that this tool is not available only to the drive for knowledge within us, far from it. Much more often than exploring the World and discovering how it is made, thought is used to create an image of the World and of ourselves, and to maintain against all odds an image designed to satisfy and reassure us, and apart from that, to help us achieve certain ambitions that are dear to us, if at all possible. There is the thought that *discovers*, just as there is the thought that *covers up* (or evades). They can coexist in the same person, and it's true that we sometimes mistake one for the other - but they are hardly alike! One is driven by the thirst to know, and the other by the fear of knowing. But since we cannot discern at a glance which of these two forces is at work, we can tell them apart by their fruits. In what I am about to say, nothing applies to the 'second way' weighing (by far the most common!), the thinking that serves the 'boss' in us. When it is he who has put himself in front of the workbench, and even though we may be the most intelligent, the most cultured, the most learned man in the world, there is no tortuous syllogism or petition of principle, no crude confusion that is not good and welcome, to 'demonstrate' or justify what must be 'demonstrated' or justified. Abstraction and generality (at this point, I mean) are used (sometimes masterfully) to drown out a fish that might seem innocuous; simplification, to lump together things that obviously have nothing to do with each other, and precision, to assert with a peremptory air and 'in the best faith in the world' things that he knows perfectly well are false. This is not the kind of thinking I am now going to try to identify some striking aspects of. (\*)

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(\*) In making this very necessary distinction between these two types of use of thought, which might be called 'disinterested' and 'interested', I was aware that the way I was formulating it was a little too 'white' - black". Even 'working thought', driven by a thirst for knowledge, is rarely free of conditioning (if it ever is). More than once in Harvest and Sowing, I have been led to observe the extent to which even the 'mathematician at work' (let's say) can be imprisoned by deliberate statements, prejudices and blinders, hindering the free development of his knowledge of things. Often these are collective blinkers, shared by most, if not all, of their peers. They are the ones that draw these 'invisible circles'.

The attraction exerted on us by the 'attractors' of the first group and those of the second does not seem to me to be of the same nature. If I try to describe this nature by a single suggestive term, in both cases I would say that in the first case the attraction is of the order of the *impulse*, that it has the quality of *desire*, and that in the other it is of the order of a *necessity*, a *constraint*, imposed by the very nature of thought and by the limitations that are proper to it. It is this double intuition that I would now like to try to clarify a little (\*).

I have already spoken on several occasions in Harvest and Sowing, and as recently as the day before yesterday, about the powerful fascination that accompanies this kind of 'archetypal prescience' in us of an essential *unity* behind the apparent disparity of things. At the level of the drive for knowledge, I believe I recognise in this fascination the main force at work in the progression of scientific thought, which takes the form of successive *syntheses*, each striving in its own way to capture this elusive unity. Admittedly, the success of the scientific way of thinking, and of its 'method', the final word of which is perhaps '*precision*', is undoubtedly due, in large part, to its tactic of methodically examining 'the particular', before venturing to speak of 'the general', to make a rigorous observation of 'the effects', without prejudging their presumed common 'cause', to list 'the multiple', while pretending to forget the prescience of the underlying *unity*. The proper approach to precision would be to highlight particularities and *differences*, rather than leaving them in the background, in favour of what is presumed or recognised to be *common*, through a perhaps more hidden *kinship*. But if this has been the approach and method of scientific thought, there is no doubt that it is *not* in this direction that our thirst for knowledge spontaneously leads us. It is rather that thought is incapable (it would seem) of directly apprehending 'the Whole'. He

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I've mentioned elsewhere, some of them of little consequence, and others which, with hindsight, look like thick walls! And yet it happens that these 'walls' are breached by one person like no other, as if they had never been there in the first place! And a hundred years later, no one remembers these imaginary walls, which had held everyone back for generations, until the day when some oddball slipped through to go beyond them. I hardly need to point out that it is precisely this oddball - and at the precise moment when he goes beyond - who, for me, embodies this 'thought at work', or *free* thought, that of *the child*, which will be discussed in the following pages.

(\*) (25 March) The following reflection on the theme of "desire and necessity" overlaps with that touched on in passing in the note 'Desire and rigour' (n° 121). See also, in the first part of Récoltes et Semailles, the two sections 'Désir et méditation' (Desire and meditation) and 'Belle nuit, belle de jour' (Beautiful night, beautiful day) (n° s 36, 39), where, in different lights, this same theme (more or less) is touched on again.

It is necessary to make the diversions through the particular in order to apprehend the general, through the multiple in order to apprehend *the One*, through the multiplicity of effects in order to apprehend the unity of the cause. Only once we have made these diversions are we in a position to return to where our desire leads us, to the common cause and root of things. And, in so doing, arrive at an *understanding* that gives *meaning* to what, at first glance, were little more than observations, repertoires and descriptions.

This new understanding is of the order of the Whole, and not of the Part. It changes the way we look at things, or to put it more accurately: our 'eyes' are no longer the same. And by the same token, the very things we used to look at are no *longer* 'the same'. They have not ceased to be "particular", "multiple", "different", certainly. But we now approach them with *expectations* (more or less precise) and *questions* (more or less pressing). "THE method" has remained the same: precision above all.

! - and the 'questions' we keep asking are not 'to the Whole', to the great Silencer, but to the part, which is always eager to answer all the questions we want to ask it - the stupid as well as the intelligent, the superficial as well as the profound, it's not far behind! And when we've filled our bags and notebooks with the answers of the multitudinous, it's time once again to return to the One, the All. For a new pair of eyes.

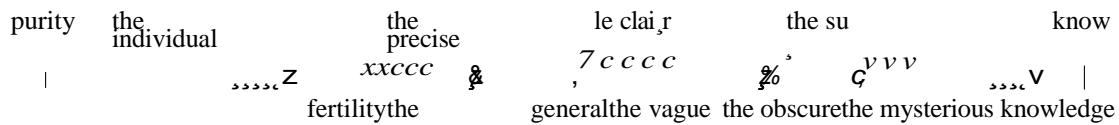
This seems to me to be the back-and-forth movement between desire and necessity, between the flesh of knowledge and the bones of knowledge, between *the Beloved* and *the things* she inhabits that lead us to her.

In this movement, '*purity*' belongs to the method, to the path chosen. It is manifested in a clear vision of the constituent parts of a whole, their individual characteristics and their mutual differences. It lies in the *precision* of this vision. *Fecundity*, on the other hand, comes from elsewhere. It lies not in the method, nor even in the things we are questioning, but in the One who inhabits them and answers us through them.

To put it another way: the pure is a *means to* lead us towards the fruitful, towards the fruitfulness proper to the Beloved, the Mother. When the pure ceases to be a means, to become its own end, thought is cut off from the source and dries up, for want of renewal. It may accumulate works and fill entire libraries, but these are not the works of Love. They may speak of the glory of the patron, but they have no part in the fruitfulness of the Mother.

## 12. Precision and generality - or the surface of things.

(22 March) Yesterday I began to try and pinpoint the back-and-forth movement, in thinking about discovering the World, between 'desire' or 'the end', embodied in the fruitfulness of 'the Mother', and 'necessity' or 'the way', embodied in the purity of the method, of the very mode of knowledge that 'thinking' represents. This movement seems to me to be evoked quite well by the following 'zig-zag diagram':



I've drawn a zig-zag diagram showing seven couples (represented by seven arrows) linking four yang qualities and four yin qualities, between the two separate couples

purity → fertility      and knowledge → knowledge,

These two pairs express a dynamic relationship common to the seven pairs of the zig-zag, all of which can be seen as representing one of the many aspects of the 'dynamic of desire': one in which 'knowledge' that repertoires and explains is the means and the path to *knowledge* 'in understanding', and in which 'purity' of intellectual approach is the means and the path to the *fruitfulness* of an intuition of the Whole. This intuition plunges deep into the unconscious, and none of the formulations that it inspires in us to describe it and pin it down in the field of consciousness can fully capture or exhaust it...

The six yang terms in the total diagram are on the same line (the top line, as they should be), and so are the six yin terms (which form the bottom line). The yang terms in the zig-zag are

the particular,    the vague,    the obscure,    the known (grasped by "knowledge"),

they represent the pole of 'knowledge', and that of the 'purity' that is proper to it - t h e pole proper to thought as a mode of knowledge. The yin terms are

the general,    the vague,    the obscure,    the mysterious,

they represent the pole of 'knowledge' that apprehends and understands, and the fruitfulness inherent in intuitive knowledge of things.

In the sequence of the four yang qualities, we see a progression towards an apprehension that is clearer and clearer, better and better circumscribed, until the final stage of what is well and truly known, 'grasped', 'appropriated' as it were by thought. It's a progression in the direction of yang.

In the sequence of the four Yin terms, there is a progression in the opposite direction, from "the general", distant and devoid of any particular tonality, which begins to reveal a substance when it is perceived as "the vague", this substance becoming closer and more carnal in "the obscure", to finally revealing itself in its true nature, as what is closest and most intimate, in "the mysterious".

What *attracts* us by the force of desire is well "*the mysterious*", revealing itself to us through that familiar perception of "vagueness", of "obscurity": and at the same time, by a strange para-dox, we do not cease until we sound it out and probe it in all directions, to transform it into something "*known*", or to put it better, to transform *the diffuse knowledge of the mysterious* into something *expressed and known*.

This paradox seems to me to be peculiar to thought. This dynamic could give the impression that the human mind abhors the vague, the obscure, even the mysterious, and that what spontaneously attracts it is anything that presents itself in a precise and clear form, as the object of impeccable *knowledge!* And that's certainly what the consensus of the group, the repository of knowledge passed down from generation to generation, would tell us. But the reality is quite different. The thinking mind is yang, and what attracts it is its complementary yin, the mystery. It is in its confrontation with what is obscure, or to put it another way, in its ever-renewed marriage with the mysterious, that the mind itself renews itself and draws fruitfulness. If, in its mode of expression and communication, it chooses precision rather than vagueness, and if it constantly seeks clarity rather than obscurity, it is because it knows by instinct (or by ancestral experience, which has become like second nature...) that *this is* its surest means of penetrating the unknown and apprehending the mysterious, and of constantly consummating the marriage with the beloved.

Of the four yin qualities mentioned earlier, the only one that is the 'official' concubine of the 'mind' is the least yin of all: 'generality'. Of course, no one will object (or at least they didn't until a few years ago, in more clement times...) that a researcher (or even a 'scholar') is 'looking for the general'. It is also the only one of these four yin qualities that is not generally felt to be '*opposed*', or even antagonistic, to each of the other yin qualities.

four yang counterparts, with the exception at most of 'the particular'. The unspoken ideal that scientific thought seems to seek, therefore, seems to me to lie in a close alliance of generality and precision, an ideal expressed by the couple

the precise --> the general

shown in the diagram earlier. This pair does not seem to me to be a traditional pair of *opposites*, as is the case for neighbouring pairs.

the precise --> the vague      or the particular --> the general,

and for the other four pairs that follow in our zig-zag. I suspect that even today, few scientists would dream of rejecting this pairing as expressing the ideal harmony sought in the scientific process.

As far as I'm concerned, if someone had asked me the question, there's no doubt that I would have recognised that ideal without thinking twice about it. I still wouldn't deny it today. But, like all ideals, this one only touches the surface of things. It is not in the ideal, but in the rich *reality* and its mother, the *dream*, that the depth lies, and the fruitfulness that is its own.

### 13. Harmony - or the marriage of order and mystery.

(March 23) Last night, as I followed the associations of yin-yang pairs prompted by reflection, I saw our pretty zig-zag of yesterday extend further to the left, so as to enter into types of qualities that are not peculiar only to thought. In the initial diagram, I've replaced the terms 'the general' (i.e. 'substantivised' adjectives) with the corresponding nouns 'generalities', and so on. This leads me to extend it as follows (\*):

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(\*) (25 March) Before extending the zig-zag of the previous day, I had been led to replace the yang term 'the particular' (mating with 'the general' or 'generality', and almost duplicating its right-hand neighbour 'precision') with the term 'rigour', to form the new pairing

rigour - generality,

complementing one's neighbour (or "concubine") on the right

precision - generality.

	discipline	control	volonté	rigour	precision	clarté	savoir
	<i>xxccc</i>	<i>ccc</i>	<i>§</i>	<i>ψψ</i>	<i>ŋŋ</i>	<i>ŋccc</i>	<i>ŋ</i>
imagination	jue	abandon	spontaneity	generality	vagueness	,	<i>ŋxxx</i>

mystery,

where the top line is still made up of yang terms, and the bottom of yin terms. I've used "bold" arrows to represent the couples in my repertoire (given below) (\*), which are considered "legitimate couples". These are the ones that seem to me to be particularly well 'matched', while the others look a bit like 'cohabiting couples' (needless to say, I don't imagine that this distinction has any rigorously objective character!)

This time there are seven yang qualities, ranging from "discipline" to "knowledge", via "control", "will" and "rigour" (the latter taking the place of the term "the particular" in yesterday's zig-zag). The eight Yin qualities oppose them "in staggered order" range from "imagination" to "mystery", via "play", "abandonment", "spontaneity"... Imagination' can be seen as *the direct*, intuitive *approach* to the mysterious, or as the pathway from the conscious to the unconscious. The discipline of rigorous thought constitutes the *indirect path*, which is also the path proper to thought, the 'yang' path par excellence.

Each of the new seven couples that I have just introduced seems to me to be rich in meaning, and deserves to be examined to hear what it has to say to us. But I'm not going to do that here, since yesterday I didn't take the time to question the first seven couples that had just appeared separately, contenting myself with noting what they suggested to me in their

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It's the first of these two pairs that seems to me to be the best 'match'. While it is true that we often lose in precision what we gain in generality and vice versa, such a situation *never* arises for the 'rigour - generality' pair. It is true that rigour tends to start with the particular and work its way up to the general. But it can be exercised, without losing anything of its own nature, in the context of the 'general', or the 'vague', as well as in that of the 'particular' and perfect precision. I first wrote about rigour in the section "Rigueur et rigueur" (ReS I n° 26), then in the note (already cited in the previous b. de p. note) "Désir et rigueur" (n° 121).

(\*) The thought provoked by the presentation of this 'repertoire' (and of the famous 'Christmas tree diagram') led me to expand it on the way, by including 'couplings' that had initially escaped my attention (such as 'rigour - generativity', mentioned in the previous b. de p. note), or that I had tended to neglect or discard, in favour of others that 'at first sight' seemed a better match. The new pairs introduced in the course of this reflection will be indicated by brackets. These are in no way intended to suggest that these pairs are less important or 'significant' than the others, but rather to serve as reference points to mark the progress of the reflection.

together. Today, I'd rather go back to the day before yesterday's thought, which had been left hanging. I had written two groups of five pairs each, with five *yin* 'at- tractor terms' in the first, and as many *yang* 'attractor terms' in the second, declaring that the attraction towards the former had the quality of *desire*, and that the attraction towards the latter, the *yang* 'at-tractor terms', represented the inherent *necessity* of thought, the *path* to satisfying desire. So we 'interrogated' the first 'package' of couples, the '*yin* attractor package', from this particular angle. Today I'd like to turn to the second, the '*yang* attractor packet', which I'll mention here as a reminder:

*the simple* - the complex  
*the abstract* - the concrete (or the real)  
*the precise* - the  
*vague order* - chaos  
*structure* - substance.

Of the five *yang* attractors in this package, there are two that seem to me to play a key role

simplicity, and *order*.

*Abstraction*, *precision* and the search for the *structure* of things (the substance of which so stubbornly eludes thought) all seem to me to be subordinate qualities that the mind does not really seek for their own sake. Rather, they are the very *means* that enable the mind to apprehend 'the simple' in the bewildering complexity of things and events, and to discern or bring out the presumed order behind the apparent chaos (in the eyes of the scrutinising mind, at least) that the raw perception of reality reveals to us.

"Simplicity" and "order" are closely related qualities, so much so that we might be tempted to declare them identical. However, the order we perceive in things can itself be more or less 'simple', or more or less 'complex', depending on the depth of our understanding of the harmony of things. But however subtle and complex the order perceived and expressed by our thoughts may be, it always embodies, by its very nature, a 'simplicity' that is itself more or less 'simple' (or even 'simplistic'), or more or less 'complex', depending on the depth of our understanding of the harmony of things.

less delicate or 'complex'. And conversely, to recognise the simple in the complex is to see an order appear in it that had previously escaped us. And when we succeed in 'simplifying' a conception of things (or the reasoning that supports it), we are also more or less approaching the order inherent in things themselves, whereas the 'order' we had been able to see in them was no more than a more or less crude outline. Perfect simplicity is that which perfectly expresses and embraces the hidden order inherent in things themselves.

So we could say that 'simplicity' and 'order' are like the soul and body of one and the same quality. This quality is in no way a creation of the mind or spirit, or a quality inherent in them that they project elsewhere. It inhabits the things of the Universe, both the 'concrete' and the 'abstract', independently of the 'mind' or 'thought' that tries to apprehend them. And it's clear that this quality, however 'yang' it may be in its relation to the substantial *complexity* of these same things, or to the sense of *chaos* that chaos arouses in us when the hidden order ceases to be perceived - that this quality is intimately linked to that 'yin' quality par excellence, evoked by words like 'totality' (or 'the Whole'), 'unity' (in the multiple), or 'cause' (common, linking the multiplicity of effects by a profound kinship). After all, every order establishes a *unity*, expressed by this very order, which both governs and connects the multiplicity of things it contains. At the same time, it also appears to us as the common *cause* of the multiplicity of relationships that this order institutes, and of the multiple consequences that these imply. And conversely, it is also true that the unity that resides in the profound kinship of things, a unity that can be seen through and beyond their sometimes disconcerting diversity, is none other than that hidden 'simplicity' to which we cling (even if it is only hinted at), in order to find our way through the bewildering complexity of appearances and phenomena.

And so, without having expected it in the least, it seems that, as I reflect, there is a profound identity between two types of qualities which, the day before yesterday, seemed to me to be almost opposites, or at least to be very different in essence: On the one hand, *Unity*, *mystery*, with its deep carnal resonance embodied in *the Mother* and in the fealty that is her; and on the other hand, *Order*, and the simplicity it embodies, which at first appeared to me to represent the proper *path* for thought, in our ceaseless quest for the Mother. But now Mother and Order appear in their turn as two indisputable aspects of the same essential quality inherent in things, as representing, on the one hand, the "simplicity" of things and, on the other, the "simplicity" of things.

the shadow side, and the other the light side.

If I look for a name for this quality of life, manifested in the fecundity of the One, the Mother, and in the pure simplicity of the Order, it comes to me: *harmony*. This is the quality of all that is neither yin nor yang in tone, but which expresses the balance between yin and yang, between the Mother, in her inexhaustible fecundity, and Order, the expression of immutable laws.

This dual aspect of the harmony inherent in things - that of mystery, the source of enchantment, and that of order, the expression of the law that governs the Cosmos - seems to me to be present in things from all eternity, independently of the presence of the human mind striving to apprehend this harmony. And thought is not the only path open to the mind, certainly, nor especially the most direct, for this purpose. It's the 'yang path', that's for sure - and to this day, it's the one I've followed most of all. It's the path that approaches the harmony of things from the midday side, the side of order: through what can be *expressed* and grasped (if at all) by language, even if it means reshaping it from day to day, as and when necessary. In this approach, the order sensed in things, and the means of expressing it precisely in terms of *structures* (even if it means climbing as high as necessary on the ladder of successive abstractions. . .) - these are the things that we need to understand. ) - these are the things that we always feel are 'at hand'. And without ever having been told so, it is they who, obscurely, act as a means, not to say a tool.

Admittedly, the worker is attached to the tool, which for him is like another himself. But it is not the tool that is invested with his desire, but the substance he is working with.

And it is not on this slope, which we climb under the midday sun, that the desire that constantly pulls us forward, towards the heights, is invested. If it pulls us in this way, it is towards *the other* presumed side, the side of shadow, and towards the deep valley from which it comes and where it ends...

#### 14. The Characteristic and the Characteristic - or the Cosmic Accordion.

(March 24) The Dreamer has been having a field day, every night or so, teasing me about my work on yin and yang. As it happens, I'm so caught up in this work that I hardly take the time to ponder the meaning of any of his pranks, which apparently only provokes him further. Last night I was treated, among other things, to a very discreet flash (in my half-sleep) of an *accordion*. Obviously,

this one represents my interminable zig-zag of yin and yang from yesterday and the day before, which I had found a way to extend a little further to the left before falling asleep in bed. The accordion was baptized '*harmonica*' for the occasion, so peremptorily that it took me a moment to convince myself that this was definitely a mistake, that that wasn't what the bellows instrument I'd just seen was called. It was only then that I realised the gag - the bellows represented nothing less than *the harmony* of 'order and mystery' that had just been mentioned!

Less fortunate than Pythagoras of old, I have not had the privilege of hearing this harmony, only of seeing it, in the form of a most mundane symbol. The Dreamer has no regard, decidedly, for high poetic dress! And the *souffle* suggested by this bellows is surely none other than the breath of life that animates all things and links the side of light to the side of shadow. I know this breath well. It is neither a poetic fiction nor a metaphor, but a tangible, omnipresent reality, even if I sometimes forget about it. It certainly wouldn't have occurred to me to make a symbolic representation of it, using some familiar object - only the Dreamer is capable of such ingenuous irreverence.

! And he's done his homework - he's decided not to include Madame Lamère and Monsieur Lordre in the flash, with one holding one end of the accordion-harmonica and the other holding the other, and pulling and pushing in perfect unison, giving a convincing image ("ein treffendes Bild") of the perfect harmony reigning between the two supposed spouses animating and governing the Universe.

There was also a more elaborate dream in which I was walking down a sloping street while typing (I couldn't say how). I was typing yin-yang couples, which appeared in very distinct characters across the street about fifteen paces further on. To tell the truth, I think they were more like couples, each made up of a vaguely pejorative or disapproving term, followed by a complimentary term that seemed to set things right. Each time I typed it on my invisible machine with the intimate satisfaction of a musician, who would strike a well-felt chord to 'resolve' a dissonance in beauty, brought there quite purposely for the needs of the cause. There were several couples that followed each other like that, like a series of dissonances-provocations, each resolved by the harmony it called for (here we are again, in harmony!). But when I woke up (just after the end of the dream, if I remember correctly), I could only remember one. It's the couple (I'll give it to you in

thousand!):

### **Characteristic - Characteristic.**

I laughed, yes. This laughter (which has just taken hold of me again) came straight up from invisible depths, without me being able to say exactly 'why I was laughing' - a laugh from the belly, not from the head. Or, if I 'knew' (and perhaps I still 'know' now), I wouldn't have and couldn't explain it to myself in clear words. No matter! What is clear, in any case, is that it is none other than my modest self that is the target of this teasing... .

The dream goes on and on, and it would have been well worth my while to write it down in black and white for my own information, in order to get a little more insight into it, if not to 'explain' it to myself. But I've given up, so eager was I to get back to these new, unexpected notes on yin and yang in exploratory thinking - notes that I'm still (familiar refrain!) 'in the process of finishing'.

First of all, I want to get back to my accordion-harmonica. It's getting so long that there's no question of it appearing on a single double-line. This time, I saw the bellows extend (to the left again, towards the 'past') not by seven notches, but by no less than *nine*. Here I'll limit myself to pointing out the spur-of-the-moment part, connected to the left 'discipline-imagination' section of the bellows of our harmonic zig-zag. Here is the spur:

There is a slight change of perspective in passing from the yang term on the right, 'discipline', which ended the yang side in yesterday's zig-zag, to 'the fact', because we are passing here from an 'inner' quality or tonality, concerning the mind or thought, to an 'outer' quality or 'optic', concerning the world observed and reflected in the scanning mind. It is to 'bridge the gap' between these two perspectives that I have added, above the term 'the fact', the essentially equivalent term (apart from the perspective) 'factuality', which I had to invent for the occasion (it is not in the 'Petit Robert', sorry!). This term makes sense

to designate the dispositions or attitude of someone who sticks strictly to the facts, which also has a certain connotation of "objectivity". There is a very common German word for this, 'Sachlichkeit' (\*). For a similar reason, I thought it would be a good idea to lump together 'le nécessaire' (which parallels 'le possible') and 'nécessité' (which parallels 'hasard'), and similarly for 'le réel' and 'réalité'.

I'm not going to spend too much time here trying to describe the rich cloud of associations surrounding this slew of new tan 'yang' and 'yin' terms that have just appeared, and the pairs they form between them. To do this properly would require volumes (just as the terms and pairs already appear in yesterday's portion of the cos-mic accordion)! I'll just note one particularly strong association here. Yesterday I noted that 'imagination' represented 'the pathway from the conscious to the unconscious' (and hence also 'the *direct*, intuitive approach to 'the mysterious', to the unknown...). The next Yin term, '*dream*', refers precisely to the privileged realm of the imagination, freed in the dream from the shackles (yang and superyang) that keep it prisoner in the waking state. And it is also the dream that is *the messenger* par excellence of the '*possible*' (which, as luck would have it, is the next Yin term). And so, provided we know how to listen to it and trust it, it is also the secret source of inspiration and vision that feeds our creative impulse, transforming this '*possible*' into a tangible, living reality.

But now I'm back to the mathematician's passion for structure - and this lengthening harmonica (sorry, accordion) is a fascinating structure indeed. The day before yesterday, I seem to remember, when the seven-notch zig-zag had just been lengthened by another seven notches, I said to myself that to do it properly, it would have to close in on itself - and then I didn't think about it any more. To tell the truth, this zig-zag had appeared a bit on the side, as a sort of curiosity, a bit like the famous Christmas tree diagram, but at the same time quite suggestive, my goodness! As for the part of the bellows that I have just connected to it, its last notch

order → freedom,

"hanging up" the term "order" on the bot that remained free, named (as if by chance) "libéré", he

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(\*) This word is formed from "Sache", meaning the object, or the thing; therefore "Sachlichkeit" designates the attitude that sticks to "objects", i.e. *facts*. I would point out that the German word for "fact" ("Tatsache") is formed from the same root "Sache".

came to me this morning as I was going about my business. I was very happy - So here we are, hanging on to the accordion, this famous 'order', who only yesterday appeared as an important character - *the* most important of the day, to say the least, along with the 'mystery' lady with whom he had just married before my very eyes (\*).

It didn't click right away, though. It has to be said that I was in a hurry to get to the market, and hadn't had enough sleep. It was only later, just before getting back to the machine, when I took the trouble for the first time to scribble down in black and white the whole new piece of bellows that connected to yesterday's, that 'the miracle' happened. On the far left of the long bellows was the word '*order*', which I had just added mentally that very morning. And on the far right, which I'd had time to forget a little in the meantime, the term that remained free, yin this time, was '*mystery*'. And it was precisely these two terms (as if by chance), or rather the important characters they represent, that I had seen paired up just yesterday, without having expected it in the least! And so, without my even having expected it, the cosmic accordion-harmonica closes! And there's no longer any need to connect superimposed double-lines. This time it's not a question of lines, but of *cycles*: two concentric circles, one yang, outer, the other yin, inner. (And yet, the accordion of this mischievous Rêveur was not circular).

I did not wait, to quickly trace my circles, with my free hand, and to transfer the yang terms on the external circle, the yin terms on the interior, this corresponding in staggered to make a diagram suggesting the sun, or the corolla of a flower with its

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(\*) This remarkable coupling

order - mystery

was not in my famous repertoire, it had only come to my attention through yesterday's reflection. The couple

order - freedom,

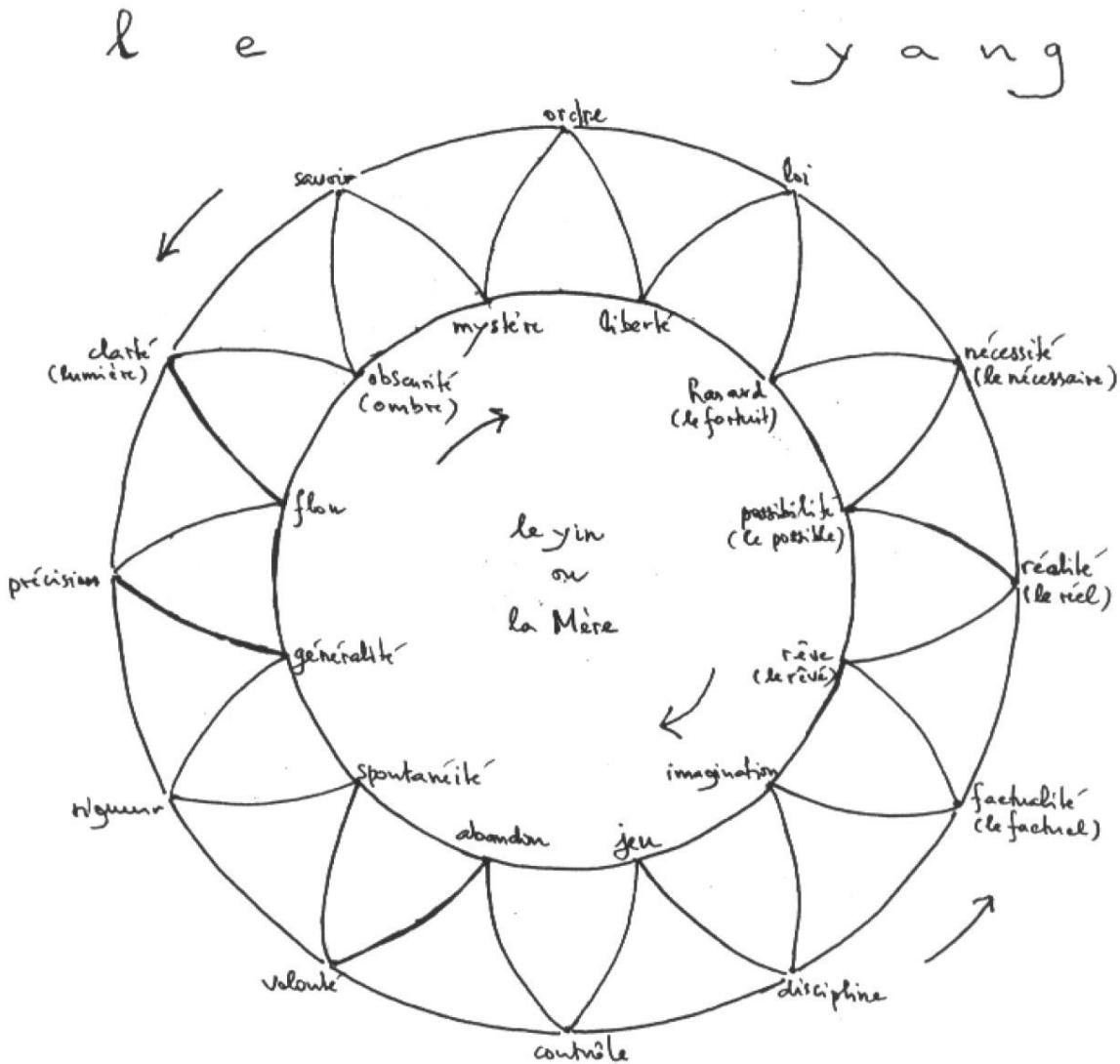
which is all too common in political jargon, had also eluded me until now, and only appeared this very morning. The reason is probably that I was inhibited by the fact that the presumptive 'order' spouse was already 'taken', by the well-known couple (forming a push-button association)

order - chaos.

That's what "cultural conditioning" is all about!

petals (a sun, why not). And there are *twelve petals*, corresponding to twelve yin and twelve yang terms, as many as there are signs of the zodiac, I swear I didn't do it on purpose! It must be characteristic (of the cosmic harmonium, to give it a name), but not characteristic (for my modest self, an emulator this time of Kepler the Esotericist!).

But that's not what I was going to talk about when I sat down at my desk. But I'm not the one in charge - now I've got to deliver the seventh marvel hot off the press, in a nice neat line. We'll call it the comic accordion, or the cosmic harmonica, or (to get everyone on the same wavelength) *the cosmic harmonium*.



o n l' e s p r i t  
(alias Eros)

## 15. Discovery or "invention"? - or the scribe and the "Other".

I have to admit I'm still a bit stunned by what I found earlier. I've had time to draw a nice line on the net, with compass, ruler and all (it's been ages since I've used them), then to have a meal, and after that, for an hour or two, to contemplate this line and get a bit of a feel for it (\*). I must admit that I find it hard to 'place'. Is it a more or less abracadabra 'invention' of my mind, or is it a *discovery* of something that really does 'exist', independently of my modest person?

When I do maths, I've never asked myself such a question - I know, without ever having had to tell myself, that I never invent anything, but that I *discover* things that exist - things that have always existed. Even the good Lord never had to create them, and perhaps He didn't know them any more than I did, before I brought them to light. And this time, with my extendible accordion suddenly metamorphosing into something completely different - blossoming into a kind of twelve-petalled 'cosmic flower', each petal part of a twelve-zodiac of yin and yang - I once again had that irrecusible feeling of 'discovery'. In any case, from the 'subjective' point of view of the experience, there was no difference.

And yet I remain perplexed. If someone other than me had ventured to play with the kind of yin-yang pairs I was examining (in this case, those concerning thought and the knowledge of things it gives us), to assemble them in a zig-zag and with the vague idea that they should close - would he not have come up with one or more 'cosmic flowers' of his own creation, all different, with eleven petals or fifteen or whatever?

It's true that in adding all these pairs one after the other, at no point did I have the impression that I was going 'willy-nilly'; that instead of 'attaching' this term to the end that remained free, I might just as well have added another. If there was any 'arbitrariness', it was only at the level of the 'vagueness' inherent in all spoken language, and which means that we can hesitate between quasi-synonymous expressions, like 'necessity' and 'the necessary', which (as I wrote earlier) essentially designate the same 'thing', but seen from slightly different angles.

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(\*) There was a power cut, which forced me to make a break in the notes.

The least I can say then is that the diagram I have arrived at says something about the way *my* mind perceives the Universe, and the interplay of yin and yang in the qualities of things in the Universe, and in the mind that probes them. As for knowing to what extent, and in what sense, this strange structure that I have just uncovered has an 'objective' meaning, independent of my person and the mind that inhabits it, I feel incapable of answering this question 'by rocket science'. Undoubtedly, the answer to such a question can only come from experience, just as (for example) the similar question could be asked about the subdivision of the zodiacal band in the celestial sphere into the twelve zodiacal regions, with the particular meaning attached to each of these regions; and the 'inventor' of this subdivision, and of the divinatory art which is based on it, was perhaps also justified in asking himself such questions. (It's true that my aim is in no way to set out the principles of a divinatory art, a kind of thing that is absolutely out of my league...)

In my perplexity, however, I see two tangible, positive intuitions emerging. The first is that the diagram I have just arrived at, with the qualities of balance and harmony that I sense manifesting themselves in it, must at the very least be a marvellous *guideline for* further exploration in the direction I have just begun: that of the ways in which '*thought*', indeed '*spirit*', is perceived and acts. I can already see how this (relatively crude) task of 'teasing out structures' (in the mathematical sense of the term) in the set of 'terms' (or 'spouses') involved in my (very provisional) repertoire of yin-yang pairs, will be a great help to me.

- to what extent this task obliges me, along the way, to affirm my perception of the *meaning* of each of these pairs, and of the meaning of the qualities or entities designated by its two terms; and by the same token, to refine my own intuition of the interplay of yin and yang 'in general'.

This brings me to the second 'positive intuition' to emerge from the past week's work, culminating today in the unexpected appearance of the 'cosmic harmonium'. It's the near-conviction that there must exist, within this motley collection of 'terms' and 'pairs', a great *wealth of structure* (where I take 'structure' here in the mathematical sense of the term), of the kind I've seen emerge so far. First there was the famous 'Christmas tree' diagram, which certainly didn't look very extraordinary, at least in the eyes of the mathematician - not to mention that the choice of both the 'groups' (of pairs) forming the vertices of this diagram, and that of the 'affinity links' between groups, represented by the edges of the diagram, was to a large extent open to debate.

arbitrary. However, this has not prevented the drawing of this diagram, seen as a preliminary outline of an overall 'map' for the 'doors to the Universe', from proving to be a very useful piece of work, in the sense specified in the previous paragraph.

The first truly remarkable mathematical object to emerge from this reflection was the sub-diagram I called 'Thought', represented by six vertices, any two of which are linked together, suggesting the existence (for the moment still hypothetical) of an icosahedral structure (left) associated with these six vertices (\*). Finally, the second remarkable structure (for its wealth of symmetries, but also for the extra-mathematical connotations associated with the number *twelve*) has just appeared today, with this famous 'cosmic flower' or 'double-zodiac'. However, I was only just beginning to work on this - or to put it another way, I was simply preparing a few pages of commentary to accompany a repertoire of yin-yang pairs and a certain diagram of affinity groups formed by these pairs. I had no intention of looking for any diagrams other than my innocent Christmas tree, and even less of looking for clever icosahedral or bi-zodiacal structures! The fact that they have appeared, however, is a sign that there must be an unknown *mine* here, waiting to be brought to light.

The initial mathematical structure, from which we need to deduce 'derived' structures that are both mathematically and philosophically interesting (through the meaning associated with the 'vertices', 'arrows' and 'links' that come into play), seems to me to be as follows. "The 'basic set' we're working on is the set  $T$  of 'terms' that come into play in a certain repertoire of yin-yang pairs, which we'll have drawn up as exhaustively as possible. (This will be, for example, my repertoire given below, which has been revised and expanded several times over the last few days...). From this basic set, I can discern two distinct structures. One is a 'directed graph' structure, described by the yin-yang pairs of the repertoire, interpreted as 'pairs' ( $a, b$ ) (in the mathematical sense of the term) of (distinct) elements of  $T$ , the first of which has designated the yang term, the second the yin term of the pair. Graphically, representing the 'vertices' of the graph by points (in a plane, or in space - beware, there will be a good many of them, in the region of three or four hundred!), the 'pairs' will be represented by 'edges' joining the two corresponding vertices, with in addition, on this edge, an 'orientation' or a 'direction of travel' on the graph.

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(\*) On this subject, see the section "Tales of icosahedrons and Christmas trees", no.° 10.

the edge, "going from yang to yin" (\*\*).

As I pointed out at the outset, it would seem that once we have chosen the set  $T$  of 'terms' representing the cosmic qualities and entities we intend to study, the structure of the corresponding directed graph is unambiguously determined. In other words, for two terms  $a$  and  $b$  in  $T$ , we can decide (by an intuition or a reflection of a 'philosophical' nature, visibly extra-mathematical) whether these two terms 'form a pair', and if so, which of the two terms plays the yang role in it (or, alternatively, must appear as the 'origin' of the directed edge joining the two vertices representing  $a$  and  $b$  ).

The second structure that has been used so far, superimposed on the first, is the *affinity* structure. In everyday mathematical language, this is again a *graph* structure (but this time non-oriented), consisting in the prescription, among all the possible "pairs" of elements of  $T$  (i.e. parts of  $T$  reduced to two elements  $a, b$  ), of a certain subset, formed of the pairs  $\{a, b\} = \{b, a\}$  for which  $a$  and  $b$  are considered to be "neighbours", or to "have affinities". This notion of affinity is also "philosophical" in nature, but this time much less clearly defined. There will hardly be a reader who will not detect, without a hint of hesitation, an 'affinity' between 'dream' and 'imagination', or between 'dream' and 'the possible'. On the other hand, the question whether 'dream' and 'imagination', or between 'dream' and 'the possible'. On the other hand, the question of whether 'dream' is synonymous with 'chance', or 'play', or even 'freedom' or 'abandonment', will surely be answered very differently from one person to another, and even by the same person, depending on how he or she approaches the question. In fact, what a more or less trained philosophical intuition reveals to us is not so much information of the 'all or nothing' type (' $a$  and  $b$  are neighbours', or: 'they have nothing to do with each other') but rather of the 'more or less' type (such as: ' $a$  and  $b$  are very close', or 'fairly close', or 'vaguely related'...). It is this 'vagueness', which is inseparable, it seems, from the notion of affinity (in the context that concerns us here), which is also the cause of the arbitrariness that I pointed out at the outset, for the formation of 'groups' of couples and of the 'affinities' between such groups, by which to form the (non-oriented) diagram of the 'doors to the Universe', aka the 'Christmas tree diagram'.

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(\*\*) But please note that, contrary to what our magnificent bi-zodiac might suggest, there is *no* subdivision of the set of 'vertices' or 'terms' into two disjoint packets, some 'yang' and others 'yin'. The same term can be yang in its relation to another, and yin in its relation to yet another. On this subject, see the section "Creative ambiguity (1): pairs, ribambles and rounds" (n 3).°

We therefore find ourselves in a rather awkward situation, where the mathematician who is used to working with well-defined structures finds himself confronted with a kind of "fuzzy structure", where he is supposed to take advantage (for who knows what purpose? . . .), among other structures, of a so-called graph structure (known as the "affinity structure"), without being too sure at any time whether a given pair of vertices really does represent "an affinity". ), among other structures, from a so-called graph structure (known as an "affinity structure"), without him ever being too sure whether a given pair of vertices really does represent an "edge" (i.e. whether its two terms are considered "neighbours"), or not!

But such a situation will not seem so strange to the mathematician (let's say) who is experienced in the task of constructing theories, where the very *notions* with which we will have to work still remain in the limbo of the uncreated. It's a matter of cutting them down to size, one by one, patiently, in order to make sense of some shapeless cloud of intuitions, all of which may seem evanescent and impalpable, but which nevertheless have a tangible texture and a warm substance, with an 'evidence' that is carnal, so to speak, and beyond all doubt.

It is the unborn, then, that tells us at every moment, as the work of birth progresses, what that portion of form that is about to be born should be, and by what end to take it to see it emerge from nothingness and *be*. The very groping of the hand that grasps the as yet unborn thing to bring it into being is not indecision or wandering, but a grasp of knowledge from which all hesitation and perplexity are absent.

And these things that we write as if *someone else* wrote them with our hand, and that we think we learn by writing them - somewhere in us, in unknown depths, they were already *known* long before our hand wrote them, and were only waiting for the in-tense attention of the *scribe who was* listening, who was willing to record them.

## 16. The Flower and its movement - or: the further away I get, the closer I get.

(25 March) A few more comments on our cosmic flower, before we leave it to continue the interrupted thread of reflection.

The twelve yang terms, placed on the outer circle, also form the points of the twelve petals of the corolla: these join two by two, in the twelve points of insertion on the inner circle, representing the twelve yin terms of the "harmonium".

Viewed separately, each petal also appears as a kind of ogival "mount", the yang apex of

which forms a pair with each of the two yin terms, representing the yin and yang sides of the petal, and the yang apex of which forms a pair with each of the two yin terms, representing the yin and yang sides of the petal.

These are the lowest points (\*) on either side of the mountain. These points also mark the bottom of the 'valleys' or 'ravines' formed between our mountain and the two adjacent mountains on either side. I have decided not to mark the 'yang to yin' direction on each of the two sides, i.e. the downward direction, towards the inside of the central disc surrounded by the corolla of the cosmic flower.

Among the two sides, we can distinguish the *left side* (or 'yin side') and the *right side* (or 'yang side'). It would seem that it is this latter side that always corresponds to the cosmic couple acting as the 'legitimate' or 'principal' couple (\*), whereas the one described by the left or yin side would be the 'concubine couple'. Yesterday it seemed that there were two exceptions among the twelve cases, for the two adjacent mounts (or petals) 'law' and 'necessity'. Of the four sides of these, those in my repertoire were in fact

law - freedom, necessity -

chance, which correspond to the yin sides, and not

law - chance, necessity - possibility,

which correspond to the yang sides (those now presumed to be 'legitimate'). But I suspect that this anomaly is only apparent, and that the choices in question in my repertoire are accidental. On the conditionally cultural side, political jargon would lead us to associate 'freedom' with 'order' as well as with 'law' - and in the former case, the term 'law' then remains 'available' (psychologically speaking, for one afflicted with the monogamous cultural reflex) to mate with 'chance', so as to force the hand (by the same monogamous reflex) to mate 'necessity' with 'chance', suggested by the justly famous aphorism (from Ochre Dem, if I recall correctly): "all things are the offspring of necessity and chance" (\*\*). However, the meaning of this aphorism would hardly have changed if a more far-sighted Democritus had used

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(\*) It is understood here that the "down" direction is towards the centre of the Flower's yin circle.

(\*) This would be consistent with the common association between "legitimacy" or "must" on the one hand, and "right side" or "right direction" on the other.

(\*\*) It's a strange thing that in this aphorism, "chance" and "necessity" have genders that are different in the *opposite* direction of the distribution of yin-yang roles. The same thing happens in German ('*der zufall*', '*die Notwendigkeit*'). I don't know what the situation is in Greek, the original language of this aphorism.

the term 'law' rather than 'necessity'. (It is true that this variant, which is more in keeping with a 'scientific' understanding of reality, robs the aphorism of some of its lapidary force. . .).

. ) As for deciding in a rigorous way, in each of the two cases presented here as doubtful

(and while we're at it, for the other ten as well), there is indeed reason to distinguish, of the two sides, which of the two would correspond to a 'legitimate' couple (the other being a 'concubine'), and (if so) whether it is indeed yang as expected and not yin, this would require a deeper dive into the cloud of meaning of each couple than I have done so far and than is my purpose here.

In the reflection of three days ago (\*), when I began (without knowing it yet) the description of the cosmic accordion with a first third of the bellows, I noted a double progression when we go from left to right on either of the two lines yang or yin

In other words, we were moving towards 'more and more yang' on one, and towards 'more and more yin' on the other. If we stick to the graphic convention that the arrows represent the direction of passage from yang to yin (or also 'from more yang to less yang', or 'from less yin to more yin'), this double progression would therefore be indicated, on the upper yang list, by an arrow going from right to left, and on the lower yin line, by an arrow going in the opposite direction. This is the heuristic (or 'ontological') significance of the two directions of travel that I have indicated on the graphic representation of the cosmic flower: a 'clockwise' direction of travel for the outer yang circle, and a counter-clockwise direction of travel for the inner yin circle. A quick examination gave me the impression that the phenomenon just mentioned, observed for one third of the cosmic flower, is in fact valid for the entire perimeter, and this applies to both the yang (outer) and yin (inner) circles. In other words, it would seem that the entities represented by two adjacent yang 'vertices' are in a mutual relationship where one plays the yang role in relation to the other which plays the yin role (in relation to it), i.e. they are in a yin-yang 'pair' relationship (in the sense of the reflection from a week ago "Creative ambiguity (1) - or pairs, ribambles and rounds", PU n° 3) (\*\*), and that moreover the yin-yang 'pair' is in a mutual relationship with the yang 'vertex'.

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(\*) See "Precision and generality - or the surface of things", n° 12.

(\*\*) Be careful not to confuse these "pairs" with the pairs of complementary qualities or entities, which I call "cosmic pairs". Obviously, none of the twenty-four pairs discussed here is such a pair.

The yang term is that which is *upstream* (in relation to the direction of rotation we have just specified for the yang circle). And it would seem that the same thing applies to the yin entities represented by the 'valley points' on the yin circle, this time using the opposite direction of rotation indicated for the said circle. Here again, to verify in detail the validity of this impression, by examining with the care they deserve each of the twenty-four pairs of adjacent vertices or adjacent valley-points, and (if necessary) to highlight the exceptions to the rule, would require more in-depth work than that which I now feel prompted to invest in philosophical research of a general nature.

The preceding comments, inspired by the cosmic flower, seem to me to highlight the delicacy of the interplay between yin and yang, which I had already tried to evoke, using simpler examples, at the very beginning of this reflection. So we see that qualities or entities perceived (in the context represented by the Flower) as being yang can nevertheless enter into a 'pair' relationship where one acts as a yin term in relation to the other - and vice versa among qualities and entities perceived as yin. We find here again the differentiation between such '*pairs*', and what we had called '*couples*' (called 'cosmic'). But what's more, we've seen a further differentiation appear in the Flower, between so-called 'legitimate' couples (which could also be called 'main' couples, to be less facetious... ), and those known as 'con-cubine' or 'concubinage' couples (or 'secondary' couples, to be more serious... ). I can safely assume that there is nothing 'scholastic' about these notions, that they do not represent a mere game and conventions of the mind, but that they do reflect (as I have the impression) *realities that are, so to speak, 'tangible'* (for the mind). In other words, realities that correspond to the world of qualities, modes of perception and modes of action of the human mind - this would require the development and refinement of an intuition of that world, through patient, rigorous and in-depth work. The Flower could play the role of both inspiration and focus for such work. Maybe I'll do it one day, or do it again if someone else has already done it before me.

It would seem that the Flower also highlights another phenomenon that we have already touched on in passing. I will express it here by saying that the factitious 'hierarchy' instituted by society, that of the 'more and more yang', when we look for its reflection (or rather, an archetype) in a similar 'hierarchy' at the level of cosmic entities, reveals itself as being an 'order' which is in no way '*linear*'; an order therefore for which, in every

sequence of terms following one another in hierarchical order, there would be a 'greatest' term (described as 'leader', or 'God', or 'ideal'), and another which would be the 'smallest' or 'lowest' (described as 'slave', or 'demon', or 'calamity'). On the contrary, it's an order that tends to take on a *cyclical* form: as we progress towards 'more and more yang', we end up coming back to terms that are 'less yang' than the initial term, before finally reverting to the initial term (\*).

*The inside* of the "yin circle" forms the "fleshy" part of the flower, its "fertile" part, also formed by the seeds of the "sun-flower" or sunflower. It is also the hidden, invisible, deep part for anyone approaching from the outside. It represents "*the yin*" or "*the Mother*". The twelve qualities or entities inscribed on the twelve 'valley points' located on the circle of the yin are its typical attributes or manifestations.

The part of space outside the flower, i.e. *the outside* of the "yang circle", represents "*the yang*" or "*the spirit*" (human), in its drive for knowledge to meet the Mother. The twelve "vertex points" on the yang circle represent as many modes of perception and action.

The dynamic of the quest suggested by the cosmic flower is that of *the exterior* reaching out to meet the *interior*, of the *surface* seeking *depth*, of the *light* seeking *the night* and melting into it without ever exhausting it.

And it is also *Eros* the child, who is constantly reborn from the Mother and sets out to meet the World, the Unlimited, in order to find Her. Thus in the morning the light is born from the mists and the night, only to return in the evening and sink into it. Thus order decants from the original Chaos, to return to Chaos when a Universe dies - before being reborn from its ashes at the Dawn that follows Evening. In this way, the order in gestation in the obscure matrix of the mysterious reveals itself to the mind eager to know, and this knowledge immediately becomes its sail, carrying it forward for a new plunge into shadow and mystery. And the invisible order that governs true freedom, once recognised and assumed by the spirit, becomes the means to a greater freedom, governed by an order that is even more hidden and looser.

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(\*) The idea of the *cycle* to express "the round of yin and yang" appears in these notes first at the end of the section "Creative ambiguity (1): pairs, ribambelles and rounds" (n° 3), then at the end of "Creative ambiguity" (n 4).

(4): extremes touch" (n° 6). This idea is associated with a striking aspect of the traditional Chinese conception of the 'five elements'. There is in fact a relationship of 'domination' between these elements, which is not 'linear' either, but *cyclical*.

Yes, I am detecting *two* movements rather than just one, two indissociable movements in opposite directions. The first, which had earlier caught my attention, is that of *return* - the movement of the spirit scanning the Universe, that of Eros returning to the Mother. But in this return, which irresistibly evokes the image of *death*, there is also *birth*, there is renewal (\*). After each plunge into the Unknown, the spirit emerges *different*. It has *forgotten* and *learned* - and to 'forget' and 'learn', in the full sense of the word, is also to die and be born, it is also to *change*.

Rather than speaking of *two* movements, it seems to me that it would be closer to reality to speak of *one and the same* movement. We perceive it through its two closely intertwined tones, one low and one clear: that of a 'return' or 'death', in the dark bosom of things yet to be born - and also that (which I had initially tended to forget) of a 'departure' or 'birth', in the clear light of day.

It may seem difficult, if not impossible, to use a geometric image to represent a 'movement' in two opposite directions at the same time - a direction away from the centre, and a direction back towards it. The very idea of such movement might seem to contradict sound logic. But it is not. We can imagine the cosmic flower as a figure immersed, not in the plane, but in a sphere, with the two circles of yang and yin again represented by concentric circles. The most beautiful figure, richest in symmetries, will be obtained by tracing the yin and yang circles on either side of and equidistant from the same equator (\*\*). Once this has been done, if we take the "starting" movement in a direction perpendicular to the yin circle, this movement would continue along the "meridians" coming from the "yin pole" (or north pole), moving away from this pole. We then see

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(\*) These terms 'death', 'birth' and 'renewal', each charged with a very strong meaning, can (with reason) seem excessive when the 'work' of thought, and the 'quest' of the spirit, are confined to the field of exclusively intellectual research. This is what happens in particular in 'scientific' research, in the usual sense of the term. The 'renewal' we are talking about here affects only the most peripheral layers of the psyche, and may well be accompanied by a profound spiritual sclerosis. It was this phenomenon of sclerosis that Pythagoras must have observed, and which he tried unsuccessfully to prevent through the institution of the Pythagorean brotherhood.

(\*\*) While we're at it, we can take the angular distance between the yin circle and the yang circle, that of the circles bordering the zodiac band on the celestial sphere. If, in addition, the edges of the 'petals' of the cosmic flower are traced along the arcs of great circles (so as to achieve the minimum distance between valley points and vertices), the spherical figure is thus fixed without any ambiguity ("to within a hair's breadth of congruence").

that by continuing this movement along such a meridian, by starting to move away from the yin pole, we end up returning to it (after crossing the yang pole). This is therefore a movement in which "while moving away (from the yin pole), we move towards it" - but "from the other side".

Once again we see, in a different light, the image we saw earlier of a 'cyclic' movement, as a symbol of the dynamic relationship between yin and yang. This time, instead of a movement along the two 'parallels' represented by the yin and yang circles, it is a movement along each of the 'meridians'. The first expresses the 'hierarchical' progression from 'less yang to more yang' or from 'more yin to less yin' (\*). The second symbolises the common dynamic that links birth and death, desire and fulfilment. It is also the dynamic at work in the work of "exploring thought" (\*\*), as a tool of the spirit, in the discovery of the mystery of things.

## 17. Chaos and freedom - or the terrible sisters.

(26 March) After the unexpected (and welcome) interlude of the Cosmic Flower, I'm really looking forward to picking up where I left off three days ago (\*\*\*) , and bringing it to its (provisional) conclusion. The idea then was to take a closer look at the 'attractor package

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(\*) (2 April) In fact, it was in the form of 'yang to yin' that this movement first came to our attention. So it's a *downward* movement, in the *opposite* direction to the "hierarchical progression". It is also the movement 'towards the root', the one I had already recognised as being spontaneously mine, in my work as a mathematician: "Instinctively and by nature, my path has been that of *water*, which always tends to *descend*, the path towards this trunk, towards these roots... ". (See the note "Les neuf mois et les cinq minutes", n° 124, in particular page 560.)

(\*\*) (2 April) It would have been more appropriate here to write "de la pensée qui explore et de la pensée qui bâtit", de in such a way as to suggest, by this very name, the double-movement-in-one we are talking about here. This return to the text made me recognise this movement, as being the same one I had already mentioned, two months ago, in a different context and in a different light, at the end of the 'Promenade à travers une oeuvre'. See the two stages "À la découverte de la Mère" - ou les deux versants" and "L'enfant et la Mère" (n° s 17, 18) and more particularly pages P 49 - P 54.

(\*\*\*) This was in the section "Harmony - or the marriage of order and mystery", n° 13.

yang", made up of the five pairs

- the simple* - the complex
- the abstract* - the concrete (or the real)
- the precise* - the
- vague order* - chaos
- structure* - substance,

which were 'counterparts' to a 'yin attractor package' (which I won't mention here). Both had been introduced the day before, in the section entitled 'Desire and Necessity - or the Way, and the End' (n° 11). It is these ten pairs, and the types of qualities (some perceived as 'yin', others as 'yang') that they imply, that have served over the past five days as a focus for further reflection (even if, with the interlude of the Flower, they may have seemed a little forgotten). Of these twenty yin or yang qualities, only four are found in the Cosmic Flower (namely, generality, precision, vagueness and order), which has twenty-four (\*).

Among the five yang attractors in the 'package' mentioned just now, we have already highlighted two

*simplicity, order,*

to which the other three appear subordinate. Then we realised that the qualities they represent are, in fact, 'like the soul and body of one and the same quality'. It was 'the body' and not the soul, the most yang aspect of this common quality, that I then felt prompted to bring to the fore, 'order', only to see it marry its predestined yin spouse, '*mystery*'.

As I watched the wedding take place, I wasn't too perturbed by the fact that

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(\*) Sixteen of these twenty "qualities" do not appear directly in the Flower. When we review all the qualities that appear in the six groups of pairs revolving around "thought", we find many more that are not included in the Cosmic Flower. It is by no means out of the question that many of them may still be grouped together in one or more remarkable diagrams. They could be grouped, along with the Flower itself, under the name of "mandalas", or ordering principles. Compare with the comments made the day before yesterday in the section 'Discovery or invention? - or the scribe and the Other" (n° 15).

than in a couple

order - chaos

by which I had just introduced 'order' into our famous 'package', it appears as the spouse of *chaos*, and not of mystery. I didn't think anything of it until afterwards, because the marriage of order and mystery seemed so obvious! I thought about it again later - how it was that 'chaos' seemed to have disappeared from our thinking. There is no trace of it in the Cosmic Flower. Order appears there as the central yang term, as the highest 'summit', the one around which all the others seem to cluster, with their corresponding 'ravines' or 'valley points'. And this master summit couples with 'mystery' on the yin side, with 'freedom' on the yang side, pretending to ignore 'chaos' superbly.

This made me realise, first of all, that among the forty different qualities and entities which appear either in the Cosmic Flower or in one or other of our two 'at- tractor packages', there are exactly *two* which stand out from all the others as a kind of '*anti-attractors*', *not to say* 'repellents'. They are precisely two of the three wives of the (resolutely polygamous...) order we have met so far, namely the ladies

chaos, freedom

- excluding, therefore, Lady Mystery, who, on the other hand, exerts an exceptionally powerful attraction.

It would seem that the very idea of chaos arouses an almost insurmountable repugnance in the human mind. We feel it, 'viscerally', as something irreducibly *opposed* to order, the object of our incessant quest, just as we feel 'destruction' as opposed to 'creation', or 'evil' as opposed to 'good'. Sensing the *complementary* nature of order and chaos, and the reality of their marriage, comes up against powerful conditioning, which I can see in myself as well as in others. For many people, the horror of chaos must be amalgamated with the fear and horror of death, felt as the negation of life, as its powerful and implacable enemy.

The relationship of the mind to 'freedom', and more particularly to *its own* freedom, seems to me to be more ambiguous. It would be more in the nature of an instinctive *mistrust*, that

that of a genuine repulsion, comparable to "the horror of chaos" (\*). I've had ample opportunity to observe this mistrust or unease, particularly in my own work as a mathematician. Perhaps this tendency is even stronger in me than in other mathematicians or scientists. But generally speaking, I believe that the mind in search of the hidden order in things likes to feel constantly held (not to say forced) by the feeling of a *necessity*, which is '*dictated*' to it at every moment by the very things it is questioning (\*), if not by the customs and habits of thought bequeathed by tradition, and by the peremptory rules of a reassuring method; whereas he would be more reluctant to move freely in the unlimited field of the 'possible', when the imagination is given free rein and all control from the conscious mind is abolished (\*\*).

I suspect that this repugnance is not inherent in the very nature of the mind, that it is rather part of the '*weight*' with which it is weighed down by powerful conditioning, the product of a *repression* found in all human societies. This 'mistrust' of one's own freedom, and this craving for 'control' over the thought process

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(\*) However, the 'horror of freedom' (of *one's* freedom, I mean) does exist, and more than once I've been seized by it in others...

(\*) As I was writing these words, I realised that this "image" of "dictation" has come up many times. when I was asked to talk about my work. The idea would not have occurred to me then to try to avoid 'repeating myself', so much so that this term 'dictation' seems to me to be far from being a simple image or metaphor, but describes a reality that is present at every moment in the work, and which always imposes itself with the same force, almost every time I am led to speak of the work of discovery.

(2 April) In the more limited field of scientific thought, I think I can detect this same 'instinctive distrust' of the mind, towards the very idea of freedom, in its almost tyrannical predilection for enshrining observable reality in rigorous mathematical 'models' of a 'deter-minist' nature, in which we even end up believing as hard as an iron. This propensity sometimes takes on grotesque, even obsessive dimensions in fields such as molecular biology, where the fashionable 'dogma' is that the appearance and development of life on earth occurred and continues to occur 'by the greatest of coincidences'! (As Lewis Mumford wrote, this 'chance' of the biomolecularists would represent a 'miracle' infinitely more incredible than the one they do their utmost to dismiss...). In the social and socio-psychological sciences, this obsession with elimination takes delirious forms, with the mania for tests and the 'measurement' of qualities (such as intelligence) which are clearly not designed to be expressed by decimals.

(\*\*) (2 April) I come back to this "unlimited field of the 'possible'", which is the very structure of "logical thought". (and of the language that is good) seem to want to cut us off without return, in the reflection of three days ago "The language of images - or the way back" (n° 24).

and discovery (whether this control comes from a centre inside or outside the person), seem to me to be inseparable from our 'alienation by mistrust' of the very sources of creativity and creation within us. These sources are deeply buried in the unconscious, and (I believe) forever hidden from conscious view (\*). And the mistrust that lives within us, if not a can (which will never say its name...), is also almost always confined to the unconscious, albeit in shallower layers (\*\*), accessible to a curious and penetrating gaze.

In recent years, I have become increasingly aware of this heaviness of spirit within me. Seeing it subside now seems to me to be the decisive step ahead of me on the road to maturity - a door, heavily locked and lined with iron, suddenly swinging wide open... And it also means rediscovering the lightness that dreams reveal to us, knowing how to seize the iridescent bubbles that the Dreamer never tires of raising from inaccessible depths and throwing at us, laughing under his breath...

As for the 'chaos' in all this, once again it has disappeared! I don't think, however, that these stubborn disappearances are due to the horror my mind would feel for it (after all, a reflection on chaos doesn't expose me to chaos, but would rather be a way of distancing myself from it!) I have the impression, rather, that 'chaos' represents only a superficial reality of things, not to say a mere appearance, which disappears under the effect of a more penetrating gaze. So, behind the chaos of the random collisions of particles in a conflagration (where the good Lord himself would be hard pressed to predict or prescribe the course of any of the participating molecules), the attentive mind discerns the action of immutable *laws*, both physical and mathematical, governing the evolution of the system as a whole. And behind the chaos of desires, feelings and ideas battling it out in the psyche, we can nonetheless discern an *order*: both the order of cause and effect, and the order that resides in the presence of the "elements".

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(\*) (2 April) *Unseen*, at least. I do not mean to say that we cannot know anything about it. Thus, the molecular structure of matter is hidden from direct perception by sight or touch, but can be detected and even accurately described by means of its directly perceptible manifestations. It's true that we are a long way from having even the slightest precise or delicate knowledge of the deep creative layers of the psyche. I even suspect that such knowledge will forever be inaccessible to discursive thinking, to 'surface' thinking - that the surface of being can never know its own depths.

(\*\*) On this subject, see also the note "Les deux connaissances - ou la peur de connaître" (n° 144).

and in the free choice of whether or not to make use of them.

#### 18. The vague and the precise - or the net and the sea.

To finish off (take heart!), I'd like to take a closer look at the three 'yang attractors' that I described as 'subordinate' (to 'simplicity', and to the 'order' of which it is the soul...). These are the qualities

*abstraction, precision, structure.*

They seem to me to be closely linked. I have already had occasion to point out to the pastor that *precision* was the quality par excellence, characterising the approach of so-called 'scientific' thought, and the secret (of Polichinelle) of its spectacular successes over more than thirteen centuries (\*). This quality seems to me to be quite different in essence from simplicity. Depending on the case, the simplicity inherent in a situation or context will be most finely apprehended using the precise language of practised thought, or the (apparently 'fuzzy') language of the inspired poet, the visionary or the mystic. The deliberate aim of scientific thought, and at the same time undoubtedly its main limitation, is to restrict itself precisely to those aspects of things that are accessible to precision (\*\*). And it is in this deliberately restricted field that precision also reveals itself as *the* means par excellence for accessing 'the simple', that is to say, for apprehending and pinpointing *the order* that lies hidden behind the bewildering chaos of appearances.

This "precision" means is implemented by the dynamic of "back and forth", of "double-movement-in-one", with which we are now familiar (\*\*\*) . At the beginning, thought is confronted with "the *vague*" (aka "vagueness"), with the unknown (or more or less known) *substance* that we need to know (or know *better*). The 'work' of gaining knowledge then manifests itself as a '*decantation*' of the 'precisely formulable', laboriously separated from the formless, and immediately grasped (as if by nimble hands...) by thought,

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(\*) See the section "Desire and Necessity" - or the way, and the end" (n° 11), page PU 31. It would be appropriate here to remember that these "spectacular successes" have been accompanied by serious setbacks, which are becoming increasingly apparent...

(\*\*) It's only a short step from declaring that there are no other important aspects. crossed by a huge number of people!

(\*\*\*) This movement appears first in the section "Desire and necessity - or the way, and the end" (n° 11), then in "The Flower and its movement - or: the further I go, the nearer I come" (n° 16).

through language. And language transforms and recreates itself at the same time, like new fingers growing out of us, under the unrepeatable impulse of need.

At the end of this work, we are now in possession of a baggage, or rather a *new* baggage - a conceptual 'toolkit', coming to the rescue of the panoply of those we (perhaps) had before. So our 'means' have been diversified, refined and re-tempered by this plunge into 'the vague' (\*). And these new tools are in turn the means for a new plunge into 'the vagueness', into this same sea of mists, whose closest folds have only just been illuminated and dissipated, to reveal to us other even vaster, and just as 'vague' and just as obscure...

An obscure presentiment, confirmed by a thousand years of experience, tells us that this *sea* of waves and mists is bottomless and shoreless, and that our ingenious landing nets and panoply of probing tools, which we never tire of imagining and assembling, are all and always "just a hair too short". This is just as true today as it was at the dawn of the human mind, when it was first stammering out its first words. Today, as a million years ago, it is *the limited*, the finite, striving to grasp the infinite, the *limitless* - without ever exhausting it and without ever touching bottom or shore... .

Such is the timeless movement back and forth between 'the vague' and 'the precise', between 'the unknown' and 'the known', between 'mystery' (indeed, the chaos of total ignorance, that which still ignores itself) and the clean lines of 'order'. And here's the really crazy thing: in the vast literature that, for centuries and millennia, has been supposed to give an account of the adventure of the mind in the discovery of things, *nothing of this movement shows through*, except between the lines. Always (\*\*) we are given 'the précis', as if it had leapt out of the brain of the 'Scholar' (as if from a trap door, or from the 'output' of an infallible mega-computer...), to fit impeccably into the boxes-paragraphs, paragraphs and chapters specially provided for this purpose, and to constitute in canonical order the learned memoirs, notes and communications where we have every leisure to read them.

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(\*) This term "the vague" often tends to take on pejorative connotations - it is the name given to the misunderstood, the mysterious, by thinking equipped with the blinkers of precision...

(\*\*) This "always" is to be taken with a tiny grain of salt. There are certainly exceptions, but they are extremely rare. The only one I know is Kepler, a decidedly special figure in more ways than one. He had no qualms about talking about himself, including his trials and tribulations, his illusions, his errors and his wanderings...

As for what inspires us, what tells us over the hours, days and years what we have to do in each moment, and that too (perhaps) which has kept us going in circles for years, or for a lifetime, or even for generations - the vague, the unknown, the mystery, and the shoreless sea of the elusive, insistent, insidious dream - all trace of *that* seems to have been eradicated, as if by a prudish, sullen and implacable *Censor*.

It's one I'm beginning to recognise well, with its thousand and one faces! And more than once, in the pages of *Récoltes et Semailles*, I've seen his worried, tenacious shadow looming. From the very first pages, after 'the child' and 'the good Lord' who started the dance, the first character I had to talk about was him. It was in the sections 'The Child and the Good Lord' (aka 'Eros and the Mother') and 'Error and Discovery'. So here I am, unexpectedly, right back where I started!

#### 19. Order and structure - or the spirit of precision.

But I'd like to come back to the two 'yang attractors' that are still out there,

abstraction and structure.

The first (or 'abstract') forms a couple with 'the concrete', and the second is the spouse in the couple.

structure - substance.

The bride, 'the substance', exerts a powerful fascination on the mind, incapable as it is of ever 'grasping' it directly, by means of thought alone, however precise that may be. So it tries to grasp it through ever tighter meshes of ever finer structures, 'sticking' to the substance and embracing it ever more closely. One might be tempted to say that the 'order' inherent in the substance of a thing (whether it is 'concrete', 'palpable', or 'abstract', living in a world of concepts), would tend to manifest itself in the form of 'structure'. But perhaps it would be more accurate to say that it is this order that can be grasped by the mind and expressed, communicated and transmitted by means of language. We are talking here, obviously, about the "spirit of precision", or the "spirit of geometry" of which Pascal spoke - that which makes precision its  $\alpha$  and its  $\omega$  in order to apprehend the unknown and the mysterious, through the order manifested in them. We could say that the search for 'structure' is the mode

The "spirit of precision" (and particularly "scientific" thinking) is the preferred way of apprehending "order", and through it, the very substance of things.

If, then, we were looking for some cosmic mini-Flower to express the yin-yang dynamic of the qualities apprehended by the 'precision mind' (rather than that of the 'mind' or 'thought' itself), the yang 'master term', around which all the other qualities would cluster, would undoubtedly be 'structure'. It would marry 'substance' on the yin side (the side of the heart...), instead of 'mystery', and 'movement' (\*) on the yang side (the side of reason), instead of 'freedom'. And my hands are already tingling with the idea of continuing with the mini-Flower, with 'movement' marrying 'form', promoted as a yang term adjoining 'structure' (instead of 'law' adjoining 'order'). But I'm going to cut to the chase anyway...

I think I can now see quite clearly the relationships between the qualities of order, structure and precision. All that remains is for me to examine the last yang attractor,

the *abstract* (or *abstraction*),

in its relationship to the other four in particular. I have already had occasion to look at it a little, in the two consecutive sections "The quest for unity" and "Generality and abstraction - or the price to pay" (n° s 8, 9). But it was quite clear at the time that I had barely begun the theme opened up by that rather strange thing, in truth, that is 'abstraction'. And it was above all the desire to delve deeper into this thing that led me to extract from my scribbles, and then to 'throw on the table', these two famous 'attractor packages', of which I am now in the process of completing a very first tour.

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(\*) In the pair "movement - rest" (associated with "action - inaction"), "movement" is perceived as a yang quality. Here, we take 'movement' in a somewhat different sense, as meaning not the very fact of being in motion (as opposed to being at rest), but rather the 'quality of movement' (fast or slow, circular, rectilinear etc) or even its precise conformation, as it might be expressed by 'the equations' of motion. (In German there are two different expressions for the two things, 'Schwung' and 'Bewegung'. Movement in the second sense seems to me to go hand in hand with 'form', to make the couple

form - movement,

where this time he plays a *yin* role. The zig-zag that begins here could continue, perhaps, with "form - content" ...)

## 20. The abstract and the concept (1): the birth of thought.

(27 March) So here I am, back on the theme of abstraction, which I started a week ago today. I'd put it on hold for a while, but I never really forgot about it.

In this reflection from a week ago, 'Generality and abstraction - or the price to pay', I noted that the mind's relationship to abstraction is most often fraught with ambiguity. This clearly distinguishes it from the four other 'yang attractors' (which were introduced the very next day, in the wake of 'abstraction'). It's a given that it would be hard to do without this unwelcomed thing - to the very point that the mind, launched in pursuit of the elusive flesh of things like an Ahab in pursuit of the White Whale, moves from one level of abstraction to the next and the next (like so many violins that it would hoist one after the other to capture the forces of desire...), without seeming to be alone. ), without even seeming to notice! But the 'cold' mind often seems to be weighed down by an almost insurmountable reluctance to leave a familiar floor of the Abstraction building, where it has made a cosy nest for itself, and to see itself called upon to go up a floor or two or even three, where it will find larger windows and a transformed view, which it will often find hard to recognise. "Simplicity" is fine (because nothing is more tiring and less fun than swallowing 'complex', which is always a little 'complicated' around the edges...), and 'generality' is fine too, as long as 'it doesn't cost any more' and often even simplifies things by cutting out the redundant - but when it comes to abstraction, it's with a heavy heart that he'll have to take things up another notch. The extra abstraction is often the 'price' that you pay only by being reluctant, after stalling for a long time or going round in circles, to finally get out of a dead end or a mess that's just not possible - and even then!

In the minds of most people, there is a push-button, almost visceral equation of 'abstraction' with 'complication'. Remarkably, even mathematicians, the so-called masters or specialists of abstraction, are no exception. Above all, I see in this a tacit rationalisation of this reluctance to 'change floors' (and thus, to some extent, the Universe...). At a very superficial and hasty glance, this assimilation may seem well-founded. However, it consists of a very crude confusion, which I think deserves to be brought to light.

In the mind's approach to understanding the world, abstraction has been the means, not to 'complicate' what would be simple to grasp directly, but rather to arrive at an apprehension of the simple in what appears irremediably complex, by bringing out 'the co-extensive'.

mun', 'the essential', through the countless avatars of the 'different' and the 'accidental'. This has been the case since the first groping step, in the mists of time, with the invention of language. It is surely a truism, but one that we tend to forget, that thinking is inseparable from the language that expresses it and gives it form (\*), and that language is already abstraction. To think is to express through language, and 'language' means 'abstraction'. *Creating language is no more and no less than "abstracting"*. All language is a vehicle for abstraction. An abstraction that 'climbs' more or less 'high', *created* one day and then *used*. And insofar as thought is not limited to moving within the confines of a routine, to living on acquired knowledge, but is creative, the work of thought and its progress in the knowledge of the Universe are inseparable from the creative renewal of the language that gives substance to this work. This renewal is, each time, a new act of abstraction.

I see the first step of the human mind in its adventure of knowledge in the appearance of the first *word*, with the understanding of its *meaning*: a 'symbol', representing something 'common' to an unlimited multiplicity of different situations, whether present, past or still in the limbo of the future... . This is the first step in the adventure of the individual, as in that of the species - one took place in early childhood, and the other is lost in the mists of time, both erased, no doubt forever, from conscious memory...

The first word of all is surely "mum" or "mother". This phoneme (or "type sound" formed by the voice, recognisable as being "the same" when pronounced at different times and by different people. . . . ) becomes a 'word', i.e. a symbol for the unlimited, the indeterminate, at the moment when it becomes clear that it designates not only *a particular* familiar person whom we feel to be the very foundation of our universe, but also, and at the same time, any *other* person who might play a similar role in relation to someone *other* than ourselves. This act of *naming*, with the understanding that what we name is not only such a thing as we touch or point to, but at the same time any other thing (even if we were never to see or touch it) which shares with it such particular 'qualities' as that name is now meant to express and embody - this is the creative act par excellence at the level of the mind, *the archetypal act* of the human mind. *Conceiving* these 'particular qualities', *naming* them, and '*abstracting*' the general or 'abstract' from the particular or 'abstract' - this is the archetypal act of the human mind.

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(\*) (16 April) I remembered afterwards that this is only true for a certain type of thought - the only one in our culture that has official status. ... See the b. de p. note (\*) on page PU 74.

of the 'concrete' that constitutes the immediate and tangible given - these are three aspects of one and the same act, the original act of the mind in discovering things. And it is also the ever-renewed embrace of the spirit with the flesh of things...

Step by step, you end up making progress! Words are assembled into "sentences" or "propositions", and these into "discourse"... Compared with the first steps, a proposition like "two plus one equals one plus two" represents a prodigious degree of abstraction. Just imagine a child of a year or two, who is beginning to speak and knows the meaning of the words "one" and "two", being served this proposition! Does this mean we should dismiss it as 'too abstract' and describe it as 'complicated'? It's true that in almost all everyday situations, such a proposition has no place, and to try to introduce it (for example, to make recalcitrant children mumble it) is to introduce an artificial complication. This does not prevent certain avenues of thought from leading us to situations that we would be entirely incapable of grasping, if we did not have a clear understanding of the proposition, much more general and much more abstract still: "for two numbers  $a$  and  $b$ , we have  $a + b = b + a$ ". In such a field of thought, this statement (which elsewhere appeared prodigiously abstract and 'complicated') will appear simple, even obvious, and its degree of abstraction will not even be perceived, to the extent that the notions it implies and its very content are part of things that are quite familiar, and therefore felt to be 'concrete'. At the level of the skin-deep reactions of the scientist (let's say) who works in his lecture theatre, 'the concrete' is no more, no less, than what has become familiar to him (having forgotten the effort it took him to swallow it willy-nilly); and 'the abstract' is everything that presents itself in the form of an off-putting unknown that he would be reluctant to get to know, given the price... .

## 21. The abstract and the concept (2): the miracle of simplicity.

It's a fact that the higher we climb the ladder of abstraction, the more 'complex' the notions we are led to handle become, in a very tangible sense, and that it would be easy to specify in the various cases in question. This might give some semblance of justification to the 'visceral assimilation' of earlier, that 'the more abstract, the more complicated', which leads us to *oppose* abstraction and simplicity (\*)! On that account,

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(\*) I heard a similar comment just recently, from a colleague and friend, a distinguished algebraist and Germanist familiar with Goethe, Wilhelm and the I Ching. In commenting on the 'Promenade à travers une

Archimedes' principle in hydrostatics would be 'complicated', Kepler's laws governing the motion of the planets would be even more 'complicated', and Newton's law and the differential equation it embodies would be a thousand times more complicated than the Keplerian laws they claim to 'explain'. The absurdity here is obvious. But perhaps it's worth taking a closer look.

Abstraction can be seen as the tool of all tools, fashioned by thought to express, and thereby apprehend, the order inherent in things (\*). In other words, it is the means of all for apprehending and bringing out the "simple" in the "complex", the means specific to thought for accessing simplicity. The deeper we penetrate beneath the surface of things, the more delicate it becomes to grasp and express the order that manifests itself there. We could say that it becomes more 'complex', without this meaning that it loses its essential quality of 'simplicity', that it has become 'complicated'. Perhaps it would be better to say that there are different '*levels*' of order, or of simplicity, revealed in turn to the eye as it penetrates further into the intimate structure of things. It would seem that at the level of the *expression of* order, by means of language shaped to measure by thought, these 'levels of depth' translate (in the opposite direction, so to speak) into increasingly 'higher' levels of abstraction.

No more than 'thought' or 'language' is 'abstraction' in itself 'simple' or 'complex' (or 'complicated'). (Even though it is true that in abstraction there are these successive levels, corresponding to the levels of depth of thought probing things). Its 'raison d'être', however, is to be a tool for accessing the simple. Just as the raison d'être of a well-sharpened knife is to cut - which does not preclude the fact that we can also

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work' he had just read, my friend disputed that the notion of schema (which I mention in the Promenade) was 'simple' (of a 'childlike simplicity', I even ventured to write). The proof was that he had never managed to understand the definition, so abstract was it!

This friend's personal threshold of tolerance for abstraction is relatively low (and this has been a serious handicap in his work as a mathematician, cutting him off from the rich source of inspiration and insight ('Einsicht') that is geometry (and in particular so-called algebraic geometry, re-invented by the fertile point of view of diagrams). Anything above this threshold is classified as 'complicated', without further ado...

(\*) (3 April) It would probably be more accurate to say that it is *language* (and not abstraction) that is the 'tool' of thought. "Abstraction" would appear to be the very '*soul*' of language, or the guiding principle at work in the tool, both in its development and in its work. I'll come back to this point in the following day's reflection: "The strata of language - or skin and embrace" (n° 22).

use it to swat a fly with the flat of the blade or handle...

Of course, because of a certain conceptual 'sophistication', using a relatively substantial mathematical background, Kepler's laws will seem 'complicated' and 'abstract' to most people (even educated people) to whom we would like to explain them. This gut feeling of 'complication', when faced with something that is basically completely foreign, that we have no desire or reason to want to grasp or understand, is the expression of a lack of understanding and ignorance, combined with a lack of interest (\*). It tells us a little something about the person who expresses himself in this way, but tells us nothing about these laws and their degree of 'simplicity' or 'complication'. We can only make up our minds on the subject when we ourselves are at least a little curious about the things to which these laws are supposed to apply (i.e. the movements of the planets), and when we have some idea of the inextricable complexity of the phenomena observed, and of the efforts made over two millennia to find kinetic 'models', using circular movements, to account for this complexity as best we can. (Models that become more and more complicated as observations become more refined, but which nevertheless 'take off'). Finally, you need a minimum of familiarity with the very language that expresses these laws, in this case the geometry of the ellipse.

Only then is one in a position to see what might be called the "*miracle of simplicity*" revealed. For anyone already familiar with the usual foundations of geometry, the necessary 'addition' of abstraction or language is limited to a modest chapter on the geometry of the ellipse: enough to keep an average student busy for a week or two. In return, you can throw into a giant wastepaper basket a whole library of abracadabra calculations, representing two thousand years of fruitless efforts to find even the simplest laws in the bewildering confusion of the planets' movements. ...

*That's abstraction as a tool. We're going up a notch in the degree of abstraction,*

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(\*) It is obvious that we cannot be interested in everything - which would be tantamount to being interested in nothing! Apart from a necessarily very limited portion, and in fact infinitesimal in the face of the immensity of things known, we are each in such a state of incomprehension and ignorance, of disinterest. But there are few, especially among the 'intellectuals', who know how to include this personal limitation in their view and judgement of the things of the mind, and who will not be tempted to describe as 'complicated', 'incomprehensible' or 'uninteresting' things that escape their understanding or that do not seem to interest them.

we go from (say) the geometry of the cherished circle, a long-time friend, to that of the ellipse, a stranger to the uninviting, to be sure. People will say, perhaps with good reason, that it's "more complicated", or even that "it's all very complicated". And it's true that you'll need ten whole pages, if not a hundred, to get to grips with a new language, to feel at ease, to have the impression that you at least know what you're talking about. One hundred pages to develop a language, plus a handful of pithy statements in the new language - and there you have another ten thousand abracadabra pages, fit for the Bin (\*)!

## 22. The abstract and the concept (3): the layers of language.

(28 March) Yesterday I watched the "miracle of simplicity", in a particularly famous case of exceptional significance. If you don't let yourself be dazzled by this historical dimension, you realise that this is the kind of miracle that - like the unexpected blossoming of a flower - happens at every step in any work of discovery; more or less great, of course, or more or less small, that's not the point. The exhilaration of discovery is not the privilege of the giant, as a tyrannical tradition would have us believe, but that of the child... .

The '*means*' of the miracle is very often just another step on the upward path of abstraction, with the different perspective, the new depth that this step brings us. And so, yesterday, we saw the staggering difference in magnitude between the '*means*' for this step and the '*miracle of simplicity*' - this miracle of an unsuspected order that suddenly emerges from confusion.

That's all well and good, but we mustn't confuse '*means*' with '*cause*', and imagine that the miracle of creation springs from the recipe: a little more cranking in the right direction.

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(\*) There is no connotation of disdain in the evocation of this Basket of Capitals. As I was writing this line, the association that was especially present, and which I'm sure is recognisable to more than one intellectual worker, was that of my own wastepaper basket, and the intimate satisfaction I get from seeing these sheets and bundles of sheets filled with scribbles of all kinds being crammed into it one after the other, and sometimes also austere processions of more or less formal definitions-proposals, all of which have now become embodiments of the original chaos (of a thought still searching for itself) returning to the chaos (of the Waste-Basket) ; while at the same time, like order decanting from chaos, the neat pile of clean sheets of paper of a beautiful, well-done and (provisionally...) definitive essay piles up on my table!... definitive!

(\*)

abstraction! The "cause", or "spark", or "force", is not in any crank. It comes from elsewhere. It is in the child's curious and sacrilegious gaze. It's in the Worker who works with our hands, and who tells us at every moment *which* crank *to* turn to tighten this rope and hoist that sail and that one to fully capture the forces of a wind that comes from elsewhere.

Kepler didn't even have to go to the trouble (or the pleasure...) of defining the notion of ellipse, and developing a theory of it as far as he needed to. This tool had been ready for a long time. It had been rusting away in a corner for centuries, if not a millennium. On the other hand, it had been well understood, for even longer, that the movements of celestial bodies could only be *circular* movements, or if not, movements that would be obtained by superimposing or 'composing' such movements, like a tangle of invisible giant wheels, in a vast cosmic merry-go-round that was terribly intertwined. Someone once made this claim, backed up by compelling metaphysical arguments, and since then everyone has learned about it at school, or at least at university, from an early age

Look for the circles! And if you have to superimpose ten of them, with ten different radii and ten different angular velocities, go for ten! Kepler had learnt this like everyone else, and of course he believed it too, just as everyone else did. No matter how much the planets shouted at him to the contrary, with figures that would burst his skull, he did his best to do as he was told: he covered his ears! Until the day he got bored of this delirious escalation. That was the day he *forgot* what he'd learned too well, and simply *listened*. To listen not to books, or to learned, peremptory masters, but to the humble voice of things.

It was, then, the crossing of one of those 'invisible circles' I talk about here and there in the 'Promenade' (\*), and one of the most tenacious of all, surely, in the history of cosmology. The 'cause' that makes such and such a 'circle' feel like an impenetrable wall for generations, even millennia, and that makes such and such a 'circle' break through at such and such a time - this cause is not technical. It cannot be expressed (let's say) in terms of objective 'difficulty', in terms (for example) of a prohibitive 'degree of abstraction', which would exceed the possibilities of the human brain up to such and such a point in the genetic evolution of our species. The 'power of abstraction' of the human mind is no greater than that of the brain.

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(\*) These "invisible circles" were first mentioned in the "The importance of being alone" stage (ReS 0, Promenade, n 2).°

today than five thousand years ago (\*), and Kepler's was no greater than that of Hipparchus or Archimedes, or even that of the first mathematician to come along.

And yet, these successive 'border circles' which, step by step, mark the 'limits of a Universe' that is expanding as if in spite of ourselves, and at the same time, the recalcitrant progressive advances of a kind of 'collective thought' weighed down by immense inertia - these circles *also* seem to me to mark, roughly speaking, the successive 'stages' or 'steps' in 'abstraction'. And this reluctance on the part of the mind to leave a familiar stage, in order to 'go up a notch' towards the next one with its even more unusual allure - it would seem that this is, in the end, only one of the many aspects of this almost insurmountable inertia of the mind, by which it opposes any 'change of Universe'. The human mind would be more inclined to deploy prodigies of technical virtuosity, sometimes to the point of seeming to defy the limits of what is humanly possible in terms of brain power and endurance, than to take that 'tiny step', the *childlike* step, through which we pass as if playing at *another level* - the level which renders superfluous all this impressive display of strength! In technical terms, this 'tiny step' often translates into nothing more or less than moving to a 'level of abstraction' just a hair higher.

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(\*) I'm talking here about the 'power of abstraction' as an *individual* capacity, which will manifest itself on higher or lower 'registers' or 'levels' of abstraction, depending on the 'needs' with which the mind is confronted. These depend above all, of course, on the cultural context. These needs were relatively modest for a Chaldean priest-astrologer-astronomer or for a Pythagoras, compared with those faced today by the first mathematics student to come along, swallowing his 'programme' as best he could. But it takes a thick skin to imagine that said student, or even the star mathematician of the day, has any greater 'power of abstraction' than those distant pioneers - those who blazed the first trails, where today there are wide boulevards and motorways for all comers...

There must also be a "power of abstraction" as a *collective* capacity, for a given environment and period. It is this capacity that has evolved so significantly. Nowadays, it is no longer measured in millennia or centuries, but we can see that it has clearly progressed in the space of a generation or two, particularly in the scientific world. These two notions of the power of abstraction, one relating to the individual and the other to a group, seem to me to be linked in various ways, but to be very different in nature. In my reflections, I have focused on the 'brake' that the collective 'power' or 'threshold' of abstraction represents on the free deployment of this same power in the individual; and this by virtue of the psychic 'principle of inertia', which means that the vast majority of people will tend to set a 'personal threshold' for themselves, by 'aligning' themselves purely and simply with the 'collective threshold'.

Yesterday I described abstraction as a 'tool' of thought. This expression now seems somewhat inappropriate. It would be more accurate to say that *language* is a tool of the mind. *The same* is true of *thought*, which appears indissolubly linked to language, as the soul is to the body. There is one and the same 'tool', of which the body is the language and the soul the thought (\*). As for abstraction, this is one of the *qualities* specific to

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(\*) (4 April) When I wrote this passage, I was thinking only of 'thought' and 'language' in the usual sense of the term - the 'language of words', which is also the language of what we might call 'waking thought', or 'logical thought' (in the very broad sense of the term 'logical', it has to be said...). I had completely forgotten that there is, however, a completely different kind of 'thought' and a completely different kind of 'language'! It can be called *the language or thought 'of images'* - without there even being any question of being able to distinguish 'thought' and 'language' here - even if it's like the 'soul' and 'body' of the same process in the psyche. This is what we might call the original language, or the archetypal language. It's also the language par excellence of dreams. I only remembered this language, and this 'archaic' type of thinking, the day after tomorrow, in the section entitled 'The language of images - or the way back' (n° 24).

It would be more appropriate to call 'thought' in the usual sense (the only kind that is recognised as such in our culture!) 'abstract thought', rather than 'logical thought' (although it very rarely deserves this appellation). The main characteristic of *the other* language, the language without words or sentences, is that it seems entirely alien to any process of abstraction. It is not a long 'pre-logical' language (for it is no less logical than the language of words, even if its logic is different - more fluid, and more reluctant to be defined by words...), but rather, 'pre-abstract'. It is an entirely '*concrete*' language.

After a short reflection on this language of images, the thought occurred to me that this language, or this thought, is not the prerogative of our species alone; that we share it at least with animal species close to our own, or even, who knows, with all living beings without exception, animal or vegetable. This reminded me of a philosophical fragment by Bernard Riemann, included in his complete works, which had quite astonished and even impressed me when I was looking through them a few months ago. In it, Riemann takes the term 'thought' in a visibly broader sense, without associating with it a connotation of sensory 'images' that would be the support of thought. It is therefore a question of a thought which (it seemed to me) would be without any material or sensory 'support', and which would nevertheless be susceptible to unlimited evolution, in the sense of an increasingly intimate 'knowledge' of certain things probed by thought. In particular, he spoke of the 'thought of the (planet) Earth', which would evolve in delicate symbiosis with that of the innumerable plants it has nurtured over centuries and millennia, even millions and billions of years, and whose individual 'knowledge', decanted by the experience of myriads of existences, it would somehow totalise in a global creative 'knowledge'.

Such thoughts, from the pen of one of the great mathematicians of modern times, and in the midst of the Age of Enlightenment, seem strangely out of place. For me, they attest to the depth of a mind of a very rare and perhaps unique quality - one in which innovative and fertile scientific thought, given free rein

It is, without doubt, the tool's key quality, the one that most profoundly expresses the very nature of the tool. To think is to abstract, or at the very least, to make use of the process of abstraction accomplished by our predecessors, and passed on to our cultural heritage by means of language. This 'language' includes both 'sound' language (or 'spoken language') and written language, and more generally, any set of sound, visual or other 'symbols' that function as language (such as the symbols used in a scientific discipline like mathematics).

When we say (without further clarification) that thought and language are by nature 'abstract', we are surely implying that they are abstract in *relation* to 'concrete objects' in the strictest sense of the term.

Such as the objects we see in front of us, or touch with our fingers (in the literal sense of the word). This quality of abstraction (which we might call 'absolute') is inherent in every word of language, without exception. It is also an essential condition, if the word is to be the cultural heritage of a group with a continuity over time that goes beyond a human lifetime, and not the property of one person or a very restricted group of people, sharing between them a field of experience that is well defined in space and time. This character of 'absolute' abstraction is evident even in basic words, the most elementary of all, such as 'mother', 'father', 'eat', 'drink', 'sun', 'earth', 'water', 'fire', 'rain', 'wind', 'house' and so on. Between words like these, which form the very basis of a language and of our experience of things, and words like "family" or even "group", "people", "nation", "government", "politics", "philosophy", "abstraction", there is a "distance", a difference in "degree of abstraction", comparable to that which exists between the "base-words" themselves, and the "concrete objects" to which they are applied.

To put it another way: the process of abstraction, which seems to be (from the point of view of the formation of *concepts*, the bearers of *meaning*) like the soul in the progressive formation of an increasingly complex, increasingly 'ramified' language, capable of capturing folds and

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in the privileged fields of abstraction (mathematics and physics), has been combined with a direct and penetrating intuition of things that are more delicate and more essential: things that are probably forever hidden from 'abstract thinking', or at least from the big hooves of so-called 'scientific' thinking.

It is not the coexistence of two exceptional 'gifts', generally considered to be 'opposites', that seems to me to make the greatness of Riemann, this modest and unpretentious man. But it is that he retained the innocence to remain himself, without denying one of his faculties, for the dubious 'benefit' of another more prized by his contemporaries. And I have no doubt that it was this same innocence that made him 'great' in his chosen profession - that of mathematician - without having sought it out.

This process is *cumulative*. Once one of its steps has been taken, the new concept, embodied in a new word, ends up becoming part of the familiar and 'concrete' things, in the same way as, or even more so than, those other things that we had previously described as *really* concrete.

So, historically or structurally speaking, the concept of *number* (an integer, let's say) is visible from a high degree of abstraction (much higher than a word-concept like 'two' or 'three', for example, which represents a very down-to-earth quality). This does not prevent the fact that there is surely not a single mathematician to whom this notion does not appear to be extremely 'concrete' - much more concrete, let's say, than 'fire' or 'earth', designating things with which he has more or less lost contact (supposing he ever did). At the level of abstraction at which many mathematicians work, the number appears as concrete (and at the same time, as distant!), from the heights where it traces its twirls, as would be the grade-manger of his family home, to someone talking about the French economy or the world cereal market.

All this illustrates that, for all practical purposes and once it has been realised that *all* thought and language are 'abstract' (in relation to 'objects' in the ordinary sense of the term), the notion of 'abstraction' is above all a *relative one*. One discourse, one language, one thought, one theory is 'more abstract' or 'more concrete' than another. When both (or both) belong to not too distant domains of thought, such a relationship (of 'more' or 'less' abstract) is perceived, most often, by a very clear and unequivocal intuition, and concordant from one 'user' of language to another. This intuition is usually vague, and perhaps difficult to pin down precisely. Nevertheless, it seems to me to reflect a certain objective and tangible *reality*: that of a kind of *stratification of language*, through what might be called 'successive levels of abstraction'. (Where the word 'language', here, still refers indifferently to everyday language, or to the more or less specialised language of scientific or technical knowledge).

When I saw the intuition of this stratification emerge from my reflections yesterday, I was thinking mainly of more or less scientific language (for example, that of the mathematician), in the service of what I called the 'spirit of precision'. But it now seems to me that this process of refinement, by superimposing successive 'layers', is by no means limited to the somewhat 'technical' language of 'precision'. I am convinced that this is a remarkable feature, which can be observed in *any* language without exception.

- Both in the language that has been formed and transformed over the millennia, and in the language of the latest computer, whipped up in no time by the ingenious brains of a team of computer scientists. No doubt linguists have been observing and describing it for a long time, in one form or another. (\*)

Moving from one degree of abstraction to the next means '*going up*' from one stratum to another, 'higher' stratum; it's an ascending process, a process with a very strong *yang* tonality. On the other hand, this approach is also our means of *deepening* our knowledge of things, so it's a downward progression, a '*descent*' into *yin*. There are two aspects to the same movement. This is certainly the movement that appeared in our reflections a week ago, in the section "Desire and necessity - or the way, and the end" (n° 11).

It is "desire", the thirst for discovery, that constantly drives us to delve deeper into the juicy depths of things. As for 'necessity', or 'the way' to satisfy desire (which rises from its ashes as soon as it is satisfied...), we now see that it consists above all, in concrete terms, *in reinventing a language*: a language that is increasingly flexible, increasingly delicate and untied, capable of probing ever more deeply and intimately into the inexhaustible char of things. The movement of desire that plunges even deeper, and the movement of necessity that takes us up a notch, are one and the same creative movement. At the level of the visible and the tangible, the creative act is that of conceiving, naming, abstracting, and so on.

- to make a new stratum appear and 'rise up', on top of the old strata that are like the foundation and flesh of our exploratory thought. Or to put it better, it is the act of forming a new *skin*, more delicate and more sensitive still, superimposed on the old.

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(\*) There is an obvious mathematical paradigm for expressing, or at least 'mimicking' to some extent, the operation of moving from one 'stratum' of language to the next. It is the passage from a (finite) set to the set of its parts, or to a suitable subset of it. The initial set would represent the set of "words" or "concepts" of a given language, now considered "concrete" or "given" at a certain stage in the language's evolution. The set of parts envisaged would represent the "new stratum" superimposed on the old, by the process of forming and adding new notions, by "abstraction" from the old. Here, a "new notion" (or a new "concept") is considered to be a "part", i.e. a "subset" of all the notions (expressed by the corresponding "words") already accepted in the language. For example, the notion "parent" is obtained by "summing" the two notions "mother" and "father". The concept of 'person' is obtained (roughly speaking!) by adding together all the previously known concepts designating more or less specific individuals, and so on.

the one that preceded it.

It might seem as if this 'new skin' has been plucked out of thin air - or out of the conjurer's hat, abracadabra hoplà - and there you have the handsome rabbit you weren't expecting! And that's how things are always presented, after the event. There have certainly been times when I've proudly claimed about myself that I've 'pulled this or that out of thin air'. But the reality is quite different.

Innovative abstraction, the kind that, as soon as it appears, becomes *one* with the mind like a new skin - it doesn't come out of nowhere, or out of a 'hat', however shiny and well-stocked it may be. It is born in the night or in the half-light. And it is the humble fruit of our loving embrace with the One in whom our desire never ceases - the One who never tires of receiving us into Herself.

### 23. Abstraction and meaning - or the miracle of communication.

(March 29) It might seem that for the past two days I've been composing a vibrant 'panegyric of abstraction', as the 'means of all' ways of thinking about this and that! Perhaps it won't hurt to take a quick look at the other side of the glittering 'abstraction' coin.

First of all, there is what might be called abstraction 'for its own sake', instead of abstraction 'out of necessity'. I get the impression that this kind of 'abstraction game' is almost always, if not always, sterile. That it's a way of appearing to do or say things, and terribly learned things at that, while going round in circles or cleverly drowning a fish (a more or less abstract or more or less concrete fish, depending on the case). This is a genre that can be found in the speeches and publications of scientists, as well as those of philosophers, and in the countless speeches that punctuate attitudes, actions and behaviour in everyday life. I have already had occasion to allude to this (\*), making it clear that our reflection was going to focus on thought that explores and discovers, and not on thought that struts or 'recou-vers'. Let us emphasise here that today, as in the past, this kind of thinking is by no means rare, even in the most upmarket quarters of what is regarded as 'the world of thought and the spirit'.

But even for those who don't appear to be in a position to strut or drown

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(\*) See the section "Desire and necessity - or the way, and the end" (n° 11), in particular pages PU 31, 32.

fish, there is a "pitfall of abstraction". This is the danger of *losing touch with "the concrete"*. "*The concrete*", here, refers to the totality of objects, qualities, facts, experiences, etc. which form the content and substance of the previous stratum or strata in the levels of abstraction, and which alone give *meaning to* the words we use. So it's a question, in fact, of losing contact with the *meaning* of what we are saying, which then becomes mere *discourse*. It's also what we call 'paying lip service', or letting ourselves be 'caught in the trap of words'. This temptation is all the more natural because, at each level of abstraction in language, there are rules of internal coherence at that 'level', rules which most often remain unspoken, but which the mind accustomed to abstraction soon internalises and masters. This makes it possible to deliver a speech that looks impeccable, while having more or less completely lost touch with the '*concrete*' meaning of the terms used, and with the overall meaning that the speech is supposed to convey. When we do have the indiscretion, however, to look for a meaning, we are often surprised to find that there is none, strictly speaking, or that it is so lacking, or so contradictory, that it leaves us dumbfounded. If there is a meaning, it is an *indirect* one, teaching us something about the unconscious intentions at work in such discourse (\*\*).

When I speak here of 'meaning', I realise that this is something of a delicate nature, too complex for me to attempt here to define it entirely. I would just like to emphasise that it is not an '*objective*' quality of a '*text*', or of something said. *Meaning' is inseparable from the person who writes or says it*, or (from another angle) from the person who reads or listens to it; and the meaning that one tries to express (if it really has a meaning) is inseparable from the other.

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(\*\*) If you pay even the slightest attention to what is said in any given conversation or discussion (including "interesting", "enriching" etc), you almost always find that it is little more than a series of platitudes, nonsense and counter-sense - that the speeches made on both sides are ("strictly speaking") *devoid of meaning*. As far as I'm concerned, I've lived most of my life, like everyone else, on a certain '*baggage*' of commonplaces, superimposed on a more or less well assimilated personal experience, and a more or less fine or more or less superficial direct intuition of things. While I have sometimes 'come out' of commonplaces with conviction, I think I can say that I have rarely fallen into the rhetoric of someone 'paying lip service', convinced that they are saying something relevant or even profound. I would, however, make the exception of certain discourses (which appeared around 1972 or 1973) linked to the '*Guru syndrome*' - I came across a few letters from my pen which left me dumbstruck! (See the section '*The Guru-not-Guru - or the three-legged horse*', Res I n° 45, and also the note '*Yang plays the yin - or the role of Master*', ReS III, n° 118.) I hardly need to point out that in maths, on the other hand, I don't think I've ever 'talked the talk'.

The intention to express a meaning, perceived by the author at the moment of writing or speaking), and the meaning understood by the other (if the latter is concerned with apprehending, and not simply projecting onto what is read or heard a 'meaning' that is already ready in advance...), are rarely fully concordant. Often they are even completely at odds with each other. Not to mention the fact that it is by no means exceptional, particularly in everyday situations, for one or other or both of them to 'operate' (without even bothering to take note of it themselves, of course!) on more than one meaning at a time, which may well contradict each other. So here, in passing, we come close to the complex problems of 'communication'.

But limiting ourselves now to the person who formulates a thought, whether to himself or to others, we can no doubt say that this thought is only well established, that it is only a 'thought that explores' or a 'thought that constructs', when a *meaning* is well and truly present at the moment of formulation; a meaning which is the soul and the *raison d'être* of the concept, and which we strive to evoke and embody, to 'grasp', if only symbolically and always imperfectly, through words. This will only be the case, surely, when this meaning, even though it may be ambiguous (and thus reflect, perhaps, the ambiguity or ambivalence that is well and truly present in a reality that we are trying to grasp or define), is not nonetheless 'nonsense', contradictory to itself or to things that we know perfectly well elsewhere (\*). This meaning, on the other hand, can be something of extreme richness and complexity, tacitly implying a more or less vast and more or less profound part of the whole experience lived in the life of the person expressing it.

It's clear that in the case of a mathematician, let's say, expressing himself as such on a mathematical theme, this 'ecu' will most often be relatively limited, restricted to an ex-

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(\*) (5 April) This 'prerequisite', which at first sight might seem self-evident, should nevertheless be taken with a grain of salt. In the course of research, trying to clarify a vague intuition, we may well be led to write down things which, as soon as they are put down in black and white, appear 'silly' for one reason or another. "But you had to write it down first to be convinced! I say this at the very beginning of *Récoltes et Semailles*, in the section entitled "Erreur et découverte" (ReS I, n° 2). This is a timely illustration of the observation I am led to make below, namely that the question of *the existence of a 'meaning'* in a text eludes any 'objective criterion'. (This does not mean, however, that the question itself is 'meaningless', or that it cannot often be answered without hesitation and with full knowledge of the facts). The question of whether or not there is 'meaning' does not, strictly speaking, concern a text itself (which in this question plays no more than the role of a 'witness-text'), but *the inner attitude* of the person expressing himself through it.

In other words, it will be restricted (for the most part) to his own thoughts, in which emotion will play little or no part. The situation is quite different, however, for someone who would say something as simple as 'I love my children', or 'I love doing maths', or 'I love my country'. Most of the time, of course, these are simple reflex formulas, which circumstances sometimes seem to oblige us to utter, with unmixed conviction and without thinking twice about it.

! So they hardly have any 'meaning' as such, apart from the indirect (and indiscreet!) meaning I alluded to earlier. But when they do have a meaning, we could say that there are as many different meanings as there are different people and different moments of a totally different nature, relating to completely different levels of apprehension of a reality that is always complex.

Such "gaps" from one "meaning" to another are even more striking, perhaps, in the case of what was once a living word, which later became cultural baggage: "Love your neighbour as yourself"; "Unless you become like little children, you will never enter the Kingdom"; "Know yourself"...

The question of whether a text (let's say), which may seem abstract and 'complicated' to some, is in fact the expression of a 'simple' and living *meaning*, present at the time the text was written and which is its very soul; or whether, on the contrary, the author 'abstracts for abstraction's sake', 'listens to himself talk', 'pays lip service' - this question cannot be answered by 'objective criteria' that could be applied like an all-purpose grid, or by cultural consensus of any kind. An exception could be made, at the very most, in the case of a scientific or technical text with a long-term perspective, when the 'personal' part in the 'experience' that the text is supposed to want to communicate, and in that of the reader to whom it is addressed, is relatively minimal - when 'the reader' disappears into a more or less anonymous, and therefore more or less 'objective', 'public'. This is the case, then, where understanding the meaning of the text involves only *the reader's interest* in a subject in which he or she has no personal involvement whatsoever, and a certain *competence*, but not *maturity*.

In other cases, when there is 'meaning', it is only apprehended, or at least glimpsed or sensed ('erahnt'), by the person in whom the meaning '*resonates*' with something within him or herself. More precisely, it is then a rich cloud of associations (left unspoken) present at the time of writing the text and which alone gives it its full 'meaning', which mys-

This cloud is 'different', of course, and yet 'close' to the one that gave rise to it, through a '*kinship*' that may be elusive, but is undeniable. A kinship attested by this very 'resonance', by this movement that is transmitted from one to the other, by this *communication* between one World and another.

This is another 'miracle' that involves *two people* - a rarer miracle than that of simplicity, which involves only one. As with any miracle, there's no point in pursuing it: the more we try to provoke it, the more it slips away! And I don't have to worry about it, whether that miracle happens or not, or about any other miracle that lights up my path, like the smile of a flower unexpected at the chance of a long climb.

My responsibility does not lie in creating miracles, something that is entirely out of my hands. It's in what's up to me: to be really present and *true* in what I do - whether I'm expressing myself in writing or orally, or reading or listening. So it's up to me, when I'm expressing myself, to make sure that I'm also listening to a 'meaning' within me, seeking form through language. It is this "meaning", then, that assembles one by one the words that must express it.

"Abstract or not, these are the good ones!

#### 24. The language of images - or the way back.

(30 March and 5/6 April) Yesterday I looked at the 'word trap' - a trap, as is so often the case, into which only those willing to fall fall fall. Like any tool, language has a function, a *raison d'être*: to express *meaning*. This is also the *raison d'être* of 'abstraction', the sharp edge of a high-precision instrument. Having said that, you can use a reason to gesticulate with it - at the risk of remaining shaggy, and scratching yourself to boot. Nothing could be more natural!

This is undoubtedly the most common aspect of the 'other side of the abstraction coin'. It is also the most artificial, the crudest. *This is not the* danger that awaits the worker at work, *one* with the tool that lets him penetrate the material he is lovingly working with. There is a more hidden 'other side', which I have yet to discuss.

The higher we go in the 'stages' of language, the further we move away from what we might call 'raw experience': that which our *senses* bring to us, and which manifests itself in our *emotions*. The intensity of the worker's experience of the task in hand can easily be seen in his or her emotions.

to forget that experience. He still remembers so well the world of the senses, distant indeed, but to which he believes he can return when he sees fit (and when he finds the time!). This memory continues to fuel his language and his very perception of the things of the mind, as if to give them a weight and a roughness, and perhaps also a deeper *resonance*, that they would otherwise lack. There are also certain 'emotions' in his work - high-flying emotions, to be sure. There is the tension of expectation, or of a long suspense, suddenly resolved by a liberating denouement. There is the almost sensual pleasure of long modelling 'on pieces', contact with a material that is perhaps rough at first, but gradually softens and reveals itself to the hand that works it. There is the exultation of discovery, and the serene joy of scrutinising and contemplating what gradually emerges from its veils of mist, revealing stroke after stroke the contours of a perfect form.

It's all there, and yet...

If I probe myself, and try to define in a few words "what's missing", I'd say: there's intensity, there's breadth, but there's no *depth*. In the intensity and in the vastness, there is joy, there is contemplation. But the low note of *pain* is missing.

It is in this, surely, that we find the missing dimension, the absent depth. For everything that touches us deeply touches us like a beneficial pain and makes our tears flow, both tears of joy and tears of sorrow. These waters that water and wash our being are absent from this "world of language", the "world of the spirit". Even though this delicate language would speak to us of God, of the soul and of ourselves, it keeps us far from these waters, far from ourselves. We confine ourselves to this world of heights, as if in a chosen homeland more beautiful than the land of tears and dust from which we come, and we evade these secret and painful chords - these dreaded chords that speak to us of ourselves, if only we let them speak. And while *we* weigh our words and speak, *they* fall silent. ...

When I spoke over the last few days about 'language' as a vehicle and material for abstraction, I was referring only to what might be called the 'language of words', as if there were no other. This is a language formed with the help of 'signs' or 'signals', promoted to '*words*' (as vehicles of 'meaning'). These 'signs' or 'signals' can be aural (as in spoken language without the support of writing), or graphic (so as to leave a lasting material trace). In themselves, they have no

image', however stylised, of the reality they are supposed to represent.

In words

mother, sea, mountain,

neither the *sound* of the spoken word is supposed to evoke sounds associated with a mother, the sea or the mountains, nor the graphic design of the written word is supposed to evoke the features or contours of the thing designated. We could say that the correspondence between these signs and their 'meaning' is fixed by a 'convention' specific to the language used. A significant set of such 'meaning → sign' conventions is what we might call a 'language' (\*). The same 'language' can therefore be realised in principle (with variations) by many different 'languages', and even by an infinite number of them. (It's true that, in practice, the 'dictionaries' for switching from one to another are always approximate (\*\*)). So, just as the same *thought* can be expressed in words in many different forms in a given language, the same *concept* in a language (\*) can be translated into an infinite number of different 'words', depending on the language used to embody the language.

There is yet another 'language' than such a language of 'concepts' or 'words' - a language of an entirely different nature. It is embodied in a single language; a more or less 'universal' language, it would seem, which is 'essentially' 'the same' from one person to another (whether French, Chinese or Hottentot), and from one era to another, since the dawn of time. It plays the role of a kind of "archetypal language", which could be called "*the language of images*" (\*\*). It is above all the language of dreams, or of the imagination,

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(\*) Of course, I'm oversimplifying here. There are the rules of syntax for putting words together, and all the subtleties of 'grammar', which I've never really got to grips with...

(\*\*) So here we come to the famous 'communication problem' in a different way! But the truth is, it's never the 'dictionary' side that's the real problem!

(\*) So I'm taking 'language' here in a rather particular sense, as something that would pre-exist the different languages that embody it, as a kind of 'structural matrix' made up of concepts and relations between concepts, independently of the signal-words that would materialise these concepts. Thus, such a 'language' would be like a 'soul' common to the 'languages' that embody it, just as a thought is the soul common to the innumerable ways of expressing it in a given language, or even in a multiplicity of different languages.

(\*\*) I've used the term 'image language', which seems to be fairly common in psychotherapeutic jargon, from the German expression "Sprache der Bilder", found in a very interesting book (on "imagination" or "image" therapy techniques) that I recently read. (Henry G. Tietze, *Imagination und Symboldeutung*, Ariston VErlag, Genf.)

when it unfolds without any control from the conscious mind.

In a word-language, there is a single word associated with the idea of 'mother', say, or 'sea', or 'mountain'; or, at most, a small number of words, corresponding to different nuances: maman for 'mother', océan for 'sea', mont for 'mountain'... In image-language, there is an *infinite* range of different images, with a sensory, emotional or 'comprehension' 'content' that can also vary ad infinitum. The image of an 'event', suggesting a 'totality' (albeit infinite) that would be delimited in advance, is, moreover, im-proper. It is by no means a question of 'choosing' from a 'collection' of images already given, like the words of a word-language that would be prodigiously rich in synonyms, to express a multitude of different 'nuances'. There is no question here of choosing, but rather of *creating* the image and its movement from scratch, at every moment. If the thought to be expressed involves (say) 'the mother', the idea of 'the mother' can be expressed just as well by the mother in the flesh and blood of the 'speaker', and in any posture or get-up, from the most everyday to the most fantastic ; It can also be a woman he has no memory of ever having seen, and yet who, he himself cannot say why, evokes for him "*the* mother" or "*his* mother"; it can also be the image of a sea with any one of its countless faces, or that of a "sea" of clouds with uncertain outlines, or the obscure depths of an underground passage...

So if I spoke earlier of a 'universal' language, an 'archetypal language' that comes to us from the mists of time, I must add that it is also the *most intimately personal* language. Each 'sign'-image, rising up from the deepest layers of our being, is an indicator of who we are: how we apprehend (often unwittingly) the world around us, and how the immemorial conflicts around which the human condition is woven are played out in our very being.

It is a language of *symbols*, just like the language of words. But symbols do not, strictly speaking, represent 'concepts', but rather '*experiences*', or 'situations' that may well escape any personal memory of a conscious experience (\*). And above all: *the meaning* attached to an image-symbol is in no way 'con-ceived'.

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(\*) The most important of the experiences or situations with which a person is confronted can be seen as a manifestation, in one of its innumerable particular guises, of a *typical experience* or *situation*, the appearance of which in a person's life at such and such a moment seems inherent in the human condition, independently of the particular context (historical, cultural, etc.) in which it takes place.

ventional', and its apprehension (or 'interpretation' of the image) is not automatic. No 'dictionary' here can replace the quality of attention and presence of the 'listener'! (No more than a dictionary could give us the key to understanding just one of the infinite number of situations that make up the fabric of our lives). And these 'image-symbols' of the language of images are indeed 'images', in the fullest sense of the word: *living images*, and better still, *lived images*. Experienced, moreover, with an acuity of perception and presence that is almost always lacking in our everyday 'experience'.

Through its "sensory texture", the image can consist of sounds, smells, tastes or tactile sensations of any kind perceived in any part of the body, as well as visual perceptions. In most dreams, several of our senses are involved at the same time. But this 'background texture' provided by sensation does not exhaust or 'tell' the 'image' any more than a rhythm tells a melody, or the outline of a flower tells the delicate play of colour and its movement in the breeze, or the fragrance that is uniquely its own, or the intoxication of the bee that comes to gather it. The emotion with which an image is charged, and also the more or less clear or more or less diffuse cloud of associations that surround it, are part of the meaning of the image and its message, as intimately as perfume is part of a flower.

In this way, the image-language remains in immediate contact with the perception of the audience at all times.

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a person's existence. According to C. G. Jung, it is these 'archetypal' experiences and situations, stored in what he calls the 'collective unconscious' of our species, that are each translated into a specific type of 'image'. It is these 'image types' that form the 'archetypal language' or 'universal language' to which I have alluded.

I have no doubt about the reality of what could be called a universal 'symbology', which could also be called a 'language', provided we are careful not to fall into the traps of such a designation. The Dreamer I have seen at work in my dreams obviously 'knows' a 'symbology' or 'language', where each 'word' (or 'type of image' or 'archetype', corresponding to some archetypal 'experience' or 'situation') is presented with an extreme 'vagueness', leaving room for unlimited freedom of realisation. But it is also quite clear that he resorts to it or draws inspiration from it whenever and however he likes, without ever feeling obliged to bow to the Archetype. Almost all of his creations seem to me to draw entirely on materials that I would call 'personal'.

*senses* (\*), with the *body* (\*\*); and also with *emotion*, the daughter of the body and the senses, the faithful messenger of what is perceived. *Perception, emotion* and the *expression of a sense* (or a '*thought*') are one and the same thing.

I feel that I've let myself be trapped by the word 'image language' (used as it is without looking twice. . . ), by talking about 'the image' as if it were a separate entity, which would be an 'element' (more or less interchangeable) for the expression of a 'meaning' or a 'thought' - just as the 'word' is the building block of a 'discourse'. Yet there are no more 'words' articulated in 'sentences' here, or even separate 'images' assembled to form a 'meaning', than there are in the flight of the seagull, the ceaseless flow of the river or stream, or the dance of the dragonfly. At every moment, the 'narrative' *is* this flight, this flow, this dance - it is *life*, lived moment by moment by the person who, by experiencing the flight, the flow or the dance and without even knowing it or 'wanting' it, 'makes the narrative' (\*). Rarely do I find that the 'story' or the 'thought' told by a dream consists of a more or less static image, or a simple succession of such images. Rather, the story and the meaning are *staged* in a kind of 'psychodrama', in a lively *parable*, more or less transparent depending on the quality of the 'listening'.

Whether through the small things or the big ones, this story-parable speaks to us above all about ourselves: about the ignored forces that rest or work within us and about their subterranean work; about the conflicts, tensions, masquerades and events of all kinds that play out in our being and that, without our knowing it, make up the fabric and the true substance of our lives; about that which

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(\*) It is a very remarkable thing that the word "sense" designates both our faculties of sensory perception in general, and the philosophical notion of "meaning" (of a text, an experience, a situation, a mode of existence or existence in general, etc). The same thing applies in German, with the word 'Sinn'. I have no doubt that this is an indication of a profound link (which I am the first to tend to forget...) between the two 'senses' (again!) of the word 'sense'.

(\*\*) Sometimes, however, I have had dreams consisting of a thought, or an emotion, or a thought-emotion, without sensory support of any kind, or the support of any word. This reminds me (contrary to what I seem to be suggesting here and there) that thought exists, even independently of the language that expresses it. It is only a certain type of thought (and in particular scientific thought) that seems to vanish when it is deprived of the material support of language.

(\*) The term "tells the story" can lead to confusion. The person who 'lives' the dream, 'dreaming it', is *not* the one who "who creates the dream, whom I call the Dreamer. He is the living word in the hand of the Dreamer, and he no more knows the meaning of the 'narrative' he is tracing, nor does he think about a meaning, than the man

thrown into the fray in broad daylight thinks about the narrative that is his life, and the meaning of that narrative. ...

*is* (that we avoid seeing... ), of what *was* (that we have long since forgotten...), and of an unsuspected "*possible*" that awaits us (and that it is up to us to realise... ).

Earlier I used the expression 'psychodrama', a term that is quite fashionable I think, and not without force. And it's true that the script and staging of many dreams do not spare the sombre colours, with the tones of an ancient 'drama' repeated in the fabric of our own lives, when they don't turn into the pure anguish of a nightmare. We, the actors in the drama, certainly 'walk' our hearts out, even if it means waking up feeling stupid and unable to think about anything else! It's not us, that's for sure, who 'speak' this strange language, the 'image-language' or '*parable-language*', the '*life-language*'. There's a director, someone bigger than us, who wields it like a mother tongue, with ourselves and the very substance of our lives forming the flesh of the words. He stages a jumble of dramas, farces, idylls and elegies - but even where the drama is in full swing, I can see that the invisible Narrator is smiling. He knows that suffering and death are simple things, that there is nothing 'dramatic' about them. The 'drama' is the waves we like to make around these things, to make them complicated...

It's that 'wry smile' of the Narrator's that makes me feel so uncomfortable with the name 'psychodrama'. It's got a nice ring to it, but I prefer the serene name of 'parable'. A 'staged' parable, that's a given, with a more or less simple or more or less interwoven 'scenario'. The staging is often comical, always unexpected and always incisive (without any concern, it seems, as to whether it will be understood...). It is not limited by any convention, style or decorum (\*), nor by any technical limitations for the grand spectacle montages - montages that would make the most fantastic creations of the most inspired magician-cinematographer pale in comparison! If such a 'magician' of image and sound sometimes enchants or moves us, it's because he knows how to listen within himself, surely to the master magician of prodigious means at work in each of us, and whom we so often disdain to listen to. It's true that his shows are free, and that he doesn't advertise.

What is undoubtedly most disconcerting about the language of parables, the language of images, is the *lib-*

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(\*) There are, however, some 'tactical' desiderata, which can be seen as constraints when it comes to thwarting the Censor's vigilance. But I have the impression that for the Dreamer, this difficulty is rather part of the charm and salt of his game...

*erty*. You can feel that this is her soul and her essence. It is enough to frighten anyone: infinite creative freedom. There are no rules to which an Other within us can speak... ), or to hear it and grasp it - on the fly! No step seems to prescribe the next, nor to be prescribed by the one that preceded it - no dream foreshadows the next - and yet each time we perceive, obscurely, an invisible *order*, a *purpose*, a *meaning* of a parable in which we are a docile and clumsy actor without even thinking of a "meaning" that we would be playing...

It's a language that is certainly beyond the means of the 'boss', a spectator in spite of himself and always ill at ease with these 'on the fly' games that go right over his head - totally idiotic games, in fact; so idiotic, fortunately, that there's no point in even dwelling on what shocks, worries and moves - mere ramblings of a drunken, mad dreamer, who wakes up (alas!) every time the boss dozes off or falls asleep.

No, this is not the language of the 'boss', a language incapable of formulating rules or maxims or advice, or the slightest commonplace and other comforting nonsense - except to explode a meaning that we prefer to ignore!

It's not the language of clumsy hands and clumsy minds, it's not for the eternally sleepy 'watchman', nor for the 'scholar' clinging to knowledge and afraid to know.

It is the language of the Awakened Sleeper, the Intrepid, the Benevolent - the one who holds in his light hands our most secret thoughts, our most fleeting desires as well as our most tenacious and senseless ones. He knows our fears and our distresses, those that pursue us day after day, as well as those long forgotten, sunk in those bottomless chests to which he alone has the key. And from all these threads formed by our hopes and our despairs, our impulses and our fears, our desires, our thoughts, our rejected weaknesses and our ignored strength - from all this he weaves, moment by moment, the shimmering fabric of a language that only he knows and wields, a language that from moment to moment takes shape and transforms itself under his magician's hands. Invisible, elusive, a mischievous child and an enigmatic old sage - *he* is the Master of the living word, of the language of life, the *mother tongue*. The language from which the countless words of the countless longs mots have drawn their life, their vigour and their meaning since the dawn of time.

It is a strange thing that the mother tongue, the language common to all human beings (indeed, to all beings... ), should be so unsuitable, it might seem, as a means of *communicating meaning* from one being to another. It is true that it is not the language of the boss, and if it is a means of communication, it is certainly not from one boss to another.

We can, of course, 'translate' it into the language of words. That's exactly what I don't

I take infinite care to do this every time (or almost every time...) that a dream calls out to me with exceptional force. Such a 'translation' is a means of listening, like a stethoscope for ears that are a little deaf! It's very useful and even indispensable, given the case. But it's also clear that image-language is not designed to be translated into words, any more than word-language is designed for the stethoscope. And any translation is as different from the original parable as a description of fire, water or a real-life scene is from the thing described.

If I try to think of some means of direct communication through image-language, or through some other 'language' that comes even remotely close to it, I can't think of much (for lack of imagination, no doubt) other than painting or sculpture, and above all *dance* - the language of movement par excellence, the language of the *body*.

It's true that the body has a thousand other ways of expressing itself, of 'speaking' - in a language that is sometimes more eloquent than the language of words or even dance. There is the game of love, of course, this game of games, the game played by the Earth with its innumerable lovers, with the sun, with the sky, with the rain, and with each of its creatures. ... And there is the language of the eyes too, just as there is that of the hands (not to mention that of the feet, a little joking devil tells me...).

The list is definitely growing! And I was thinking also, and above all, of the language (which Baptist Science calls 'psychosomatic') through which the body expresses and thereby, perhaps, 'compensates' in its own way, for the violence suffered by it, or by the deep layers of the psyche that take root in it, at the hands of worried and pitiless forces, often flying the 'Spirit' flag. And perhaps it is true that there is no 'meaning' well and truly expressed, by anyone and in any language, that is not also well and truly 'heard'...

Maybe I'm digressing - because who's to say that all these 'languages' I've just mentioned are really part of this 'language-parable', the mother tongue, which would encompass them all. And yet I suspect that this is indeed the case. ... But I return to the familiar form, the '*parable*' - where the presence of a *meaning*, expressed by a brilliant Director-Prestidigitator, is obvious (even though we would do our utmost to ignore it). If for a long time I was reluctant to recognise it as a real *language* (and I have a feeling that this reluctance has not entirely disappeared even now...), it is undoubtedly precisely because it seems so ill-suited to what seems to be the very *raison d'être* of all language: communication with others.

And yet I'm well aware that it's even more important to know how to 'communicate' with

*yourself.*

When the initiative to 'speak with myself' comes from 'me', in the waking state, the idea would never occur to me (until quite recently, at least) to call on anything other than the language of words, the one that I know and handle comfortably (whether in German or French). But I'm also well aware that when the initiative comes not from me, but from 'the

Other', it's never in that language that He speaks to me. It's always in the language of parables, the "language of images" - and when I take the trouble to listen, I often sweat blood and water to "translate" it into "mine" as best I can. I don't know if one day this will no longer be the case... . It would seem that the 'raison d'être' of the language-parable is to be the means of *speaking to ourselves and about ourselves*. It is the language that our 'unscientific' chooses, to 'speak to the conscious'. It is the language through which the deep creative layers - those that '*know*' and '*can*' - express themselves and make themselves known; the home and

dwelling place of the *Other* - of the *Player*, the *Dreamer*, the *Stage Director* or *Prestidigitator* or whatever other name we give him; the *Eye* that sees and the *Ear* that hears  
and the *Hand* that holds the keys to all the 'secrets' of the universe.

chests and all the underground passageways, and the torch too, to get to the bottom of each and every one of them...

It's even strange that the Other never tires of 'talking' to us, while we never listen to Him, so to speak. And yet I often feel how much He delights in his own games

- not to contemplate them, but to invent them and create them from scratch with a verve that is uniquely his own, and without any concern, it seems, as to whether there will be a spectator-listener. He is the *Voice* of that which *is* within us and which seems voiceless; his *raison d'être* (it would seem) is not to be *heard*, but *to be*. He is the *Creator*, the one who creates without witnesses, before any creature yet enters into dialogue with him or rejoices with him in his works.

It has been said that the language of images is the language of the child. The 'language' through which he grasps the world around him. I've forgotten my childhood, but something tells me it's true, that this is the language of my own childhood. I don't know if I'll ever find it again. Yet someone inside me speaks it, this language, just as I used to speak it, spontaneously and effortlessly - before I buried it one day and forgot it. Someone inside me speaks it, but I rarely take the time to listen.

I'm not the only one who rarely, if ever, listens to him. We've learned so well not to

listen to him, and we're so well taken aboard the boat "Thought" in capitals, aka "Abstraction", with its watertight hull of finely assembled and riveted *words*! Even though

we would like to find the way back to the forgotten language of our childhood, to the source of laughter and tears, and to the forgotten distresses, perhaps, that words will never, ever be able to express - this path seems lost forever... .

## 25. The Gateway to the Universe.

### A) Doors and keyholes (directory).

(9 and 10 April) Here we are, at last, with the repertoire of yin-yang 'cosmic couples' (or 'keyholes in the Universe') promised from the start, arranged by 'groups' of affinities (aka 'Doors to the Universe'). A twenty-ninth 'Door' has just been added at the last minute this very night, in an attempt to flesh out the unfortunate 'right - left' group, reduced to this one and only couple. Now, 'right' is associated with 'right', and therefore with 'justice', which is immediately associated with the yin-yang pairing

justice - charity

("charity" in the original Christian sense, "Barmherzigkeit" in German). Other associations followed, giving rise to eight couples, assembling into a flower with thirteen petals, whose Yin name would be "charity" or "grace", and whose Yang name would be "justice" or "retribution" ("Vergeltung" - with the connotation of "Karma"). Finally, I've found yet another ninth cosmic couple, which seems to me to best evoke the dual yin-yang nature of this newcomer group (or Flower-bearer). This is the couple

responsibility (or karma) - grace.

From the body, the 'right-left' Door (aka Width) remains with its one and only keyhole, as before! On the other hand, the new 'somet' that has appeared replaces the left-hand side of the famous Christmas tree diagram (formed with our groups or Doors), to reinforce its symmetrical appearance. In fact, the new group, which is only superficially linked to the 'right-left' group (which is part of the 'four directions' package, suspended on the right-hand side of the tree), is linked in an obvious and profound way to the two groups 'effect-cause' (aka Causality, aka Finality) and 'order-chaos' (aka 'law-freedom'). The corresponding vertices form the extremities of one of the edges of the 'Thought' icosahedron suspended on the left side of the tree. In this way, the new *Responsibility* group is 'suspended' from this edge of the icosahedron, at the same time as forming the end of a new branch of the tree.

of Christmas, starting with the 'firmness - gentleness' group (aka Firmness) on the trunk. But what pleased me most of all was that, when we form a 'reduced diagram' as explained below (\*), with 'super-groups' of couples, obtained by grouping together in suitable packages the groups represented by the vertices of the Christmas tree diagram, we now find a much prettier diagram, with nine vertices instead of eight. Its very shape tells us what its name should be: it's 'The Window' (on the Universe, need we add!).

I gave the newcomer group the number V'. THE reason I haven't simply numbered the vertices of the diagram from 1 to 29, but have chosen ro- mains numbers, with exponents ' (for the vertices on the left of the tree) and " (for those on the right) if necessary, plus subscripts (as for the six vertices

$IV^{\circ}_1$  to  $V^{\circ}_6$  forming the "Thought icosahedron"), will be clear enough, I think, by examining their dispo-

sition on the Christmas tree diagram.

As mentioned at the beginning ("The rock and the sands", section n° 1), I first named each of the groups by one of its pairs, which seemed to me to be particularly representative; sometimes also by a second pair, as a "nickname". These pairs (used to name the group to which they belong) appear in my directory in italics. When an archetypal pair appears in a group, as in "the father - the mother" or "the child - the mother" etc., I have included it in the name or nickname, with the exception of the "man - woman" pair in group I, where the archetypal pair "the father - the mother" already appears. Finally, in the course of reflection, I ended up giving each of the groups a more concise name, which I put in front of each group.

First of all, here is the list of these twenty-nine groups or "Gates", regardless of their diagrammatic arrangement.

- I Design
- II Action
- III Movement
- IV Light
- V Knowledge
- VI Faith
- VII Authority

---

(\*) See subsection C) above, "The Window".

VIII Elan (or Gift)  
IX Density (or Weight)  
X Firmness  
XI Force

III' Expression (or Communication)  
IV<sup>¶</sup><sub>1</sub> Totality  
IV<sup>¶</sup><sub>2</sub> Simplicity  
IV<sup>¶</sup><sub>3</sub> Unity  
IV<sup>¶</sup><sub>4</sub> Structure  
IV<sup>¶</sup><sub>5</sub> Causality (or Causality - Purpose)  
IV<sup>¶</sup><sub>6</sub> Order

V' Responsibility (or Karma)

III" HEAT Heat

IV<sup>¶</sup><sub>1</sub> Emotion  
IV<sup>¶</sup><sub>2</sub> Ethics  
IV<sup>¶</sup><sub>3</sub> Greatness  
IV<sup>¶</sup><sub>4</sub> Evolution  
V<sup>¶¶</sup><sub>1</sub> Height (or top - bottom) (or  
V<sup>¶¶</sup><sub>2</sub> front - back)  
V<sup>¶¶</sup><sub>3</sub> (or right - left) (or  
V<sup>¶¶</sup><sub>4</sub> future - past) (or  
V<sup>¶¶</sup><sub>5</sub> space - time)

It should be noted that apart from the last nine groups (numbers in IV" and V" with indices), the names of the other twenty groups are taken from those of the qualities present, i.e. yin yang, in the couples forming the group under consideration. Sixteen of these names have a yang tonality, and only four have a yin tonality, i.e. Conception, Totality, Unity, Causality (the last three forming the triangle called 'desire' in the 'Thought' icosahedron).

And here is the promised

repertoire. I *Conception*

*The father - the mother*

paternity - maternity

paternal - maternal

masculine - feminine

male - female *male* -

*female*

*engendering* -

*conceiving* the phallic -

the vaginal execution -

conception

what glides - what holds

smooth - rough

protruding - recessed

convex - concave

## II *Action*

*Action* -

*inaction* active -

passive subject -

object

affirmation - reservation

vigil - sleep

vigil - sleep life

- death

the living - the dead

(spirit - matter) ( \*\*)

dynamics - balance

momentum - sitting (or rooting)  $(V_4)^{\star\star} (*)$

ardour - perseverance

ardour - patience

passion - serenity

tenacity - detachment

pursuit - renunciation

Production - consumption

excretion - absorption

The present - the latent (III, IV<sup>\*</sup>)

energy - power (III)

### *III Movement*

#### *Movement - rest*

mobile - immobile fast

- slow velocity - inertia

energy - matter

the present - the latent (II, IV<sup>\*</sup>)

energy - power (II)

transformation - stability

the unstable - the stable

change (or mutation, renewal) - continuity progression

(or innovation) - tradition (V )<sup>\*\*</sup>

4

the changing - the unchanging

---

(\*) Remember that a Roman numeral in brackets, placed after a couple, designates the number of another group in which this couple also appears.

(\*\*) Please note that the couples in brackets are those added to my repertoire at  
The discussions have been ongoing since 16 March.

the ephemeral - the  
permanent what passes -  
what remains the instant -  
eternity

#### *IV Light*

*Light - shadow* (or tenèbres)  
light - dark  
the bright - the dull day  
- night  
summer - winter (III")  
the south - the north (III")

#### *V Knowledge Knowledge -*

*ignorance*  
the known - the unknown  
the knowable - the unknowable  
the obvious - the mysterious  
knowledge -  
mystery  
(knowledge -  
darkness)

the visible - the  
invisible the apparent -  
the hidden  
the conscious - the  
unconscious surface - depth  
(IV<sup>¶</sup>)  
certainty - doubt

answer - question

answer (or affirm) - question learn - forget (or

unlearn) (IV )<sub>4</sub><sup>22</sup>

## VI *Faith*

*Faith - doubt*(\*)

confidence - reserve (\*)

courage - prudence (\*)

boldness - restraint

frankness - tact

self-confidence -

humility (\*)

pride - modesty

courage - humility (\*)

decisive - circumspect

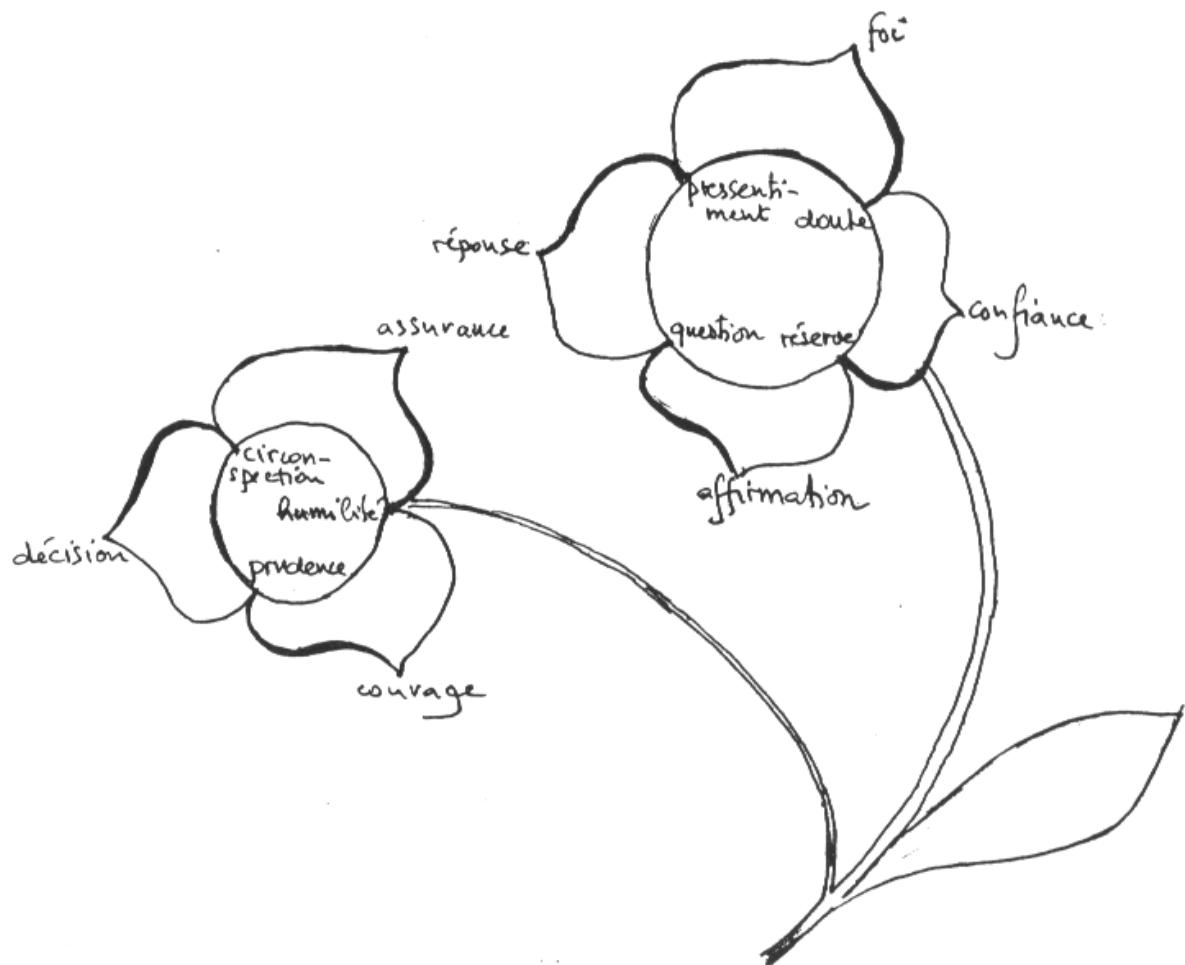
(\*)

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(\*) The pairs followed by an asterisk (\*) are those found in one of the two flowers, one with three petals and the other with four, each containing six and the other eight cosmic pairs that can be placed in the same 'Faith' group (eight of which are not reproduced in the list-tail-tail-tail-tail).

In the three-petalled flower, I have included the pair 'decision - circumspection' instead of 'decided - circumspect'. It is understood that "decision" is taken here in the sense of "spirit of decision" ("Entschlossenheit" in German, "decisiveness" in English). "Circumspection" corresponds to "Bedachtsamkeit" in German. Finally,

in the four-petalled flower, the Yin term 'presentiment' is a very approximate French equivalent of the German word 'Ahnung' or 'Erahnen', designating a very diffuse, vague and often still insecure knowledge that we may have about something.



## VII Authority

*Authority - obedience (or  
submission) what commands - what  
obeys master - servant  
mastery - service  
that which imposes itself - that  
which submits itself that which is  
obstinate - that which gives way*

what asserts itself - what confirms

mind - body

autonomy - dependence

what protects - what is protected

criticism - praise (or approval) (X)

refusal - acceptance (X)

intransigence - understood (X)

VIII *Elan* (or Gift)

*Giving - receiving*

donation (or momentum) - welcome

that which penetrates - that which

is penetrated the penetrating - the  
receptive

what permeates - what is permeated

what permeates - what absorbs

(*the sun - the earth*) (III")

bitter - sweet

salty - sweet

concentration - openness (or availability) the

closed - the open

farms - open

the full - the empty (IV<sub>1</sub>)<sup>¶¶</sup>

fill - empty (IV<sub>1</sub><sup>¶¶</sup>)

fullness - emptiness (IV<sub>1</sub><sup>¶¶</sup>)

inspiration - expiration (IV)<sup>¶¶</sup>

IX *Density* (or Weight)

*The heavy - the light*

the dense - the diluted (or the light, the  
loose) density (or weight) - lightness  
concentrated - diffused (or diluted)  
concentration - dispersion (or diffusion, dilution)  
contraction - expansion  
implosion - explosion  
sobriety - exuberance (or prodigality)  
economy - wealth  
rigour - generosity (or largesse)  
(conciseness - loquaciousness)

straightness -  
roundness  
straightness -  
roundness  
seriousness -  
humour  
severity - tenderness (X)

**X Firmness**

*firmness - softness*

hardness -  
softness stiffness -  
suppleness  
tension - relaxation  
tension - relaxation  
  
criticism - praise (VII)  
rejection - acceptance  
(VII)  
intransigence - compromise (VII)  
severity - tenderness (IX)

solidity - fluidity

solid - fluid

control - abandonment (\*)

willpower (or rigour) - spontaneity (\*)  
discipline - playfulness (or fantasy,  
imagination) (\*)

discipline      control      volonté      rigour  
*v, , , ,*      *\$z*      *vvv*      *v*      *xxccc*      *zzz*      *v, ,*  
imagination      game      abandon      spontaneity

### XI *Strength*

*The strong - the  
weak effort - ease  
strength - grace  
intensity - finesse  
vigour - delicacy  
the resistant - the  
vulnerable robustness -  
fragility*

### III' *Expression* (or Communication)

*Talking - listening  
sound - silence  
expression - perception  
expression - impression (or inspiration)  
  
explain - understand      (II, IV<sup>2</sup>)  
(discourse - meaning)  
(communication - communion)*

### IV<sup>2</sup><sub>1</sub> *Totality*

*The part - the whole  
The particular - the general*

(\*) The pairs marked with an (\*) can be found in the zig-zag diagram at the end of the 'Firmness' group.  
This diagram contains three other pairs not included in the above list.

the detail - the  
whole the accident -  
the essence

the individual - the species (or  
society) the person - the  
environment

*the precise - the vague* (or  
blurred) (\*) (the clear -  
the blurred) (\*)  
precision - generality (\*)  
(rigour - generality) (\*)

The definite - the  
indefinite The  
expressed - the  
unexpressed The  
completed - the  
unfinished  
shape - form  
expression - impression (III')

the fni - infinity  
the limited - the unlimited

The present - the  
latent reality -  
dream (\*\*)  
achieve - dream  
(necessity - possibility) (\*\*)  
(the real - the possible) (\*\*)

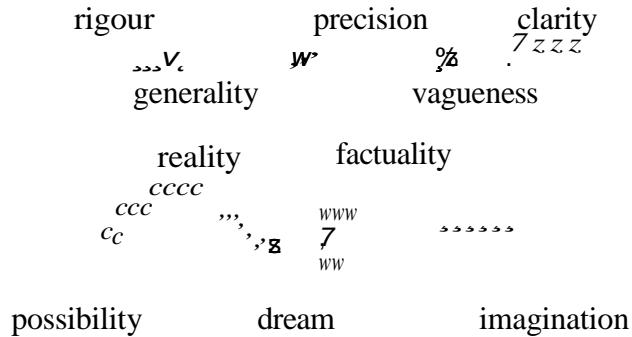
(factuality - dream) (\*\*)

(factuality - imagination) (\*\*)

---

(\*) The pairs marked with an (\*) are those shown in the first of the two zig-zag diagrams at the end of the Totality group.

(\*\*) The pairs marked with (\*\*) are those shown in the second of the two zigzag diagrams. placed at the end of the Totality group. (NB These two diagrams are taken from the Cosmic Flower in section 14.)



#### $\text{IV}_2^{\square}$ Simplicity

The simple - the complex ( $\text{IV}_6^{\square}$ )

the abstract - the concrete

purity - fruitfulness ( $\text{IV}_6^{\square}$ )

objectivity - subjectivity ( $\text{IV}_6^{\square}$ )

the smooth - the rough(I)

reason -

sensitivity

reflection -

instinct logic -

intuition

the methodical - the

inspired coherence - vision

meditation - contemplation

(necessity - desire)

#### $\text{IV}_3^{\square}$ Unity

Multiplicity -

Unity

diversity - uniformity ( $\text{IV}_6^{\square}$ )

heterogeneous - homogeneous <sub>6</sub>  
( $\text{IV}^{\square}$ )

difference - kinship (or similarity)

dissimilar - similar

what separates - what unites

separate - unify

divide - reunite  
analysis - synthesis

the divided - the whole  
conflict - concord  
division - unity  
dissonance - harmony

#### IV<sup>4</sup> *Structure*

*Shape - background*  
letter - spirit  
surface - depth (V)  
container - contents  
the enveloper (or envelope) - the enveloped  
*structure - substance*  
rhythm - melody

sensation-perception  
explain - understand (II, III') know  
- know (II)  
knowledge

courtesy - warmth  
respect - familiarity  
distant - close

#### IV<sup>5</sup> *Causality* (or Causality-Finality)

*Effect - cause*  
(purpose - causality)  
what is born - what gives birth  
what feeds - what is fed  
*the child - the mother*

act - motive

destiny - karma

IV<sub>6</sub><sup>¶</sup> *Order*

*Order - chaos*

(order - freedom) (\*)

(order - mystery) (\*)

law - freedom (\*)

(law - chance) (\*)

necessity - chance (\*)

the heterogeneous - the homogeneous(IV<sup>¶</sup>)

diversity - uniformity (IV<sub>3</sub><sup>¶</sup>)

the simple - the complex (IV<sub>2</sub><sup>¶</sup>)

purity - fertility (IV<sub>2</sub><sup>¶</sup>)

<i>order,</i>	law	necessity
<i>cccc</i>	<i>yy</i>	<i>xxxxxx</i>
mystery	freedom	chance

V' *Responsibility* (or Karma)

*Responsibility* (or karma) - grace

justice - charity (\*) retribution

- forgiveness (\*)

knowledge (\*\*) - understanding (\*)

---

(\*) The pairs marked with an (\*) are those shown in the zig-zag diagram (taken from the Cosmic Flower) at the end of the Order group.

(\*) The four pairs marked with an (\*) are among the eight pairs of the four-petalled flower at At the end of the Responsibility group. The other four couples in this flower are part of the same group, but have not been included in the list.

(\*\*) The term "knowledge" is taken in the sense of the German word "Erkenntnis", a more exact translation of which is "knowledge".

act would probably be 'intellecction'. (Unfortunately that sounds like a lot of philosophical "jargon", unlike the

## judgement - grace (\*)

---

German word, which is part of everyday language). It is a clear and distinct 'knowledge' (not necessarily 'intellectual', though), strongly present, whereas the word 'knowledge' has a more diffuse connotation, and a connotation of duration rather than of something clearly localised in time.

A fully informed 'judgement' presupposes 'knowledge'-intellecction (Erkenntnis, Erkennen, Einsicht...), not necessarily 'understanding' (Verstehen). The latter appears to be the harmonic Yin complement of 'judgement', o of 'intellecction', giving them the 'depth' they would otherwise lack.

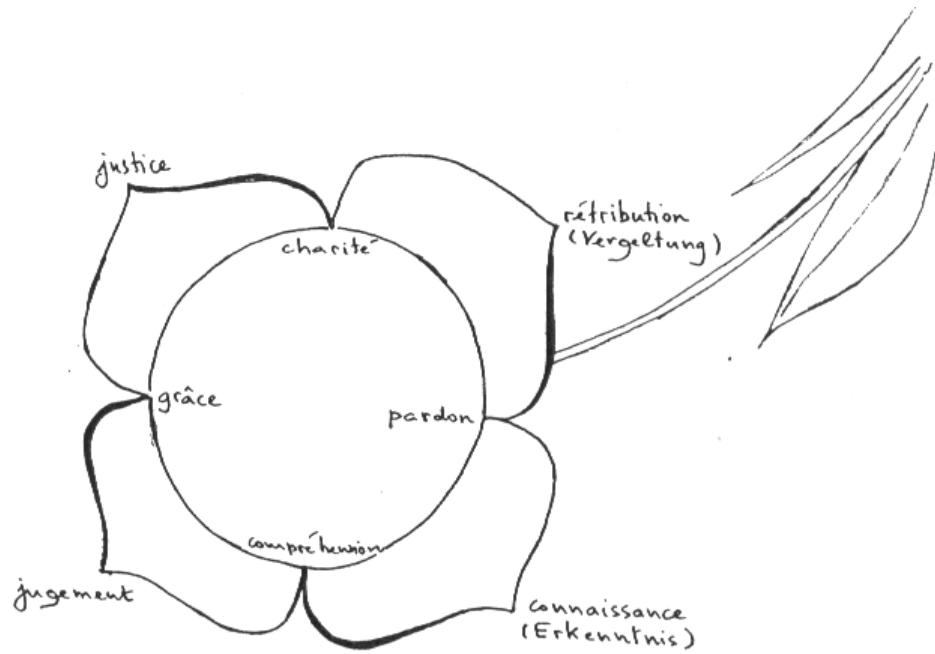
The couple

## knowledge (intellecction) - forgiveness

reminds us that "forgiveness", which would be limited to "forgetting" an offence (and more often, to a deliberate intention to ignore the offence and the intention to offend, not to take cognisance of it), is a false forgiveness, consisting of glossing over an unpleasant reality, just to be on the safe side. There can be no true forgiveness without clear knowledge of the offence committed or the harm suffered.

This does not necessarily imply a full understanding of a situation, in which you yourself are involved in the same way as the offender. I am convinced that such an understanding, if it goes deep enough, has the effect of immediately erasing any feeling of offence (so that the question of 'forgiveness' no longer arises). So I don't think we can "offend God" no matter what we do. This does not prevent us from reaping the fruit of our actions, including those inspired by malice - but the harvest is not the effect of a 'punishment', but of a *causality* without more.

When we are forgiven for a malicious or destructive act, it is beneficial for us and for everyone, including the person who forgives. But the karma created by the act is not erased for all that, either in ourselves who committed it, or in others who were involved (except perhaps the person who was offended and who forgave with full knowledge of the facts). This karma is only erased in us by a full and complete awareness (Erkenntnis) of the nature of the act committed and its profound meaning, by which karma is transformed into knowledge. But even if we have thus fully 'assumed' the act that created the karma, the karma it created in others (perhaps in the form of latent aggression or malice, waiting for the right opportunity to manifest itself) is not erased for its own sake.



III" Heat

*Hot and cold*

hot - lukewarm

fire - water

dry - wet

*(the sun - the*

*earth)*

(VII

I) summer -

winter (IV)

south - north (IV) IV<sup>¶</sup> Emotion

Jqy -

*sadn*

*ess*

laug

hter

-

tears

laug

hter

-

cryi

ng

pleasure - pain  
enjoyment - torment (or suffering)  
enjoyment - suffering  
exultation - lament (or complaint)  
hope (or expectation) - apprehension (\*)

attraction - repulsion  
what attracts - what repels  
(pleasure - displeasure)  
(what is pleasant - what is  
unpleasant) (what is  
desirable - what is  
undesirable)  
(what we hope for - what we fear)

presence - absence  
memory - oblivion (\*)

fullness - emptiness (VIII)

---

(\*) I had thought of including the neighbouring 'couple'.

optimism - pessimism,

but by taking care to identify a certain malaise, I've convinced myself that we're not talking about a 'cosmic' yin-yang couple here. In fact, in the usual sense of the expressions 'optimist' and 'pessimist', these designate more or less fixed 'deliberate statements', rather than real modes of perception and action. The two psychic attitudes involved, one with a yang tonality, the other with a yin tonality, appear to me to be *opposites*, not 'complements' whose marriage could bring about balance and harmony. The same observations apply to the combination of the two terms

idealism - realism,

which has nothing in common with the cosmic couple 'dream - reality'. Idealism is an inner attitude that also consists of a (generally 'optimistic') 'delusional statement', and therefore implies closure. Dreaming, on the other hand, opens us up to the infinite range of possibilities.

(\*) We can compare this 'remembering - forgetting' pairing with the neighbouring 'learning - unlearning' pairing (which I have already mentioned).

included in groups V (Knowledge) and IV<sup>④</sup> (Evolution). Note that the first pair describes a *state* while the second describes the yang and yin modalities of an *action*.

full - empty (VIII)

fill - empty (VIII)

positive - negative

affirmation - negation

#### IV<sup>②</sup><sub>2</sub> Ethics

*Good and evil*

the sublime - the abject

the divine - the demonic

*god - demon*

God - Satan

#### IV<sup>②</sup><sub>3</sub> Greatness

*Grandeur - smallness* the

immense - the infinitesimal

the impressive - the derisory

the gigantic - the minuscule

*the giant - the dwarf*

#### IV<sup>②</sup><sub>4</sub> Evolution

*Rise and fall*

growth - ageing

regeneration - wear and

tear

childhood (or youth) - old age

innocence - maturity

*the child - the old man*

birth - death birth -

death (\*)

creation - destruction learning -  
unlearning (V)

beginning - end  
origin - destination  
departure - return  
leaving - returning

early - late  
early - late morning -  
evening spring -  
autumn east - west

#### VII Height

*Up - down* up - down  
up - down  
elevation - depth (\*\*)

*the sky - the earth*

height (or length) - width (\*\*)  
vertical - horizontal  
thinness - corpulence

vast - deep vast -  
deep

---

(\*) Compare this pair with the neighbouring pair "life - death", which I have included in group II ("action - inaction").

(\*\*) Like all yin-yang pairs, which have a double meaning, one in the literal sense and the other in the sense of Figuratively speaking, the pairs "elevation - depth" and "height - width" can be understood in either sense.

treble - bass V<sub>2</sub>

*Thickness Front*

- rear

forward -

backward attack

- defence action

- reaction

aggression -

flight aggression

- fear

V<sub>3</sub> Width

*Right - left* (\*)

V<sub>4</sub> Duration

*Future - past*

destiny - history

durability - age

innovation - tradition (III)

momentum - roots (II)

V<sub>5</sub> Continuum

*Space - time*

extent (or distance) - duration

ubiquity - eternity

Doors to the Universe (continued)

B) The Tree.

(\*) For comments on the 'right-left' pairing, see the following sub-section, 'The Tree'.

(11 April) In my first drawings of the Christmas tree diagram, I indicated the som- mets by their number, followed by the typical pairing that serves as the name of the group in question.

plus (where appropriate) a second typical pair, serving as a nickname. This made for a slightly cluttered diagram, which I eventually preferred to replace with the clearer layout that the reader will find below, where the groups (or 'Gates') are listed by their 'lapidary name'. The reader will have no difficulty in finding the name(s) - a couple in the preceding directory (where the groups follow each other in the order shown on pages PU 94, 95).

To the critical comments at the beginning of these notes ("The Rock and the Sand", n° 1), I would like to add the following. The left of the Tree consists above all in the hexagram (or better, the icosahedron) "Thought", in addition to the two "Gates" Expression, Responsibility. The right-hand side of the Tree, on the other hand, seems to me to be centred on the Emotion group, and on a whole set of colours which bring into play in a particularly strong way the attraction-repulsion polarity. So the left side of the Tree seems to me to be predominantly yang, the right predominantly yin. Now, in the couple

right - left,

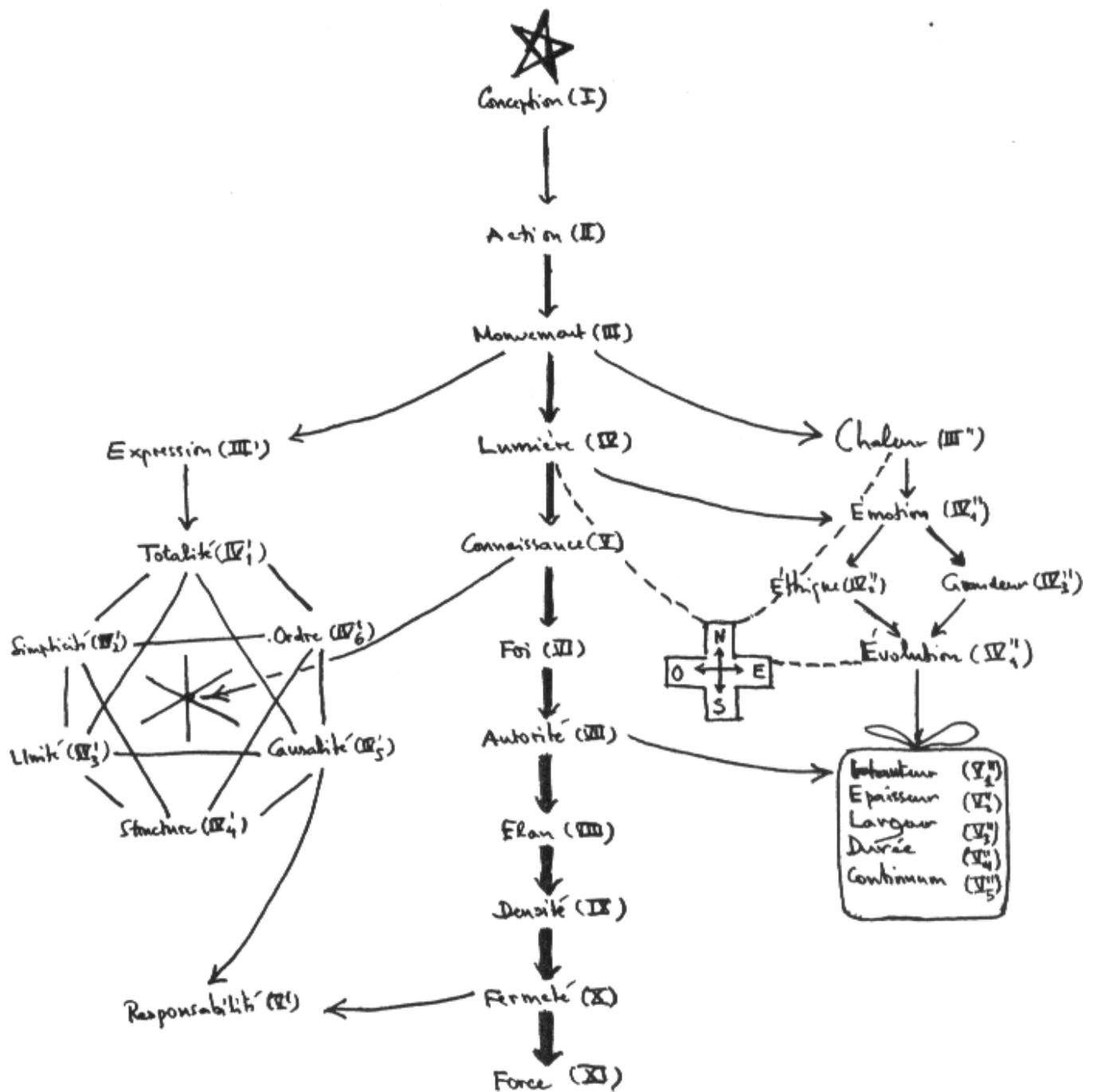
the right plays the yang role, the left the yin role. This suggests that it would be more in keeping with the dialectic of yin and yang to draw the Tree symmetrically as I have done, swapping the left and right sides. I didn't want to redo my drawing for the ( $N + 1$ ).th time, so I'm giving it to you as it is; all the more so as you can also argue that if we consider that the Tree has, just like you and me, a top and a bottom, a front (which faces us, politeness obliges. . . ) and a back, a right and a left, then it's the *right* of the tree which, for us the observer, is to our left, and vice-versa. So the good Lord (or the devil) did guide my hand when, from the very first scribbles, he had me put the groups that were to form the Thought hexagram on the left side of the sheet (aka the right side of the Tree)!

I'd like to point out in passing that the 'right-left' pairing was the only one, of all those I could think of, for which I was unable to decide on my own whether it was indeed a cosmic pairing or not. Seeing no convincing intrinsic reason why it should be a couple, I finally came to the regretful conclusion that it must not be one, thus unhappily shattering the beautiful whole formed by the other three couples.

up - down, front - back, future - past.

It was only later that I learned from various sources (both from Chinese tradition and from more recent observations by psycho-physiologists) that the left side of a person can be considered as the 'emotion' side (hence yin), and the right side as the 'reason' side (hence yang). So the contents of the pretty 'Christmas package' hanging on the right of the Tree are not out of place!

However, there remains an ambiguity (quite similar to that which arose earlier with the Tree): it is well known that it is the left side of the brain that controls the right side of the body, and vice versa. So, at the level of the brain, the left side is yang, the right side yin, and not the other way round. Unless you admit (to save the furniture) that Mr Brain is placed upside down, and looks backwards... .



## Doors to the Universe (continued)

### C) The Window.

We are now going to group some of our groups of couples (or Gates) into 'super-groups' (or '*Portals*'). The grouping I'm proposing here came to me both from a 'formal' or 'mathematical' point of view, based on the structure of the Tree itself (independently of the meaning attached to the various vertices of the diagram), and from an 'ontological' point of view, i.e. taking into account the meaning of each of the vertices of the Christmas Tree diagram as a 'Door to the Universe'.

On the left side of the Tree, the hexagram "Thought" immediately comes to mind as such a Portal. The two "Gates" Expression and Responsibility, one above the hexagram and the other below it, will each be considered as a "Gate" in its own right, with the same name as the single Gate it contains. We thus have (in descending order) the three Portals

*Expression, Thought, Responsibility.*

On the right-hand side of the Tree, there are two large Gates, which immediately catch the eye. First of all, there's the pretty ribboned "Christmas package" hanging at the very bottom, made up of the five Gates

up - down,      front - back,      left - right,      future - past

and

space - time.

The latter can be seen as a kind of recapitulation of the first four, 'space' (three-dimensional) corresponding to the first three Gates (playing the role of its three dimensions), and 'time' corresponding to the famous 'fourth dimension' of the space-time continuum, dear to Einstein. This Christmas package, promoted as a Portal to the Universe, will be named

*The four directions,*

as it should be. (And not 'The four dimensions', because each of the 'dimensions' is considered here from the point of view of the two opposite 'directions' to which it corresponds, considered as a single non-oriented 'direction', from the point of view of the dialectic of yin and yang).

The rhombus at the top of the pack, formed by the Doors

Emotion, Ethics, Greatness, Evolution,

corresponds to couples, such as

joy - sadness, good - evil,                  greatness - smallness, rise - fall,

attached to inveterate reflections of attraction (for the yang term) - repulsion (for the yin term). It could be said that the four Gates in question each embody a 'polarity' deeply rooted in the psyche (\*). This is why I propose to bring them together in a single Gate, named

*The four polarities.*

It seems to me that one of the essential 'tasks' in the long process of maturation of the psyché (\*\*), and perhaps the most arduous and crucial of all, is to transcend these 'polarities', recognising in them superficial realities (or even 'illusions'), behind which we perceive a deeper and more essential reality. In this more penetrating light, these polarities become 'cyclical relationships': each of the two terms, initially felt as opposites, such as (say)

life - death,                  to be born - to die,

appears as a natural and necessary continuation of the other, 'born' of it in a way, to end and 'die' in it again...

On the right side of the Tree, there is still the highest Gate of all, called Heat or 'hot - cold'. The pairs that form it do not seem to me to be generally felt as polarities, and in any case not with the same intensity as for

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(\*) These 'polarities', or at least the polarities of emotion (joy - sadness, pleasant - unpleasant, attraction - repulsion) and evolution (rise - decline, birth - death, etc.) are certainly also present in the animal psyche, and play a useful role. In the case of our species, however, they are considerably reinforced by conditioning, and today more than ever, often to the point of reaching psychotic dimensions.

(\*\*) Given the scale of the "task", and the lack of enthusiasm shown by almost everyone, it's easy to see why this is a good idea.

It would not be a luxury for us to have to go through a 'cycle' of countless human existences in order to see the end of it - with, perhaps, occasional returns to the animal or vegetable state, to bring us back into contact with certain realities and certain knowledge that we often tend to forget...

the couples mentioned just now. It is therefore necessary to make a separate Portal, for which I propose the name

*The cycle.*

It seemed to me that the cyclical nature of the dynamics of yin and yang is particularly apparent in this couple (\*) - and it was on the example of this couple, moreover, that we arrived at this intuition of cyclical dynamics (in the section "Creative ambiguity (4): extremes touch", n° 6). Moreover, the conjunction of the names of consecutive Portals

The cycle, The four polarities,

is likely to remind us, beyond the reality of polarities, of the deeper reality of the cycle.

It remains for us to explain the 'central' Portals, formed by groupings of Gates on the trunk of the Tree. I have found three more such Portals, each formed by several consecutive Doors on the trunk. Starting this time with the highest Gates on the Tree, the groupings I have made are as follows (listing the Gates in the order in which they follow each other, from I to IX):

Design, Action, Movement

Light, Knowledge, Faith

Authority, Momentum, Density,

Firmness, Strength.

The "ontological" reason for these groupings seems to me to be summed up quite well in the very names I propose here for these three Portals, namely

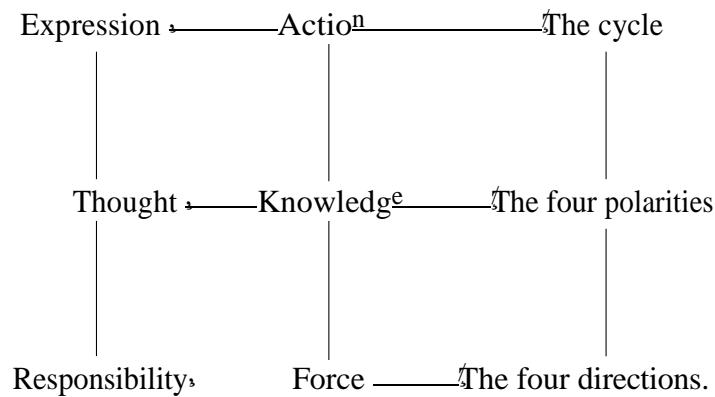
*Action, Knowledge, Strength.*

This gives us nine Portals, spontaneously grouped into three packs of three each, corresponding respectively to the two sides and the trunk of the tree. These Portals can be thought of as corresponding to the vertices of a new diagram, whose

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(\*) In fact, it was the presence in this group of the pair 'summer - winter' that suggested the association with the cycle of the seasons.

edges represent "*contiguity*" or "*neighbourhood*" relationships between Portals, just as in the original diagram, i.e. in our Tree, the edges represent contiguity relationships between Gates. The edges in the new diagram are found by taking the edges from the old diagram that are not 'contained' in one of the 'Portals', and looking at which Portals they link together (via the Gates represented by the ends of the edge). This produces the following wonderfully simple diagram:



The name of this new diagram (or 'graph') is self-evident: it is

*The Window* (on the Universe)!

As for our (Christmas) Tree, who's going to find it there - it's disappeared down the conjurer's trapdoor... .

Doors to the Universe (continued)

#### D) The bi-icosahedron

(April 12) To conclude this presentation of the "Gates", I would like to return to the question of a "canonical" icosahedral structure on the "Thought" hexagram, raised in the section "Stories of icosahedra and Christmas trees" (n° 10). I thought about it again the day before yesterday (\*), and I have an idea that could perhaps provide a satisfactory solution to the question. I have

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(\*) It was in the same breath as the nocturnal reflection that gave rise to the four-petalled flower 'Responsabilité' alias Karma, alias 'Grâce' (lest we forget her maternal name...).

to propose in any case *a pair of two* icosahedral structures on the hexagram, "complementary" in a sense that I will specify, one playing a yin role, the other a yang role (\*\*).

First I need to give a few purely geometrical explanations about the combinatorics of the left icosahedron and the notion of the left biosahedron. As I seem to be the only one who has ever taken the trouble (and pleasure) to look at the icosahedron (ordinary or 'left', as you prefer) from the combinatorial point of view, and as there is therefore no reference in the literature on these things (which should have been 'well known' for more than two thousand years), I am happy to develop here 'in form' the little we will need to recognise ourselves (\*).

In the following, we give ourselves a set  $S$  with six elements ( $S$ , as in "vertices"). The elements of  $S$  will be called "*vertices*", and the two-element parts of  $S$  (or "*pairs*") in  $S$  will be called "*edges*". Finally, for the sake of brevity, parts of  $S$  with three elements are called "*triangles*" (of  $S$ ). If we denote by  $A(S)$  or  $A$ , and by  $T(S)$  or  $T$  the set of edges and

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(\*\*) Assuming that further study confirms that this pair of icosahedral structures is indeed 'satisfactory' from an 'ontological' or 'philosophical' point of view, it would not, strictly speaking, answer the original question, which was to find *one* canonical icosahedral structure, not two. But it would be one of a thousand examples of what might be called the 'transformability' of a fruitful question (without prejudging whether the one I raised last month will indeed prove to be such). By following the path opened up by such a question, it may well turn out that it needs to be reformulated, whereas taken literally, the answer consists of a 'non-place' (here: there is no icosahedral structure on the Thinking hexagram, 'better' than all the others). This does not prevent the new, more precise and more relevant question from being the offspring of the old one, however 'vague' the latter may seem; and the fruitfulness of the daughter-question is more often than not no more and no less than that inherited from the mother-question. (Compare b. of p. (\*) page 789.)

(\*) My thoughts on the icosahedron, with a strong emphasis on the combinatorial aspect, date back to 1977, when I did a year-long DEA course on this magnificent theme. It was also my first major frustration in my teaching experience. Despite the deliberately very basic and very 'visual' level at which I set the course, in the hope that the audience (post-graduate students or teachers at my university) would get involved, I didn't really manage to ignite a spark of real interest and participation in any of it. The only exception was when one or two of the listeners drew the stereographic projection on the plane of the icosahedron (seen as inscribed on the unit sphere, with the edges represented by great circle arcs), at the same time showing the dual dodecahedron. It's true that these stereographic plots (using a vertex, the middle of an edge or the centre of a face as the centre of projection) are quite beautiful, especially when you take into account the canonical colouring of the edges (and even the faces) in five colours...

the set of triangles in  $S$ , we immediately check that we have

$$\text{card}(S) = 6, \quad \text{card } A = 15, \quad \text{card } T = 20$$

(where the first relation is put for memory). (NB if  $E$  is a finite set,  $\text{card}(E)$  denotes the number of its elements).

*Definition 1 - A part  $F$  of the set  $T$  of triangles of  $S$  is called an icosahedral (left-handed) structure on  $S$ , if every edge of  $S$  is contained in exactly two triangles belonging to  $F$ .*

In other words, if we call the triangles of the elements of  $F$  "faces", the condition we are considering says that *each edge is contained in exactly two faces*. A six-element set  $S$  with an icosahedral structure  $F$  is called a *combinatorial icosahedron*.

If  $I = (S, F)$  and  $I' = (S', F')$  are two such icosahedra, any bijection of one with the other is called an isomorphism. If  $I = (S, F)$  and  $I'' = (S'', F'')$  are two such icosahedra, any bijection of one with the other is called an *isomorphism*

$$u : S \rightsquigarrow S''$$

such that  $u(F) = F''$ , i.e. such that the faces of  $I''$  are exactly the images by  $u$  of the faces of  $I$ .

We can 'look' at an icosahedron by 'centring' our attention either on a vertex, an edge or a face, so as to obtain three different types of 'perspective' from which to study it. The perspective centred on a face will be the most convenient for our present purpose. Here is the summary statement, containing everything we need (and more):

Theorem 1. -

- a) *Two icosahedra (left combinatorial) are always isomorphic, and more precisely, there are exactly 60 isomorphisms of one with the other.*
- b) *An icosahedron has exactly ten faces. If  $f$  is a face of an icosahedron  $I = (S, F)$ ,  $f''$  a face of an icosahedron  $I'' = (S'', F'')$ , then for any bijection  $u_0$  off with  $f''$ , there exists one isomorphism and only one  $u$  of  $I$  with  $I''$ , such that  $u$  transforms  $f$  into  $f''$  and induces between  $f$  and  $f''$  the bijection  $u_0$ .*

c) Let  $I = (S, F)$  be an icosahedron, and  $F^\perp$  be the complementary of  $F$  in  $T$ , i.e. the set of triangles of  $S$  which are not faces. Then for any face  $f \in F$  of  $I$ , its complementary  $f^\perp$  in  $S$  (i.e. the set of vertices that do not belong to face  $f$ ) is in  $F^\perp$  (i.e. is a triangle that is not a face of  $I$ ). The application

$$f \rightarrow f^\perp : F \rightarrow F^\perp$$

is a bijection of  $F$  with  $F^\perp$ . Finally,  $F^\perp$  is also an icosahedral structure on  $S$  (called the complementary icosahedral structure of structure  $F$ ).

d) Let  $S$  be a set of vertices with six elements,

$$Ic(S) \subset P(T(S)) \quad (= \text{set of parts of } T(S))$$

the set of icosahedral structures on  $S$ . Then  $Ic(S)$  has twelve elements, and the application

$$F \rightarrow F^\perp, Ic(S) \rightarrow Ic(S)$$

and an involution without fixed points of this set (i.e. for any  $F$  in  $Ic(S)$ ,  $(F)^\perp\perp = F$  and  $F^\perp\perp = F$ .)

e) Let  $F$  be an icosahedral structure on  $S$ ,  $F^\perp$  the complementary structure,  $f \in F$  a face of  $F$ ,  $f^\perp \in F^\perp$  the face of  $F^\perp$  complementary to  $f$ . For any vertex  $s \in f$ , let  $s^\perp$  be the "third vertex" of the unique face  $f(s)$  of  $F$ , distinct from  $f$ , containing the edge  $as = f - \{s\}$ . Then  $s^\perp \in f^\perp$ , and the application

$$s \rightarrow s^\perp : f \rightarrow f^\perp$$

is a bijection of  $f$  with  $f^\perp$ , denoted by

$$_{uf} : f \xrightarrow{\sim} f^\perp.$$

In the same way (by exchanging the roles of  $F$  and  $F^\perp$ ) we define a bijection

$$_{uf^\perp} : f^\perp \xrightarrow{\sim} f.$$

Its bijections are the inverse of each other:

$$_{uf^\perp} \circ _{uf} = id_f, \quad _{uf} \circ _{uf^\perp} = id_{f^\perp}.$$

f) Let  $S$  be a six-element set,  $f$  a triangle of  $S$ ,  $f^\square$  the complementary triangle,  $P_f$  the set of bijections of  $f$  with  $f^\square$  (this is a six-element set), and  ${}_{sf} = \{f, f^\square\}$  the two-element part of  $T(S)$  (set of triangles), formed by  $f$  and  $f^\square$ . For any icosahedral structure  $F$  on  $S$ , let

$$c(F) = (\alpha(F), u(F)) \in {}_{sf} \times P_f$$

defined as follows:  $\alpha(F)$  is equal to  $f$  or to  $f^\square$ , depending on whether  $f \in F$  or  $f^\square \in F$  (i.e.  $\alpha(F)$  is the only element of  ${}_{sf}$  such that  $\alpha(F) \in F$ ), and  $u(F)$  is equal to  ${}_{uf}$  (notations from d)). We have therefore defined an application

$$c : Ic(S) \rightarrow {}_{sf} \times P_f.$$

This application is bijective. In other words, "it's the same" to give ourselves an icosahedral structure  $F$  on  $S$ , or to give ourselves a pair of elements  $(\epsilon, u)$ , where  $\epsilon$  is one of the two elements  $f, f^\square$  (the one that must face  $F$ ), and where  $u$  is a bijection  $f \rightsquigarrow f^\square$ .

Proof of the theorem. Part a) is a consequence of b), given that there are exactly 6 bijections of  $f$  with  $f^\square$  and 10 faces of  $I^\square$ , and that  $60 = 10 \cdot 6$ . On the other hand, in d) the fact that  $F \rightarrow F^\square$  is an involution without fixed points is obvious from the definition given in c). As for the fact that  $Ic(S)$  has twelve elements, this follows immediately from a) by a standard "counting" argument (given that the group of all bijections of  $S$  with itself has  $6! = 654321 = 720$  elements, and that the stabilising subgroup of  $F$  has sixty, hence the number

$$12 = 720/60 .)$$

Another way of finding 12 (via the "perspective around a face" explained in f)) is by

$$12 = 2 \times 6 \quad (*).$$

(\*) This is the description using face-centred perspective. There are two other equally instructive descriptions of the set  $Ic(S)$ , obtained using perspective centred on either an edge or a vertex. Finally, I would also like to mention the following canonical bijection

$$Ic(S) \cong \text{Bic}(S) \times \omega(S),$$

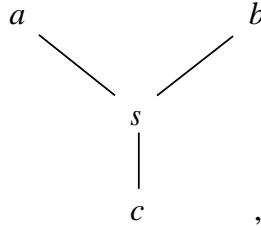
Only parts b), c), e) and f) therefore need to be proved. In b), c), f) we start from a given icosahedral structure  $(S, F)$ . Since each edge is contained in two faces, there is at least one face, i.e.  $f$ . Let  $f^\perp$  be its complementary in  $S$ , and consider the application

$$uf : f \rightarrow f^\perp, \quad a \mapsto a^\perp$$

defined in e). Let's show that it is injective, and therefore bijective (since  $f$  and  $f^\perp$  have the same number of elements, i.e. three). If we had two distinct vertices  $a \neq b$  in  $f$ , such that  $a^\perp = b^\perp$ , then posing

$$c = a^\perp = b^\perp$$

and denoting the third vertex of  $f$  by  $s$ , we would have a configuration



with three faces  $\{s, b, c\}$ ,  $\{s, c, a\}$ ,  $\{s, a, b\}$  cyclically adjusting around  $s$ , along common edges  $\{s, a\}$ ,  $\{s, b\}$ ,  $\{s, c\}$ . I say that this is not possible.

Let  $u$  and  $v$  be the two points of  $S$  distinct from the previous points  $s, a, b, c$ , let us contain the edge  $\{s, u\}$ , and let  $h$  be a face which contains it. Then the third vertex of  $h$  (distinct from  $s$  and  $u$  by definition) cannot be equal to one of the three points  $a, b, c$ , say  $a$ , because the edge  $\{s, a\}$  would be contained in three faces of the icosahedron. So the third vertex is  $v$ , and the edge  $\{s, u\}$  would only be contained in the triangle  $\{s, u, v\}$ , which is absurd.

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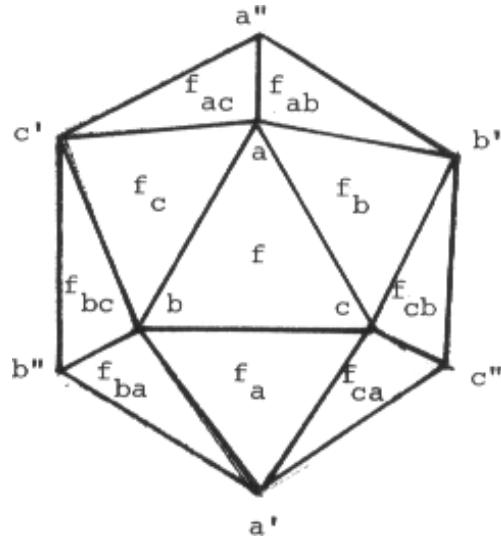
where  $Bic(S)$  denotes the set of biosahedral structures on  $S$ , and  $\omega(S)$  the two-element set of "orientations" of  $S$  (i.e. the quotient set of the set of "bearings" of  $S$ , i.e. the numbers of its elements from 1 to 6, by the action of the alternating subgroup of the symmetric group  $G_6$ ). The application is obtained by associating with any icosahedral structure  $F$ , on the one hand the associated biicosahedral structure  $\{F, F^\perp\}$ , and on the other hand a certain orientation  $or(F)$  of  $S$  canonically associated with  $F$ , which I need not describe here. As it happens, we have

$$or(F) \neq or(F^\perp),$$

so that the two icosahedral structures corresponding to the same biosahedral structure  $\{F, F^\perp\}$  are "marked" by the two possible orientations of  $S$ .

We now know that if  $a, b, c$  are the three vertices of face  $f$ , then the vertices  $a^\square, b^\square, c^\square$  in  $f^\square$  are distinct, so the six vertices of the icosahedron are  $a, b, c, a^\square, b^\square, c^\square$ . We can now write a list of all the faces of the icosahedron, using the "per-spectivity with respect to  $f'$ . To visualise this list, it is useful to make a drawing, where the vertices are represented by points in the plane, the edges by segments joining these points, and the faces by triangular areas delimited by the three edges contained in the face. What's more, for the sake of clarity, each of the points  $a^\square, b^\square, c^\square$  (but not  $a, b, c$ ) will be represented in *duplicate*, the second of which will be designated (as a point in the plane) by  $a^{\square\square}, b^{\square\square}, c^{\square\square}$  respectively. In this way,  $a^\square$  and  $a^{\square\square}$  are different points on the plane, but they designate the same element of the "abstract" set  $S$ .

We find the following figure, which can also be interpreted as a "per- spective" view of the ordinary regular icosahedron in space, a view "centred" on one face (named  $\{a, b, c\}$ )



This figure shows ten (triangular) shapes, including the four starting faces

$$(1) \quad f = \{a, b, c\}, \quad f_a = \{b, c, a^\square\}, \quad f_b = \{c, a, b^\square\}, \quad f_c = \{a, b, c^\square\}$$

plus the six "external" faces, connected in pairs along the three edges  $\{a, a^{\square\square}\} = \{a, a^\square\}$ ,  $\{b, b^{\square\square}\} = \{b, b^\square\}$ ,  $\{c, c^{\square\square}\} = \{c, c^\square\}$ . So, in words

$$(2) \quad f_{a,b} = \{a, a^{\square\square}, b^\square\} = \{a, a^\square, b^\square\},$$

and the five similar triangles  $f_{a,c}, f_{b,c}, f_{b,a}, f_{c,a}, f_{c,b}$ . To show that  $f_{a,b}$  (for example) is indeed a face, note that the edge  $\{a, a^{\square}\} = \{a, a^\# \}$  must belong to two faces, the third vertex of which can be neither  $b$  nor  $c$  (because each of the edges  $a, b$  and  $a, c$  are already contained in two of the four faces (1)), so the only possibilities left are  $b^\#$  and  $c^\#$ , hence the faces  $f_{a,b}$  and  $f_{a,c}$ .

I say that the set of these ten faces exhausts the set  $F$  of all faces. To do this, let's count the number of edges in our representative graph. Three for  $f$ , two more for each of the three triangles  $f_{a,c}, f_{b,c}, f_{c,a}$  (that's nine), three edges of the form  $\{a, a^{\square\#}\} = \{a, a^\#\}$  (that's twelve), and six that form the outline of the figure (edges of the form  $\{a^\#, b^\#\}$  etc), that's eighteen, even though there are only fifteen edges in all! But note that edges such as  $\{a^\#, b^{\square\#}\}$  and  $\{a^{\square\#}, b^\#\} = \{b^\#, a^{\square\#}\}$ , which are symmetrical about the centre of the figure, represent one and the same edge of  $S$  (i.e.  $\{a^\#, b^\#\}$  in this case), so the count is right: all the edges of  $S$  appear on our plot, and only once, except those of the triangle  $\{a^\#, b^\#, c^\#\}$ , which appear twice.

Having said that, a quick glance at the figure convinces us that each of the edges shown belongs to exactly two of the previous ten faces, and only one. So if there were a face  $h$  that wasn't part of this pack of ten, then an edge contained in  $h$  would belong to at least three faces, which is absurd.

In this way, we have been able to explain the "trace" of any icosahedron, starting from one of its faces, as a "standard figure". Part b) of Theorem 1 is an immediate consequence of this determination.

Thus, b) and therefore a) are proved, so let's prove c). The fact that for a face  $f$  (which we can take as our central face), the complementary triangle is not a face, is immediate on our plot, since  $f^\# = (a^\#, b^\#, c^\#)$  is not among our ten faces. Since the set  $T$  of triangles has 20 elements and  $F$  has ten,  $F^\#$  has ten, and since the application  $f \mapsto f^\#$  from  $F$  into  $F^\#$  is obviously injective, it is bijective. In other words, for a triangle  $f$  in  $S$  to be a face, it is necessary and sufficient that the complementary triangle is not.

To finish proving c), it remains to prove that  $F^\#$  is an icosahedral structure, so that for any edge  $L$  of  $S$ , there are exactly two element triangles of  $F^\#$  which contain it. Turning to complements in  $S$ , this means that any "square" part of  $S$  (i.e. a part with four elements) contains exactly two faces (for the icosahedral structure

$F$ ). Now the faces not contained in this part  $S - L$  are exactly those which meet its complementary  $L = \{a, b\}$ , i.e. those which contain either  $a$  or  $b$ . Now the set  $F_a$  of faces containing the vertex  $a$  has exactly five elements (see the plot, where it can of course be assumed that  $a$  is indeed a vertex of the starting face  $f$  used to make the plot), and the same applies to  $F_b$ , so the intersection  $F_a \cap F_b$  is formed by the faces containing the edge  $\{a, b\}$ , so has exactly two elements. It follows that  $F_a \cup F_b$  has  $5 + 5 - 2 = 8$  elements. Since  $F$  has ten elements, there are still two elements of  $F$  to be contained in  $S - L$ .

It remains to prove e) and f). In e), all that remains is to prove the relation

$$uf \circ u_f = id_f,$$

and the symmetrical relationship (which can be deduced by exchanging the roles of  $F$  and  $F^\square$ ). Applying it to  $a$ , for example (it will be the same for  $b$  and  $c$ ), this relation  $(a)^\square = a$  is simply equivalent to saying that the triangle  $\{b^\square, c^\square, a\}$  is a face for  $F^\square$ , i.e. is *not* a face for the initial structure, which is indeed the case.

It remains to prove f), i.e. the bijectivity of the application

$$c : F \rightarrow (\alpha(F), u(F)) : \text{Ic}(S) \rightarrow {}_{sf} \times {}_{Pf}.$$

This means that for any pair  $(\epsilon, u)$ , where  $\epsilon$  is one of the triangles  $f, f^\square$  and  $u$  is a bijection  $u : f \sim \rightarrow f^\square$ , there exists a unique icosahedral structure  $F$  from which it comes. If  $\epsilon = f$ , this means that there is a unique icosahedral structure which admits  $f$  as a face, and gives rise to the bijection  $u$  - and this is what we saw in the explicit construction earlier. If  $\epsilon = f^\square$ , this means that there is a unique structure  $F$  such that  $f^\square \in F$ , and  $u_f = u$ . Denoting by  $F^\square$  the complementary icosahedral structure, this also means that there exists a unique icosahedral structure  $F^\square$  such that  $f \in F^\square$  and  $u_f = u$ , which (with the change of notation) is what we have just seen.

This completes the demonstration of Theorem 1.

**Definition 2:** Let  $S$  be a set of six elements. A pair of two complementary icosahedral structures on  $S$  is called a biosahedral (left combinatorial) structure.

By virtue of part d) of the theorem, there are therefore exactly  $12/2 = 6$  biicosahedral structures on  $S$ . According to part f), if  $f$  is a triangle of  $S$  and  $f^\square$  the complementary triangle,

the set  $S^*$  of these six icosahedral structures is in canonical one-to-one correspondence with  $P_f =$  the set of bijections of  $f$  with  $f^\square$ . More precisely, if we identify the set  $Ic(S)$  of icosahedral structures on  $S$  with the product set  ${}_{sf} \times P_f$  as in f), then the operation  $F \rightarrow F^\square$  of passing to the complementary icosahedral structure is interpreted as the operation

$$(\epsilon, u) \rightarrow (\epsilon^\square, u),$$

where for any  $\epsilon$  in the two-element set  ${}_{sf} = \{f, f^\square\}$ ,  $\epsilon^\square$  denotes the other element of  ${}_{sf}$ .

A pair  $(S, \{F, F^\square\})$  consisting of a six-element set  $S$  and a biosahedral structure  $\{F, F^\square\}$  on  $S$ , formed by two complementary icosahedral structures  $F, F^\square$  is called a "*left combinatorial biicosahedron*" (or simply *biicosahedron*).

We define *isomorphisms* of such objects in the usual way. Note that two bi-icosahedra are isomorphic, and the set of isomorphisms of one onto the other has exactly 120 elements. For example, if we look at the automorphisms of a biicosahedron  $(S, \{F, F^\square\})$ , they form a "group" (in the technical mathematical sense of the term: stability by com-position and by passage to the inverse), which can be broken down into two disjoint subsets, each with 60 elements (making a total of 120): the first is made up of the bi-jections of  $S$  with itself (or "permutations" of  $S$ ) which transform  $F$  into itself, or what amounts to the same thing,  $F^\square$  into itself - in other words, these are the automorphisms of the icosahedron  $(S, F)$  (or  $(S, F^\square)$ ). The second consists of permutations that transform  $F$  into  $F^\square$ , or what amounts to the same thing,  $F^\square$  into  $F$ , i.e. again the isomorphisms of the icosahedron  $(S, F)$  with  $(S, F^\square)$ . By part a of Theorem 1, there are 60 of them.

At this point I've let myself be drawn into saying much more than is necessary for my 'philosophical' (\*) proposal. The essential thing is to see clearly the structure of the icosahedron (left), highlighted on the diagram on page PU 119, the notion of the complementary icosahedron (giving rise to the notion of the biicosahedron), and finally the description of icosahedral or biicosahedral structures on  $S$ , in terms of the set  $P_f$  of the six bijections of a triad.

gle previously given  $f$  of  $S$ , with its complementary  $f^\square$ . Finally, from the point of view of

---

(\*) (14 April) On the other hand, it's not much for my ardour as a mathematician, which has been reawakened again in the last few days - and there goes my reflection on the icosahedron, that mathematical love of my middle age! So perhaps I'll add to these notes (as an appendix?) a few more details on the combinatorics of the icosahedron and on the geometry of six-element sets...

the spatial geometric intuition of the combinatorial structure, it is very useful to have at home a cardboard model of the ordinary regular icosahedron (\*\*), which has twelve vertices, thirty edges and twenty faces, and to "visualise" a left combinatorial icosahedron, as described (in an essentially canonical way, (\*)), in terms of an "ordinary" or "Pythagorean" icosahedron (seen as a solid in space), taking as vertices, edges and faces of the left icosahedron, the *pairs of* diametrically opposed vertices, edges or faces of the Pythagorean solid. It was with this in mind that we drew the diagram on page PU 119, where the pairs  $\{a^\square, a^{\square\triangle}\}$ ,  $\{b^\square, b^{\square\triangle}\}$  and  $\{c^\square, c^{\square\triangle}\}$  are pairs of opposite vertices of the icosahedron-solid, and the same applies to the pairs of edges ( $\{a^\square, b^{\square\triangle}\}$ ,  $\{a^{\square\triangle}, b^\square\}$ ) etc, which we had to identify as a single ar

I come now to the Thinking hexagram, formed by the set  $H$  of six 'Gates' figuring as vertices of the Star of David hexagon, hanging on the left side of the Tree (page PU 110). The drawing shows precisely the two complementary 'triangles' of  $S$ , represented by the two triangles-graphisms together forming the Star of David in- scribed in the hexagon. In spite of the fact that the numbering in circular order of the six summits of the hexagram Thought, i.e. of the elements of  $S$ , was made a little with the chance, it is necessary to believe however that the good God a little pushed the hand: it turns out that these two triangles have each one, in terms of the philosophical reflexion which had preceded, a "significance".

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(\*\*\*) I have a beautiful one of these at home, which is a 'copy' of an element from my first year at university, for an end-of-year exam for an 'optional course' (in collaboration with Christine Voisin) on the icosahedron (in 1976, I think). Unlike my DEA course on the same subject the following year, this course, which was aimed at students fresh out of lycée, was warmly received. The results of the exam were so brilliant that my fellow professors thought it was a hoax that I had set up to discredit the teaching profession, and they automatically reduced all the marks by a third (the 18 out of 20 became 12 out of 20). It was at this point that I was astonished to learn that most of my colleagues considered the idea that a student could take pleasure in studying and preparing for an exam to be shocking. They themselves had had enough trouble studying to get where they were today, and there was really no reason why others shouldn't have a little trouble too...

(\*) If there are two such "realisations" by solid (or "Pythagorean") icosahedra, then there is a  
If the two icosahedra have the same "size", i.e. the same length of edges, then the similarity in question will even be a "displacement".

quite clear. These are the two triangles

(f) { Totality, Unity, Causality

} and

(f)<sup>¶</sup> { Simplicity, Structure, Order }.

As already noted in a footnote ((\*) page PU 29), these two triangles seem to correspond quite clearly and strikingly to the two terms

desire, necessity

in the dynamic we began to identify in the section "Desire and necessity - or the way, and the end" (n° 11). This was the reflection in which we introduced the five "yin attractors

(P) the All, the general, unity, cause,

fecundity, and the five yang attractors

(P)<sup>¶</sup> the simple, the abstract, precision, order, structure.

It so happens that the three 'pithy' names I had spontaneously given to the Gates of the first triangle (f) (Totality, Unity, Causality) are all to be found in the 'yin package' (or 'desire package') (P') above, and in the same way the three 'lapidary' names of the second triangle (f) (Simplicity, Structure, Order) are found in the 'yang package' (or 'necessity package') (P'), something which had immediately aroused the association with 'desire' for the first triangle, and with 'necessity' for the second.

It's not quite true that the five yin attractor terms (P) appear in one of the 'gates' of the 'triangle' (f) - only the first four do, while the last one appears in the couple

purity - fertility,

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(\*) If we have two such "realisations" by solid (or "Pythagorean") icosahedra, then there is a *unique* direct similarity of one with the other, compatible with these realisations, i.e. with the "markings" of the pairs of opposite vertices by the points of S. If the two icosahedra have the same "size", i.e. the same edge lengths, then the similarity in question will even be a "displacement".

which is part of the Simplicity Gate, and therefore of the yang triangle ( $f'$ ). Similarly, of the 5 yang attractors in ( $P'$ ), one enters the couple

precision - vagueness              orle precision - vagueness,

which appears in the Totality Gate, and therefore in the yin triangle ( $f$ ). The fact remains that 'by four to one', the yin attractors are arranged in the yin triangle, the yang attractors in the yang triangle. This seems to me to confirm quite clearly the ontological interpretation that was immediately obvious to me for these two triangles. They are clearly 'significant', in the sense suggested in the 'Stories of icosahedrons and Christmas trees' section of 21 March (on the same day as the reflection on the theme of 'desire and necessity').

This initially caused a perplexity - because "the" canonical icosahedral structure that I hoped on the hexagram Thought  $S$ , had in my spirit to comprise like "faces" at least all the triangles having a clearly apparent ontological significance. But the triangles "desire" and "necessity", being complementary, cannot belong to the same icosahedral structure! On the other hand, for any *bi-icosahedral* structure on  $H$ , these two triangles respectively determine the two icosahedral structures  $F$  and  $F^\square$  components, the yin triangle being a face for the structure described as "yin", and the yang triangle being a face for the other icosahedral structure, described as "yang". So the twelve icosahedral structures on  $S$  are divided into two packs of 6 each, one yin and the other yang. On the other hand, giving one of the six biosahedral structures on  $S$  is equivalent to giving one of the six bijections

$$f \rightsquigarrow f^\square$$

between the 'desire' triangle and the 'necessity' triangle. The question, then, is whether any of these six bijections should be singled out as being more remarkable than others, from the ontological point of view.

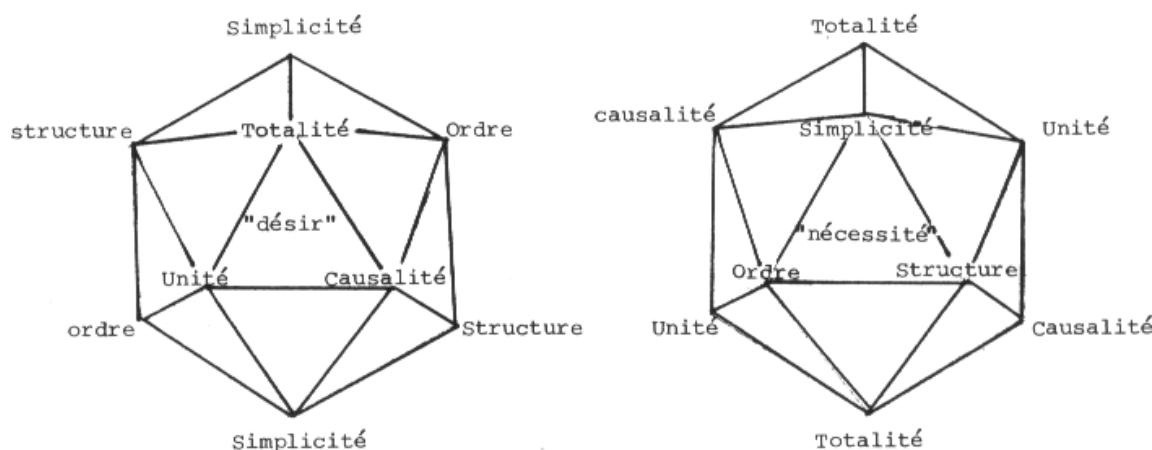
The very layout of the Tree, and of the Thinking hexagram which forms part of it, would suggest "diagonally" associating the three yin vertices with the three yang vertices of the hexagram, in pairs of opposite vertices: Totality with Structure, Unity with Order, Causality with Simplicity. But even taking into account the good will of God, that's a bit short! I tried to see, for each of the three yin (or 'desire') Gates, which yang (or 'necessarily') Gate associated with it most strongly. Without wishing to go into

In a detailed discussion on this subject, it seemed to me that in each of the three cases there was such a privileged association, and that we thus obtained the groupings

*Totality - Simplicity, Unity - Order, Causality - Simplicity.*

(It is therefore the one deduced from the hexagram, by diagonal association, simply by exchanging the vertices "Simplicity" and "Structure" (\*).

Following this suggestion, we thus obtain a biicosahedral structure on hexagram  $H$ , formed of two Thought icosahedra, called one Thought-yin or Thought-desire, the other Thought-yang or Thought-necessity. Here the tracings-perspective, recopied without more on the tracing-type of the page PU 119:



I've marked the central triangle with the name of the triangle, 'desire' in the case of the yin icosahedron, 'necessity' for the yang icosahedron. It remains to be seen to what extent we can attach a philosophical meaning to the other faces, and possibly even edges.

If you have a solid isocsahedron (made of cardboard, let's say), you can make both the "Thought" combinatorial icosahedron, by writing the names of the six Gates around the 12 som-

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(\*) I had thought of changing my initial numbering of the six vertices of the hexagram, by exchanging the two vertices 2 and 4 (more precisely, IV<sup>2</sup> and IV<sup>4</sup>). I finally gave up, not finding the thread of affinities which had guided me to pass from a group of couples yin-yang to that which follows it. It is understood that in any case the layout of the hexagram Star of David suspended in the Tree (page PU 110) is provisional. We will find further on a layout more to the page, with the "canonical suspension" of the icosahedron Thought to the Tree (of knowledge...).

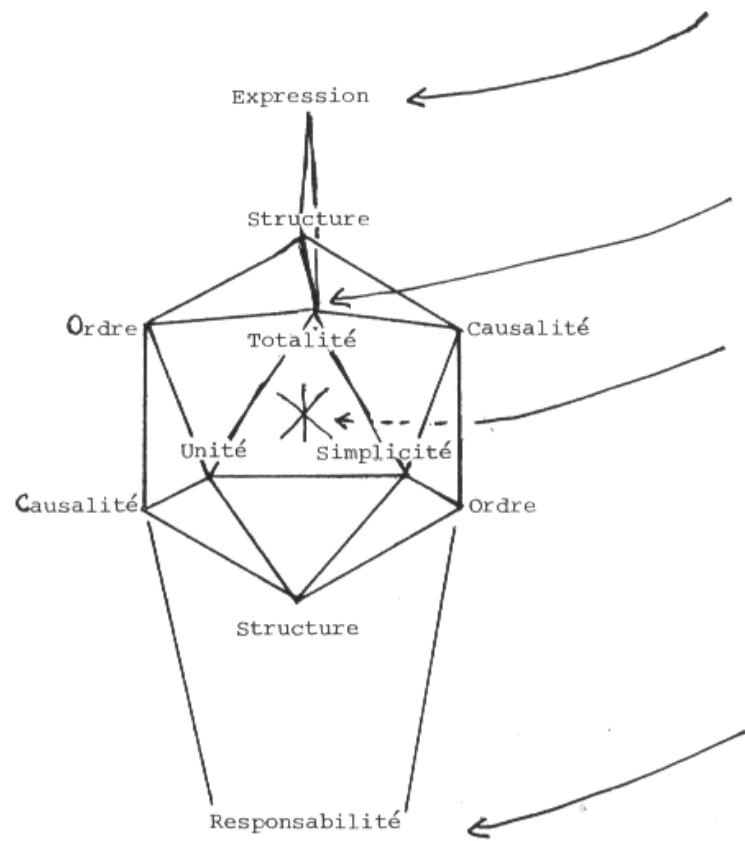
This is done in such a way as to give the same name to two antipodal vertices, and to respect the con-figuration indicated in the tracing-model given above (either yin or yang). "With a single rotation bringing the icosahedron-solid onto itself, this is possible in one way and one way only. To suspend the icosahedron in the tree, attaching it to the vertex corresponding to the "Expression" Gate, it must be suspended by one of its two (mutually antipodal) edges

#### Totality - Structure,

since these are exactly the two Gates which are linked by strong and direct affinities to the Communication Gate. (NB In the Tree diagram, I had only indicated the edge joining Expression (III') to Totality (IV<sup>2</sup>), and not to Structure (IV<sup>2</sup>) at the lowest point of the Hexagrame, so as not to overload the drawing). When this edge is horizontal and the solid is allowed to hang by gravity, it turns out that the two edges

#### Causality - Order

(which must be linked, as we have said, to the lower vertex Responsibility or Karma, which is strongly linked to both Causality and Order) appear either in a horizontal position (yin case) or in a vertical position (yang case). In the latter case, it is also immediate that the two lowest vertex-ends, appearing in either of the two antipodal edges, are "Causality" for one and "Order" for the other. We'll therefore have a nice symmetrical suspension (with no preference between Causality and Order), with more or less vertical wires (instead of four in the yin case, to make it symmetrical), attached to these two ends, to link the Responsibility Gate to the icosahedron. This is how the left side of the Tree can be traced (from the perspective of an observer standing slightly above the Thought-yang icosahedron).



# HARVESTING AND SOWING

Reflections and testimony  
on a mathematician's past

by

Alexandre GROTHENDIECK

Part Four:

**BURIAL (III)**  
or the Four Operations

Université des Sciences et Techniques du Languedoc, Montpellier  
and Centre National de la Recherche Scientifique (French National  
Centre for Scientific Research)

To Zoghman Mebkhout  
the lone worker  
as a token of respect and affection



## HARVESTING AND SOWING (IV)

### THE FUNERAL (3)

or

### The Four Operations

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<sup>(163)</sup> (16 February) It was exactly a month ago today that I began the impromptu reflection triggered by reading C. G. Jung's autobiography. I thought I'd spend a few days on it, just enough time to put down on paper the first strong impressions I had after reading it - and today I'm still going through them all! They were enriched and transformed in the course of reading, by virtue of the work triggered by it and by the writing of my reading notes. I've just had time to go through the impressions aroused by the first four chapters on Jung's early years - the chapters written in Jung's own hand. I was about to compare these impressions with others, not always concordant at first sight, aroused by later chapters. But just as I was about to start today, I realised that this digression (which is already approaching a hundred pages...) really doesn't belong in this other 'digression', which is already long enough on its own, that I've called 'The key to yin and yang'. (A digression which, a month ago, I thought was nearing its end (\*). It's true that my reading notes on Jung fit in well with the dialectic of yin and yang, and that they have also led me, without having sought it, to clarify many things that had been barely touched on previously, both about my life and about life in general. But that doesn't seem to me to be enough to open a parenthesis of such prohibitive dimensions within another parenthesis, itself situated in the final chapter, 'The Funeral Ceremony', of a long reflection on my funeral. It's about time I got back to thinking about it and brought it to a conclusion!

In the final analysis, therefore, I am not going to include these reading notes in *The Key to Yin and Yang*, or even in *Burial*, with which they are only tenuously connected. These notes can be seen as an illustration of what I tried to express, in general terms, in the notes on (among others) 'La surface et la profondeur' and 'Éloge de l'écriture' (n° s 101, 102). I'm not sure whether I'm going to include them in *Récoltes et Semailles*, as a fourth part, or whether I'm going to make them a separate text in volume 2 of *Réflexions* (\*\*). It is true that

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(\*)(26 March) As I was writing this, I was still under the impression that the note I was starting was going to be part of 'The key to yin and yang'. It was only over the next few days that I realised that another stage of reflection had already begun. "The key" therefore ends with the previous note "The endless chain - or the handover (3)" (n° 162 ).<sup>112</sup>

(\*\*)(26 March) Finally, these reading notes will form (not the fourth, but) a fifth and last part of *Récoltes et Semailles*, which will no doubt form part of volume 3 (not volume 2) of *Réflexions*, along with other texts of a more mathematical nature. The set of notes on the *Burial* that form the 'third breath' in the writing of *Harvest and Sowing*, beginning on 22 September last year, together

that this reflection on Jung's life, as it actually unfolded, is an inseparable part of the long reflection I've been pursuing for a year, which for me is called Harvest and Sowing - and I'm directly involved in it, just as I am everywhere else in these notes. It would therefore be artificial to separate this part of the reflection from Harvest and Sowing, for the sole reason that it sprang up unexpectedly in the middle of a Funeral, and that it 'overflows' a little too much on the central theme of the latter.

For the moment, I'm going to take the opportunity of this break in my reflection on Jung's autobiography to get back to my sheep, and to bring this funeral ceremony to a successful conclusion, if I can!

It's about time I wrote a short report on my friend Pierre's visit to my home last October. I mention his arrival in the note of 21 October ("L'Acte", n° 113), when he had just arrived the evening before, with his daughter Nathalie (two years old). After the departure of my visitors (in the note 'Le paradis perdu' of 25 October, no.° 116) I write: 'In a few more days it will be time to take stock of what this visit has brought me - a visit I was no longer counting on... Those "few days" have become almost four months - but here I am at last!'

I would have liked to give an 'on the spot' account of this meeting, which represents for me an important episode in the adventure of discovering the Burial, its reality and its meaning. But this time, I feel restrained by a concern for discretion, to deliver as is the totality of the multiple and vivid impressions left on me by the passage of my friend. It is true that I had no such hesitation in including one of these impressions in my reflections (in the note of 26 December "Le désaveu (2) - ou la métamorphose", n° 153). But mentioning a certain impression one had of a certain friend at a certain moment, and describing the precise 'moment' when such a diffuse impression suddenly became manifest, irrefutable - these are two very different things. The second is a bit like taking a photo of a friend at a moment when he doesn't feel observed, and, what's more, circulating it without having ascertained his agreement. This is why I shall confine myself to giving a few impressions left by this visit, and refrain (as elsewhere) from commenting on it.

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which I had planned to make a third part of Harvest and Sowing, will be divided into two distinct parts, under the respective names 'The key to yin and yang' and 'The four operations', forming the third and fourth parts of Harvest and Sowing respectively.

in Récoltes et Semailles (\*)) to take indiscreet photos!

First of all, I need to *put* this visit *in context*. I had intended abori to visit Pierre at his home (\*\*\*) to have him read Récoltes et Semailles, including l'Enterrement. At the beginning of May, I wrote to him to say that I would like to see him soon and have him read a text, intended above all for 'my friends and pupils of yesteryear in the world of mathematics', into which I had 'put my whole self' - 'I don't think I've ever cared for a text like that'. I thought that the typing would be finished in the course of the month, and proposed to come and see him in the first half of June. In the end, because of the delays in the typing, not to mention the work involved in putting the finishing touches to l'Enterrement (as it was then planned, i.e. essentially what is now part I of l'Enterrement), my visit was postponed several times, and in July and August Pierre was not in France. Moreover, he had shown no curiosity about the work that I was so keen to give him in person and have him read before anything else. Finally, in June I sent him the first part of Récoltes et semailles, 'Fatuité et Renouvellement', thinking it would be a good thing for him to read it, before giving him l'Enterrement - in case my thoughts on myself 'clicked' with him and triggered something - you never know! I'd been ill for ten days or so, and there was no question of me going to Paris any time soon.

I was impatient, however, to have him read L'Enterrement, in which Pierre was crucially involved, and I would have liked him to come and read it at my place before he left on holiday. It was with this in mind that I sent him the complete Introduction towards the end of June, as well as the table of contents of l'Enterrement - I thought it would come as a shock to him, and that he would be keen to come and see me before he left to find out in detail what I had to say about this famous Enterrement and his role in it. Instead, I did not hear from him again until around

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(\*) There is one exception, however - the 'photo' I took of J.L. Verdier during a telephone conversation, in the note 'The joke - or "weight complexes"' (n° 83). I remember that in order to describe the little scene 'on the spot', I had to overcome a certain reluctance on my part - I felt a bit as if I'd handed my ex-student a billboard, which is absolutely not my 'style'. Of course, I was also delighted and quite pleased with myself that he had rushed headlong into this panel, even though it was one of the biggest and most obvious. Serves him right!

(\*\*\*) I express this intention at the beginning of the note "My friends" (n° 79), and in the first footnote of page to this one.

at the end of August - so much so that I wondered whether he'd actually received my letter. That was the great suspense! In his second letter after his return (dated 25 August) he finally said a few words about the introduction and the table of contents, in terms that struck me as most evasive. "I had the impression that you were unaware of much of the love with which your 'orphans' were surrounded...", he wrote to me, and attached an annotated bibliography in support, a sign of obvious goodwill to dispel what he seemed to feel was a distressing misunderstanding. In his next letter (dated 12 September), he announced that he would be moving to Princeton on 7 October, and told me that he would try to stop by my place before then. When I didn't hear from him again, I thought he'd left for Princeton - but no, when I phoned IHES I learned that his trip had been delayed. And a week later, when I didn't expect to see him for a long time, there he was in the flesh, in the company of little Nathalie!

(February 17) The atmosphere at the meeting was, to all appearances, as peaceful and friendly as could be. A superficial observer in the vicinity would have sworn that Pierre was poring over a mathematical manuscript, and that from time to time he offered me his observations and constructive criticism as a mathematician who was well 'in the know'. As far as Stone himself was concerned, it had to be understood that he had come to me (out of respect for me, who had, after all, been his 'master'), sacrificing two precious days of a very busy man's time, to do his best to clear up an unfortunate misunderstanding that had crept into my mind through who knows what unfortunate combination of circumstances. Both his good faith and mine were certainly above suspicion and there was no need even to mention it, as it was so obvious. His role, on the other hand, was to enlighten me on all the points of material detail that did not seem entirely clear in my notes, or on which I might have made a mistake. He made a list of his observations as his reading progressed, and submitted it to me on the day he left - I had the good sense to make a note of it on the spot, using keywords. In fact, he did manage to read most of Burial I in two days, and in any case all the notes (identified in the table of contents, and by the internal references in the text) that directly concerned him. Quite an achievement, considering that it took me two months full-time to write those notes...

During these two days, little Nathalie was the best behaved of all the little girls. She was

I can hardly say that I heard the sound of her voice - whether it was speaking, shouting or crying. She didn't seem to dislike me, but didn't show much. As for her dad, he was a real model dad - always on hand when needed, to feed, take for a walk or put to sleep a little girl who wasn't demanding or annoying in the slightest. He'd brought her along, he told me, because after the big preparations for the move to Princeton, Mum was too busy doing the housework to look after Nathalie again. But over and above this practical reason, which was certainly a force majeure, I thought I sensed another reason, which remained unspoken, surely: the presence of the little girl added a note of sweetness to the atmosphere of a meeting that my friend, without perhaps wanting to admit it to himself, was dreading. At the same time, her presence was a living, shining sign of the unspoken willingness he had shown in the rush to move to the United States - a willingness of obvious good faith and equally obvious goodwill.

For my part, I had not the slightest intention of rushing my friend, to make him tackle anything - I was at his disposal to go into more depth with him on any question he felt prompted to enter into. As it turned out, his main concern was not to go *into the substance* of any of the many situations examined in my notes, where his probity as a mathematician (or his probity at all) was clearly called into question. An observer who had heard our conversation, which sometimes even turned into a mathematical discussion (something that had not happened between us for more than three years (\*)!), could not have suspected that in the text that my friend was commenting on, there might have been anything that called him into question in any way whatsoever. As for me, I felt that my friend was clinging firmly to this fiction, painfully maintained, of patently best faith in the best of all worlds. He cautiously avoided anything that might have shattered it, by making it clear that the tacit 'consensus' he wanted to establish between us, against all odds, was in no way a reality, but precisely a fiction, playing the role of a 'straw' to cling to...

During those two days, I could feel just how false the situation was, so full of anguish underneath the peaceful, good-natured exterior. It was like the rope in the hanged man's maision, which nobody talks about even though it's on everyone's mind! I still ended up

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(\*) On the subject of the cessation of all mathematical communication between Deligne and myself, see the note "Two turning points" (n° 66).

I think it was on the day we left, after lunch. After all, in the notes he was reading, and in the introduction he must have received nearly four months ago, I had expressed myself in very clear and strong terms about a number of *acts* of his. Did he really have nothing to say on the subject? He replied, with blurred eyes and a faint, rather miserable smile, that he was doing his best to 'protect himself' - without specifying (as far as I can remember) what he was trying to 'protect' himself from, surely, my enquiry must have seemed to him like a violent intrusion into a life that had hitherto seemed to him most tranquil and problem-free - where everything must even have seemed to him surprisingly *docile*; so docile, perhaps, that he had forgotten that it could be otherwise. Assuming the situation in which he has placed himself, that is, simply confronting it, examining it as it is - this would represent an upheaval of such magnitude in his vision of himself and the world, such a collapse of the rigid structure of the ego, that most would prefer a thousand deaths and set the world on fire if they could), rather than take the risk of such a leap into the unknown. It was from all this, surely, that my friend wanted (and no doubt still wants) to 'save himself'.

I shouldn't be surprised, having seen this kind of scenario repeated hundreds of times, an expression of great fear in the face of the reality of things and above all, beyond that, in the face of the risk of inner renewal. I certainly shouldn't be surprised, and yet each time I am, I'm astonished, when I see the most blatant evidence rejected, and suffer and inflict a thousand torments, for the sole purpose of avoiding what I know, and know for sure, to be the greatest of blessings...

In any case, after this unsuccessful attempt on my part to 'get off the rails', the conversation turned costly. Those were the only minutes (\*), I think, during those two days/ when our conversation took a personal turn - or something was said that went beyond the fiction of 'consensus', maintained despite the evidence to the contrary 1 I'm afraid that, as is often the case, on this occasion I didn't have the affectionate, yet straightforward 'roundness' that could have helped my friend, by de-dramatising an atmosphere which, despite appearances, was extremely tense, and had been for months. As I

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(\*) Apart from the conversation we had on the station platform just before my friend left. I'll come back to that later.

As I went about my domestic duties, gardening and writing, leaving my friend to his reading, and also during meals together, there was a silent *expectation* in me towards my young friend - the expectation of a *response* to what I was saying to him, through the medium of this text in his hands. He couldn't help but sense this expectation

- and he knew deep down that it wasn't his few poor material details that 'answered' them!

Surely it would have been a relief to him if I'd taken the lead in some way, even if it meant starting with a tidy spat that he hadn't stolen, no, and finally establishing *contact* where there

was none. It's true that over the past fifteen years, every time I'd tried to raise something personal and close to my heart with him, I'd been met with complete silence, or (when it

was verbal) the usual astonished inflexions, in true 'velvet paw' style. It's true that I no longer wanted to play that game, which I had left with no desire to return since the 'turning point' of 1981 (\*). But it's also true that this time there was an obviously unique 'moment' in the relationship between us, which might have merited a departure from the rule (or habit, which has become second nature...) of not going against someone else's reluctance to broach

such and such a thing. Sometimes it's a good idea (and within certain limits) to 'force the hand' just a little, like with a child...

that we would take to the dentist despite the (irrational) fear he may have of it... .

I'm not saying all this just to pity poor friend Pierre, who didn't get all the kind encouragement from me that he might have wished for, and what's more

! After all, it's normal for me to have my limits, just like everyone else, and what's more, it's not necessarily my role, and even less my obligation, to cushion the blow for those who have put themselves in situations (albeit unwittingly) that could come back to bite them in the ass, one day or another and in one way or another.

What's more, when I drove Pierre and Nathalie back to Orange station on the evening of 22 October, I didn't feel at all like it was a 'meeting for nothing', a 'missed opportunity'. I hadn't been naïve enough to expect much - it's so rare for two people to get to the heart of an issue that deeply concerns them both! There was no dialogue, that's a given - and yet I felt that I had learned a great deal. There had already been these 'material details', of course, many of which were very interesting, and which dotted the last i's and crossed the t's as far as the

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(\*) See the note already quoted "Two turning points", n° 66.

I'm going to come back to this, as a continuation of this note (\*). I'll come back to this, as a continuation of this note (\*). What was more important was that during those two days, I observed my friend with new eyes, in the light of what I had learned about him in the course of my reflections on the Burial, I can say that I 'reacquainted' myself with him - in his relationship to me, to things, to his daughter... . This chapter remains a private matter - it's here that the natural reserve I mentioned at the beginning of today's notes comes into play.

But from the point of view of understanding the Burial, there was another reason above all, more subtle than the previous two, why it was important for this meeting to take place. I think I had sensed this importance from the moment I decided to go to Paris to meet my friend, but I couldn't say why then, apart from the fact that it is always important to talk face to face with the person concerned, if at all possible, when there are things of consequence that involve both of us. And yet we didn't talk about these very things - and yet I had the impression that I had learnt, about the *reality* of the Burial, what I still had to learn.

I could put it that way too. Before this meeting, all the circumstances and actions that make up the Funeral seemed so *implausible*, so crazy, so delirious, that despite all the tangible, irrefutable 'proof' that had accumulated over the weeks and months, and despite the three hundred pages of notes I'd already devoted to it - somewhere deep inside me, I *still couldn't believe it* (\*\*)! It's n o t t h e first time something like this has happened to me, far from it!

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(\*) See the note "Dotting the I's" (n° 164) which follows this one.

(\*\*) This *incredulity* in the face of the testimony of our healthy faculties, when it upsets too violently the current consensus or the ways of seeing that we hold dear, has already been evoked in the note "The robe of the Emperor of China" n° 77<sup>¶</sup> ) Visibly, the writing of this note had been a means for me to overcome (at least partially) this incredulity in the face of the obvious, by putting my finger on this inveterate reaction. In doing so, however, I *distanced* myself from this incredulity, presented as that of ordinary mortals (adults), by identifying myself with the 'little child who believes the testimony of his eyes' ('even though what he sees is quite unheard of, never seen before and ignored and denied by everyone'). This must have been my unconscious intention in writing this note - to distance myself from an attitude of incredulity towards my own faculties, and from a gregarious instinct to 'do as everyone else does'. Such attitudes and instincts do exist in me, as they do in everyone, but (like everyone else) they remain mostly unconscious. So this was like an attempt to exorcise that which was alienating me from myself

- and the main result of this attempt, I believe, will have been to bring out *more deeply* in the unconscious that which

There - a nagging doubt may linger for some time, a tenacious vestige of resistance to the discarding of an old vision of things, a vision that is often more comfortable, or more in line with current consensus, than the one that has taken its place. Sometimes, too, this doubt is not simply the expression of inertia against a creative change in our vision of things, but it also reflects a healthy, valid element in the old vision, a *real* aspect of things, which had perhaps been thrown overboard a little too hastily, along with everything else! The fact remains that, as always when a doubt arises, the right thing to do is to become aware of it (which is not always easy, given the inveterate reflex to 'silence' unwelcome doubts), and, having done that, to examine it carefully, I can't remember a single time when I've examined a doubt carefully, without learning something interesting (or even important to me), and of a nature that would make any doubt disappear (\*) - Any doubt is the unmistakable sign of work that needs to be done.

In the case in point, that of my unexpressed, perfectly irrational doubt about the very reality of a so-called 'funeral', I must confess that before this meeting with my friend, I hadn't even arrived at this first prerequisite for any work: I hadn't really become aware of it. I hadn't really become aware of it. It remained a simple, diffuse *malaise* that didn't say its name - it was up to me to question it! I only realised the unease and its meaning after the event, when it had just dissipated, precisely by virtue of the encounter with my friend. In fact, I believe that this effect would have occurred regardless of the attitude he adopted - whether it was that of a kind of eager collaboration to provide me with all the missing 'material details' (as was the case), or, let's say, on the contrary, that of a vehement, perhaps furious, denial of the most obvious facts. In either case, the

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I wanted to distance myself. The insidious doubt, acting as a secret flaw in my knowledge of things, was not eliminated for all that, nor was the unfortunate incredulity 'overcome' ('at least partially', sic)!

I realise once again that at this point in the reflection, it fell short of what I call 'meditation' - which is a reflection in which the obscure and delicate inner movements (such as that secret disbelief, and the real motivation in me writing the note, which was to 'exorcise' that troublesome disbelief) remain the constant object of vigilant attention.

(\*) It would be more accurate to say that doubt has been transformed into knowledge, which has taken its place. This has nothing in common with what happens when we dispel (or 'overcome') a doubt, which has the effect of making it disappear from view, whereas it has taken refuge (or been exiled...) in invisible, deeper layers. It is further than ever from being resolved (and transformed into knowledge), and it continues as ever to act, like a secret *flaw*, a malaise, a sign of work that remains eluded. Compare this with the comments in the previous footnote.

*the psychic* reality of the Burial could not fail to appear to me, this time by direct perception (and not by 'induction' from documents, and by cross-checking from other facts known to me etc.), seeing my opposite number purely and simply *ignoring* the ubiquitous absurdities of the 'best of all possible worlds' version, absurdities whose very enormity had made me doubt at first, in my innermost being, the reality of the said Burial!

To give just one example: I had to learn from Deligne himself that he had indeed learnt the 'theorem of the good God' from Zoghman Mebkhout himself - but that he had not wanted to refer to him in his article with Beilinson and Bernstein (\*), out of *scruples* (1) towards Kashiwara, not being sure (as a non-specialist) what was the part of one and the other in the said theorem (\*\*). I had to hear Deligne express himself in these terms to see with my own eyes this strange combination of good faith in detail and phenomenal and dazzling bad faith in substance and in essence. I did not think it worthwhile to draw my friend's attention to the curious way (highlighted in the note 'Le Prestidigitateur' (n° 75<sup>22</sup>), which he had nevertheless read!) in which he had gone about this result 'which should have found its place' in his article, to give the appearance that it was none other than he (or at least one of the three authors of the prestigious article) who was the brilliant author! Nor did he have any explanation to offer for the strange fact that this Colloquium, which I called the 'Perverse Colloquium', was essentially held in the wake of the work and philosophy developed by Mebkhout in previous years (a fact which Deligne did not even pretend to dispute (\*)), but that his name is nonetheless the 'Perverse Colloquium'.

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(\*) See the notes "L'inconnu de service et le théorème du bon Dieu" (n° 48<sup>23</sup>) and "L'Iniquité - ou le sens d'un retour" (n° 75), as well as the notes that follow the latter, forming with it the Cortège "Le Colloque - ou Faisceaux de Mebkhout et Perversité".

(\*\*) Of course, there is no more reference to Kashiwara than to Zoghman Mebkhout in Beilin's article. son, Bernstein and Deligne, developing the formalism of so-called 'perverse' beams (not to be called 'Mebkhout beams'), based on the philosophy of Mebkhout-never-named. Deligne knows better than I do the role of Kashiwara in the theorem of the good God (alias Mebkhout): Kashiwara's constructibility theorem enabled Mebkhout to define the functor going from a triangulated category of 'con-tinuous' coefficients (complexes of differential operators) to another formed of 'discrete' (constructible) coefficients - something that no one in the world had thought of doing before him, let alone suspected that we would have an equivalence of categories. This was precisely the 'missing link' in the duality formalism that I had developed over a period of ten years (1956-66), and which my cohomology students, led by Deligne, were quick to bury after I left in 1970.

strictly absent from the Proceedings of the Colloquium published in *Astérisque* (\*\*). He seemed to regard this as a sort of unfortunate *coincidence*, in which neither he nor anyone else had anything to do with it. All in all, what I have called l'Enterrement can be reduced for my friend Pierre to some twenty or thirty such 'coincidences'.

It's a game where you play the fool with the most innocent air in the world, with the certainty of never being coincidental". And it's been a while since I've been wasting my time trying to convince anyone (for example) that certain so-called 'coincidences' are not mere coincidences. It can sometimes be useful to point out the obvious, but once you've done that, it's a waste of time to try to convince anyone that these are indeed *things*, and not just imaginations, what on earth would you be looking for! It's a waste of time to try to convince people of bad faith, whether it's conscious or unconscious, it's all the same, and whether it takes the form of idiocy or finesse - it's all the same.

But what had changed when we first met, and what put a note of anxiety in my friend that he did his best to control and hide, was that this

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(\*) Deligne confined himself to pretending to qualify my view of things somewhat, by saying that in his opinion the influence of Mac Pherson's ideas in the Luminy Colloquium of June 1981 (known as the 'Perverse Colloquium') was even greater than that of Mebkhout. I wasn't in the know enough to discuss the matter on the spot, and it was obviously a point of detail, which hardly mitigates the enormity of what happened. Moreover, Deligne did not dispute that neither the Colloquium in question, nor the far-reaching renewal in the theory of the cohomology of algebraic varieties of which it was the sign, would have taken place without Mebkhout's pioneering work in the years that had preceded it, and without the philosophy that he had developed in complete solitude.

I understood that Mac Pherson's idea of the "intersection cohomology" of varieties, developed by him independently of Mebkhout's ideas, remained somewhat of a dead letter until Mebkhout's "philosophy" shed new and unsuspected light on it (something discovered by Deligne). Mebkhout's theory of beams (wrongly called 'perverse', in place of a certain Colloquium...) got off to a flying start. This launch is the main event of the Colloquium, and (it would seem) a turning point in the history of our understanding of the cohomology of algebraic varieties. The keystone of this new understanding seems to me to be the theorem of the good God, which had been up in the air since the early sixties and which neither I nor (subsequently) Deligne had managed to clear up.

(\*\*) The term "rigorously absent" is literally true, at least for volume 1 of *Acts*, consisting of the Introduction and the article by Beilinson, Bernstein, Deligne), which constitutes the main part of the Colloquium. There are two thumbnail references to Mebkhout in the bibliography to two of the papers in volume 2 (one by Brylinski, the other by Malgrange), neither of which concerns the authorship of the theorem of the good Lord.

This time, the game is no longer confined to a harmless game played between four eyes, with no one in sight - and with a *dead person*, too! This time the cards are open on the table, and *it's a public game*. All bets are off as to what the famous Congregation will endorse and tolerate. It's true that it has already tolerated and endorsed a lot over the last ten or fifteen years, and it may continue to do so, who knows? Like my friend Pierre, it may not be more than twenty or thirty 'coincidences' away. ...

(18 February) When I finally drove Pierre and Nathalie back to Orange station on the evening of 22 October, I felt like an idiot. Pierre looked like someone who had scrupulously and meticulously carried out all his duties, following the timetable he'd set himself - and I felt a dull frustration that *nothing had been* said or discussed at this meeting, which had finally taken place, after months of talk about it.

It was dark, the little one (in the back seat) must have been asleep - it would have been about forty minutes in the car to the station, driving dryly. We didn't speak for quite a while. I was the one who broke the silence, under the pressure of this discontent within me that was looking for some outlet; a discontent with myself surely, rather than with anyone else. Still, I'd gone there to give my friend a bit of a hard time. I told him that I still hadn't made up my mind whether I was going to take legal action against Springer, to force them to withdraw from circulation the pirate volume APG 4 1/2, which appeared in Lecture Notes (\*). I wouldn't have been able to tell when I'd been touched by this idea, which I brought up again at random, as a way of sounding out my friend ('ihm auf den Zahn fühlen', as they say in German). He didn't react too much to tell the truth, it was more of a monologue that I did, picking up a thread that I'd dropped a long time ago, probably in April or May. As I followed it, I realised that a simple judicial showdown wasn't really the point - that it would only make sense to take SGA 4 1/2 out of circulation under its current title and presentation if the initiative came from someone other than me - either Springer or, better still, who knows, Deligne himself. /I had to add that I didn't think it was a luxury for Deligne to make such a public gesture, to make amends for certain things he had done to me. It would clear up a much-needed atmosphere!

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(\*) On this volume, see in particular the four notes "Le compère", "La table rase", "Le feu vert", "Le renversement", n° s 63□□□, 67, 68, 68<sup>2</sup>.

My friend followed my monologue with monosyllables, placed here and there. He suggested that Springer might not be too keen on scrapping its entire stock of SGA 4 1/2 - to which I retorted that all it had to do was change the cover, as it had already done on another occasion without any problems (\*\*), so it must not have cost him much. And even supposing he scrapped the stock - one Lecture Notes title out of more than a thousand, you can talk about that being written off! Not to mention that Deligne, assuming he really wanted it, had the few million old francs it would take to cover the loss of earnings...

I didn't have to say, but it was implied (and surely heard), that what was at stake was perhaps more valuable than one or two months' salary for one of us. In the end, I had to say that in this kind of thing, the most important thing is not to see *how to* do something (or, on the contrary, to list the *obstacles* to doing it), but to be clear first of all about what you *want to do*. Once that's done, the rest becomes a matter of stewardship, and 'follows' (when it wants to 'follow' indeed).

Since my not very talkative interlocutor failed to explain his true feelings, I took it for granted that he was well aware that it would be a good thing to 'clean up' a situation that really needed it - but that he was simply undecided about what he was going to do about it, a question of 'face to keep' no doubt, and things like that. I was way off the mark, in fact! It finally dawned on me, when we were already on the station platform waiting for the train. That was when Deligne came back to me, a little sheepishly, to tell me that he'd prefer it if *I was the one* to contact Springer about SGA 4h. Clearly, he didn't want to get involved, or even, at the moment, to give an opinion on the fate of this book, which he had written with, admittedly, my 'collaboration' (\*)).

It was only then that I realised that my reflections during our journey had definitely been a monologue - and that for my friend Pierre, it was still not clear that there was something perhaps not very 'in order', in a certain 'operation'.

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(\*\*) This was the occasion of my first misadventure with the Springer publishing house, which had published Hartshorne's notes (on a course in which I had developed the formalism of local cohomology) indicating Hartshorne as the author. This was volume no.° 41 "Local Cohomology" of the Lecture Notes, where the covers had to be changed. Springer then had the courtesy to apologise for the mistake, and to make every effort to repair it. The company's morals have changed since then...

(\*) On this subject, see the note "Le renversement" already cited, n° 68<sup>2</sup>.

SGA 4 1/2 - SGA 5". It's surely no coincidence, then, that it was on this theme, of all others, that I turned, looking for an outlet for my discontent. It was this operation, linked to the wholesale slaughter of a fine piece of work in which I had put the best of myself (\*\*), that had touched me the most - with a breath of violence (in the slaughter) and quiet impudence (towards what had been slaughtered). And I was touched again, by this feeling (which I knew only too well in my friend) that in the end it didn't concern him at all, the 'ideas' I might have had about this and that.

The train would be arriving soon, and this was the first time I'd been able to get *to the bottom of* something that was close to my heart, in a few words, thanks to an *emotion* that was finally coming to the surface. It didn't take long to say out loud what I felt about it. These were real feelings, of someone whose sense of decency had been wounded by someone he cared about who had played him for a fool - this was no longer literature with a slightly scientific edge, dutifully annotated with a pencil in hand.

He was disconcerted by this, trying as best he could to keep his imperturbable conte-nance. I had to say something like: "And so, you think it was a beautiful thing, this title 'SGA 4 1/2', to suggest that these are things that come *before* SGA 5 - where you had learnt, eleven years before, the maths that is used every day until today 1". He replied in the tone of someone reciting a lesson, that if he had called it SGA 4 1/2, it was only to indicate a relationship of *logical* dependence, not anteriority.

And so it was that I was given to hear with my own ears, and from the mouth of the person concerned himself, this 'farce' so enormous that I could hardly believe the evidence of my own eyes when I read it in black and white, first from his pen (in 'SGA 4 1/2'), then from Illusie's (in the volume called SGA 5, which followed, as was 'logical', that of my predecessor...)!

I had to tell him that he knew just as well as I did that SGA 5 'stood' entirely on its own, without preconditions or conjecture of any kind, and that it was not logically or otherwise dependent on later contributions. I looked him straight in the eye as I spoke to him, and as he answered me. He repeated his lesson in the same atonal voice, that SGA 5 was logically dependent on SGA 4 1/2 - but I saw in his wavering eyes that he knew as well as I did what was really going on. His eyes were more honest, in spite of themselves, than his

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(\*\*) see the note "The massacre" (n° 87) and the two notes that follow it.

mouth.

So in the end, the 'moment of truth' happened between us - but no camera or tape recorder could have detected it. Only he and I knew what was going on.

The train arrived within minutes, I think. In any case, that day there was nothing more to say to each other.

(<sup>164</sup>) (20-21 February) To conclude the retrospective of Deligne's last visit to me (last October), I would like to review here the clarifications he kindly gave me on a number of points that remained vague or even erroneous in my notes on Burial I. This will also be an opportunity for me to provide some additional clarifications prompted by those provided by Deligne.

I Motifs (Lecture Notes 900 volume ).<sup>164</sup>

1. Deligne told me that the main aim of volume LN 900 (\*) had been to develop a "theory of *motivic* abelian class fields" over a number field  $K \subset C$ , a finite extension of  $Q$ . In other words, the aim was to determine the "motivic Galois group".

tivic of  $K$  on  $K$ , made abelian". By the way, I remember that I was the first (and with good reason!) to raise this question, towards the end of the sixties. The question has a precise meaning, for a chosen notion of pattern, using the "Betti free functor" on the

category of patterns on  $K$ , thanks to the given inclusion of  $K$  in the field of complexes  $C$ . In fact, I had asked myself the slightly more general question of determining the "*metabelian*" motivic Galois group of  $K/K$ , deduced from the complete motivic Galois group by making abelian, not all of this proalgebraic group, but only its neutral component. We had to obtain a completely canonical extension of the profinite group  $\overline{\text{Gal}}(K/K)$  by the pro-tore

projective limit of (torus on  $Q$  associated with) multiplicative groups  $L^*$  of sub-extensions  $L$  of  $C/K$ . I remember that Serre was very intrigued by this question, but neither he nor I (and Deligne, whom I'd of course brought into the picture) couldn't come up with a plausible 'candidate'. This question then fell into complete oblivion, just like the yoga of the

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(\*) For details of this "memorable volume", see the two notes "Souvenirs d'un rêve - ou la naissance des motifs" and "L'Enterrement - ou le nouveau père", n° s 51, 52.

(\*\*) This is the article by R. P. Langlands "Automorphic representations, Shimura varieties and motives. Ein Marchen Corvallis", in Proc. Symp. pure Math. 33 (1979), AMS, vol II P. 205-246.

motifs from which it was derived. This silence was only broken in 1979 by the article by Langlands (which Deligne mentions in a commented bibliography of the motives, in his letter of 28.5.1984) (\*\*), an article in which my idea of the motivic Galois group was made explicit in the literature for the first time. As I did not have the honour of receiving a reprint of this article, I do not know whether it refers to my modest person. The next appearance of the motifs in the literature seems to be LN 900, where any allusion to my person, as having anything to do with the theme and main problem of the volume, is absent (\*\*\*)�.

2. Deligne pointed out to me that, contrary to what I had thought (according to a certain "house style" ...), the Deligne-Milne article in LN 900, taking up "ab ovo" the Galois theory of tannakian categories (\*\*\*)) developed by N. R. Saavedra, was written almost entirely by Milne (\*). Deligne also explained to me the error in Saavedra's work, which made it necessary (if we wanted to have the formalism of a Galois-Poincaré theory of fibre functors) to reinforce Saavedra's definition of a so-called "Tannakian" category. The work in Deligne-Milne's article was confined to making this adjustment, which was obvious once the error had been spotted. Incidentally, this raised the very interesting question of a workable internal characterisation of  $\otimes$ -categories that are "true" Tannakian categories (which, more suggestively, could be called  $\otimes$ Galois categories).

- Poincaré, since it is for them that we can develop a theory of a groupoid of Galois-Poincaré (\*\*)). This question was not addressed in the article in question, and has not yet been satisfactorily resolved. Clearly, the aim was not to pose or resolve interesting mathematical questions, but rather to provide a reference.

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(\*\*\*) (8 April) I recently learned that the motifs are used in a 1979 article by Deligne (published in the same volume as the Langlands article cited in the previous b. de p. note).

(May 12: this "end" has become the sub-note "Pre-exhumation", n° 168(iv)).

(\*) On this article by Deligne-Milne, see the note "L'Enterrement - ou le nouveau Père" (no.° 52), and also the comments in the later note "La table rase" (no.° 67).

(\*\*) The name 'groupoid' (de Galois-Poincaré) has the advantage of suggesting the close relationship with the no-fundamental groupoid of a topological space or topos. Technically speaking, however, the term "sheaf" (de Galois-Poincaré) would be more appropriate. This is the sheaf of "fibre functors" defined, not only on the base field  $k$  of the  $\otimes$ -category under consideration, but on any objects of the fpqc-site of schemes on  $k$  (with particular attention paid to objects of this site which are of the form  $\text{Spec}(k^\sharp)$ , where  $k^\sharp$  is an extension of  $k$ , or even a *finite* extension of  $k$ ).

(See the end of the note on "The clean slate" (n° 67).) (\*\*\*)

3. On several occasions in Burial I, I stressed the fact that the Hodge-

Deligne, developed by Deligne at the end of the sixties, was only a first step towards a theory of "Hodge-Deligne coefficients" on a finite type scheme over  $\mathbb{C}$ , and towards a "six operations formalism" for such coefficients. I was (and remain) convinced

that, were it not for a deliberate intention on Deligne's part to oppose some of the ideas introduced by me (such as the formalism of the six operations), the theory of Hodge-Deligne would today have reached "full maturity". Deligne pointed out that the only definition of a category of Hodge-Deligne coefficients on a finite type scheme on

$\mathbb{C}$ , ran into serious difficulties that he would not have been able to overcome.

that it is all the more imperative to *formulate* this question clearly from the very beginning of the theory, as well as the closely related question of the formalism of the six operations for such coefficients, something that Deligne has always avoided doing). In his view, Mebkhout's point of view and Mebkhout's bundles (\*) should provide a means of approaching the right definition. (And if it hadn't been for this deliberate intention, Deligne certainly wouldn't have waited for Mebkhout to develop the philosophy that Mebkhout developed (against the current of his elders), and to use it for a visibly fundamental work that for fifteen years has remained on the sidelines and is still not even mentioned in the literature, except by myself in *Récoltes et Semailles*!)

4. I thought, wrongly, that I had introduced the "filtration by weights" of a pattern, reflected (for any  $A$ ) in the corresponding filtration on the  $A$ -adic realisation of this pattern (filtration defined in terms of absolute values of Frobenius eigenvalues). In fact, Deligne reminded me that I had only worked with 'virtual' notions of weights (which amounted to working with virtual patterns, elements of a 'Grothendieck group').

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(\*\*\*) (12 May) Having recently become acquainted with Saavedra's book, it now appears that it, and the very name ('Tannakian category') of this notion which I introduced around 1964 and which gives the book its name, is a *mystification*. I dismantle it in detail in the series of notes entitled 'The sixth nail (in the coffin)' (n° s 1761 to 1767).

(\*) These are the bundles that Deligne introduced under the name of 'perverse bundles'. (See on this subject the two notes "L'Iniquité - ou le sens d'un retour" and "La Perversité", n° s 75, 76.) He was not annoyed and, in our conversations, kindly referred to them as 'Mebkhout's bundles'...

suitable...). It was Deligne who discovered this important fact, that the virtual notion with which I was working should correspond to a canonical *filtration*, by "increasing weights" (\*\*). This discovery (just as "conjectural" as the "conjectural theory of patterns") immediately provided the key to a formal definition of *Hodge-Deligne structures* (also called "mixed Hodge structures") on the field of complexes, as a "Hodge-like" transcription of the "already known" structures on the pattern and on its Hodge realisation.

Technically speaking, the influence of my ideas in the definition of Hodge-Deligne structures is twofold. On the one hand, via the notion of the weight of a pattern, suitably clarified by Deligne into a "*filtration* by weights" structure. On the other hand, since the fifties, I had emphasised the importance of the algebraic *De Rham cohomology* of a smooth algebraic variety  $X$ , not necessarily proper, as a richer invariant than the naive Hodge cohomology direct sum of  $H^q(X, \underline{\mathbb{Q}}^p)$ , which is related to the former by the well-known spectral sequence, associated with a canonical filtration (the *De Rham filtration*) of the De Rham cohomology. I was the first to define the algebraic De Rham cohomology (at a time when nobody would have thought of looking at the global hypercohomology of a complex of differential operators, such as the De Rham complex), and to insist on its *filtered* graded structure, in contrast to the bigraduated structure of the Hodge cohomology, which since Hodge had been in the limelight. In the case of  $X$  proper (i.e. the case where we have Hodge theory, implying that the previous spectral sequence degenerates

and on the base body  $C$ , we recover the bigraduated structure on the cohomoloid. From its filtered structure, taking the "intersection" of this filtration and the conjugate complex filtration (thanks to the "real structure" of the De Rham cohomology).

Rham, isomorphic to the Betti cohomology  $H^*(X, C)$ ). I subsequently proved (while nobody except me believed in De Rham's cohomology in the non-eigen case),

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(\*\*) The heuristic reason that convinced Deligne of the existence of such a (necessarily unique) filtration of a pattern is that there are non-trivial extensions of abelian varieties by tori (whose motivic  $H^1$  therefore provides a non-trivial extension of a pattern of weight 2 by a pattern of weight 1), but not the other way round. A more serious reason, at the level of  $A$ -adic representations arising from patterns over a finite field  $K$ , would be to prove that any extension of a Galoisian module of weight  $i$  by another of weight  $j$  is trivial if  $i < j$ . I don't remember whether Deligne or I were able to prove this statement, which would prove the existence of a canonical filtration "by increasing weights" for the  $A$ -adic Galoisian module associated with a pattern (an object that is already quite close to the pattern itself...).

that for a scheme  $X$  smooth over the field of complexes, the De Rham cohomology (which has a "purely algebraic" meaning) is canonically isomorphic to the complex Betti cohomology (defined by transcendental means).

This said, once postulated the existence of a notion of pattern (not necessarily semi-simple) on and of a motivic cohomology of a C-schema  $X$  (not necessarily clean, admittedly), and of a notion of "Hodge realisation" (suitable and to be found) of a pattern on C, which (according to my ideas) had to associate to the smooth motivic cohomology of  $X$  a "generalised Hodge structure" (to be defined), having as basic set the cohomology of  $\text{De Rham}_{\text{HRD}}(X)$ , the first structures we read about on the latter, namely De Rham filtration (introduced by me in the 1950s) and filtration by weights (introduced by Deligne on the basis of my ideas on virtual weights, clarifying the ideas of Serre, themselves derived from Weil's conjectures), we come across exactly the notion of 'mixed Hodge structure' introduced by Deligne.

Of course, Deligne was well aware of this line of thought (<sup>164</sup> 1). It would have been in keeping with professional ethics (which I was unable to pass on to him) if he had clearly indicated it in his work in which he introduced mixed Hodge structures (\*). He preferred not to mention it in this work, which is also *his thesis*, just as he saw fit, on this particular occasion, not to mention the name of his teacher.

5. In the annotated bibliography on motives (attached to his letter of 25 August), Deligne states that "one of the reasons why we [!] hesitated to build on it [on the few "classical texts" (\*\*)] on motives] is the use made therein of conjectures about the existence of algebraic cycles - conjectures for which we have no real evidence, whereas motives, for their part, are for me indubitable".

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(\*) This is the article "Hodge Theory II" (Pub. Math. IHES 40 (1971) pp. 5-58). On the other hand, Serre and I are mentioned in the same line, in the "Hodge I" announcement at the Nice Congress (in 1970), as I point out in the note "<sub>1</sub>La victime" (<sub>2</sub>n° 78<sup>2</sup>, on page 308). For comments on this subject, see sub-notes n° 78<sup>2</sup>, 78<sup>2</sup>.

(\*\*) These are the few sporadic ('classic') texts on motifs by Kleiman, Manin and Demazure, published up to 1970. They hardly go beyond the initial idea of a motif, and can give no idea of the finesse of the 'yoga' that I had developed, and that I had tried to communicate to anyone who would listen. In particular, there is no mention of the Galois motivic group, which had been an essential initial motivation for developing yoga. (See the note "Souvenir d'un rêve - ou la naissance des motifs, n° 51.)

I would reply to this explanation that these 'classical texts' are in no way representative of the 'state of the art' at the end of the 1960s, indeed they are far from it, and it was *not* from these texts that he, Deligne, learned about this 'state of the art'! He knows very well that my 'standard conjectures' were *one* of many possible approaches to a provisional 'construction in form' of a notion of (semi-simple) motif on a body, which in no way limited the scope and internal dynamics of the ideas he got from me (on this subject, see sub-note no.<sup>°</sup> 51 of the note 'Souvenir d'un rêve - ou la naissance des motifs' no.<sup>°</sup> 51). Killing two birds with one stone, he endeavoured, after my departure, both to discredit the standard conjectures as 'unapproachable' and devoid of interest, and to discredit a certain approach to motives that would have been mine and that would have represented a?cul de sac, indissolubly linked as it would have been (to hear him tell it) to these hopeless conjectures - to such an extent that it was more charitable for me, in the LN 900 volume where at last the work that really needed to be done is done, to pass my name discreetly under silence. ... (\*)

#### 6. In the same "annotated bibliography", I read :

"From this "classical" point of view (\*\*) there is an unfortunate gap in the literature: your conjectural description of the  $\otimes$ -Tannakian category of patterns on  $F_p$ , with unique equivalence to non-unique isomorphism - with these various fibre functors (crystalline and A-adique), cf. Tate, isogeny classes of abelian varieties over a finite field, sém. Bourbaki 352 (1968)."

These are crocodile tears, over a "regrettable omission" which is due to no-one else (apart from me...) than my friend Pierre Deligne himself, since apart from me he must have been the only mathematician in the world who was aware of the "conjectural description" in question... It was up to him to include it in the same LN 900, for good measure! This

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(\*) Deligne took the initiative on any question I might have asked him on this subject, from the very first day of his stay with me, by saying to me with his most beautiful smile: "Do you *really* think that everyone doesn't know already that it was you who introduced the motives! The astonishing thing is that despite everything my friend did to make people forget about it, I could see that it was still generally known. But in the absence of written references for my ideas, Deligne had every opportunity to create the impression that my contribution had been limited, as usual, to proposing a vague general idea (unusable as it stands, given its dependence on conjectures "as unapproachable today as they ever were"... - so vague, in fact, that it really didn't merit any serious mathematician, doing real work, taking the trouble to make even a token reference to it...).

(\*\*) See penultimate note of b. de p.

The description was not at all conjectural, as far as I remember now, except that it was necessary to suppose that we had a category known as "patterns on  $F_p$ ", satisfying some reasonable conditions, which we have the right to expect from a category satisfying the following conditions

to that name. As I recall, the quoted reference to Tate-Honda implied that the category in question was generated multiplicatively by the Tate pattern (and its inverse) and by

abelian varieties defined on  $F_p$ . There have been many beautiful things (and many more), which I entrusted to my brilliant ex-student and which have remained carefully buried to this very day...

II Discrete Cohomology ( SGA 4 1/2, SGA 5, SGA 7, discrete Riemann-Roch).

1. One of the first comments Deligne made to me about Burial I concerned the vicissitudes of the conjectural theorem that I had worked out in SGA 5, under the name of the 'discrete Riemann-Roch theorem'. I give a rather detailed account of this in sub-note no.<sup>°</sup> 87<sub>1</sub> to the note "Le massacre" (no.<sup>°</sup> 87). Deligne tells me that when he communicated my conjectural statement to Mac Pherson, he saw himself as a 'factor', an intermediary. He did not add a new ingredient to my statement - the idea of translating my statement into homological language, in order to give it a meaning for singular spaces, is due to Mac Pherson, not to Deligne. He told me that he had been surprised, on receiving the reprint of Mac Pherson's article proving my conjecture in the analytic-complex case and in the homological context (by transcendental arguments), to find the conjecture under the name of "Deligne-Grothendieck conjecture". He had thought of writing to Mac Pherson to rectify the misunderstanding, but (he himself could not have said why) he did not do so in the end... .

2. Contrary to what I assumed and implied, Deligne had not committed himself, at the time of the SGA 5 oral seminar, to writing one or more of the papers from that seminar, for example the paper on the cohomology class associated with an algebraic cycle (which he ended up writing eleven years after the seminar for inclusion in the volume of his composition called "SGA 4 1/2", without further ado (\*)).

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(\*) This act of dismantling (among many others) the SGA 5 seminar in favour of the volume called 'SGA 4 1/2' fulfilled two functions, both of which were tantamount to a 'reversal' of roles: it made me appear as Deligne's 'collaborator', and supported the claim of anteriority (already suggested by the misleading name SGA 4 1/2, and spelt out 'between the lines' in the introduction to both SGA 4 1/2 by Deligne, and to

In this connection, I asked him whether he did not think that the privilege of having been able to learn 'on the spot', in SGA 5, the basic techniques that served him in all his subsequent work, did not impose on him an obligation or a responsibility to do his utmost to ensure that these techniques were made available to the mathematical public, through the rapid publication of SGA 5. Deligne replied that *he did not think so*. I refrained from asking him the same question about the philosophy of motives, which was his main source of inspiration for the cohomology of algebraic varieties (which is the central theme of his work...).

3. It was Deligne who took the initiative of asking Verdier for his agreement to include in 'SGA 4 1/2' the famous 'État 0' of Verdier's work on derived categories. Verdier initially refused, judging that it would be pointless (I can't remember the exact expression). It was Illusie who finally persuaded Verdier to agree.

Verdier's first reaction seems to me most natural and in line with simple mathematical common sense. What's more, Verdier had decided years ago to bury the derived categories, in the form of a large-scale 'work on parts', which was one day supposed to constitute his thesis - so it was going to look rather odd to publish a preliminary sketch that had long since been widely covered in the literature. I think I understand why Deligne and Illusie were so keen to publish this Etat 0, in which my name was not mentioned. As for Verdier's reasons for going back on his initial common-sense reaction, I thought I sensed them and I express myself on this subject in the note "Thèse à crédit et assurance tous risques" (n° 81).

4. In the note "La table rase" (n° 67), I had pointed out the ambiguity of the expression "this seminar" in the passage of the Introduction to SGA 4 1/2 (p. 2) where it is said: "For the application to *L-functions*, this seminar contains *another* demonstration, this one complete, in the particular case of the Frobenius morphism". This ambiguous expression, given the context and its spirit, had every chance of being read as meaning "SGA 4 1/2", in such a way as to suggest that the parent seminar SGA 5 did *not* contain a "complete" demonstration of the rationality of the

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SGA 5 by Illusie de "SGA 4 1/2" sur SGA 5 (where references to SGA 4 1/2, via the said pirated presentation of SGA 5, abound). See also on this subject the comments in the note "Le renversement" (n° 68<sup>✉</sup>), where I finally discover the meaning of the strange name given to the pirate-volume, and of the presence in this volume of my talk on algebraic cycles.

functions  $L$ . Deligne told me that in his mind, 'this seminar' really meant 'SGA 5'.

To tell the truth, this clarification doesn't mean anything to me. I know that Deligne knows as well as I do that in SGA 5 there is a "complete" demonstration, but yes, of a trace formula, which goes far beyond (contrary to what he implies) "the particular case of the Frobenius morphism". But it is no coincidence that Deligne's writings are full of imprecisions and ambiguities, if not blatant untruths, which all point in the same direction: to suggest an impression, concerning my work or that of Mebkhout and others linked to me, of such a nature as to discredit it, while at the same time enhancing his own credit, or creating some from scratch (\*).

5. I would like to take this opportunity to add a few comments on the subject of SGA 7 II (a seminar presented as being directed by P. Deligne and N. Katz), on which I had already commented in some detail in note (unnamed (\*)) no.° 56. A slightly more detailed examination has shown me that, on this occasion, N. Katz did not hesitate to discreetly push at the wheels of the Funeral Van roundly led by Deligne, and this in many ways.

Katz agreed to appear with Deligne as co-author of the volume and the seminar, which in no way corresponds to the reality of what had taken place during the oral seminar, four years before the publication of the volume. The overall conception of the SGA 7 seminar (which continued over the two years 1967-69) came from me, and the seminar was presented as a seminar directed jointly by Deligne and myself. N. Katz appeared as a collaborator and lecturer, among a number of others. But since N. Katz agreed to sign as co-author of the volume (of which he wrote five papers, but none of the main results of which are his own), it is normal to regard him as co-responsible, in the same way as Deligne, for the general structure of the volume, and for the fact that I was not mentioned.

I am thinking first and foremost of the oversight in the introduction to the volume (signed by Deligne), where there is nothing to suggest that I had anything to do with any of the themes or results presented in the text, even though one of the two 'key results' of the seminar highlighted in the introduction is that of my own work.

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(\*) By suggesting, in particular, his authorship of the key ideas of the motives, that of staggered cohomology, and that of the 'theorem of the good Lord' and the philosophy of Mebkhout that goes with it.

(26 March) For the case in point and "this seminar", see also the sub-note "Double entendres - or the art of the con" (n° 169).<sup>7</sup>

The theory of Lefschetz's brushes had already been developed by me before the SGA 7 seminar, and had been one of my motivations for considering doing a seminar on the theme of monodromy. In Katz's presentation of this theory (Exp. XVIII), entitled "Étude cohomologique des pinceaux de Lefschetz, par N. Katz", my name does not appear in the title as is customary ("d'après A - Grothendieck"), but appears in a laconic footnote after N. Katz's name, "D'après des notes (succinctes) de GROTHENDIECK". The qualifier 'succinct' seems to have been used to minimise the fact that these unfortunate 'notes by Grothendieck' played a role here. They may well have been 'succinct', but they nonetheless represented the culmination of several days' work on the task, by no means obvious at first sight, of transcribing into an entirely different technical context the results stated and demonstrated by transcendental means. As with étale duality and Nielsen- wecken theory (\*), the classical arguments were unusable as they stood, and we had to redo the whole thing, taking the classical *results* as a guideline and completely forgetting their traditional 'demonstration' (if we can call it that). It is normal that, even helped by my detailed notes, Katz had to make an effort to get into the swing of things, just as I had to do before him - but this in no way means (at least, not according to the generally accepted rules of the game) that he is the author of the Lefschetz brush theory in stale cohomology!

Continuing in the same vein, in the introduction to the same lecture (p. 225), Katz pretends to present Mme Raynaud as the author of the structure theorem of the "prime to  $p$ " moderated fundamental group of an algebraic curve in  $p$ -car. If my memory serves me correctly, it is this theorem (proved by me in 1958, before I had even met my future pupil) which, together with the "Lefschetz cow theorem", constitutes the deepest technical ingredient of the theory, and I was quite happy, in the demonstration of the irreducibility theorem, to have to use it to the full.

In the introduction to Katz's lecture XXI (pp. 364-365), after describing the theorem

(\*) (26 March) In the meantime, I have filled this gap by including this note in the table of contents under the title 'Prelude to a massacre'.

(\*) With less restraint than his friend N. Katz, Deligne did not see fit to mention that I had something to do with what he called 'the Nielsen-wecken method' - see sub-note no.<sup>o</sup> 67 to the note 'The clean slate' no.<sup>o</sup> 67.

the main part of the presentation, concerning complete intersections in projective space, it is said that :

"There are heuristic arguments due to A. Grothendieck and based on the yoga of crystalline cohomology, which make the general statement plausible for any projective and smooth  $X$ , by essentially the same method".

This comment implies that I was inspired by the method of the text (by an unspecified author, who can only be one of the two authors of the volume), to embroider on it "heuristic arguments" that allow the proven result to be generalised. I seem to remember that it's just the opposite - that it's my "heuristic arguments" (which I had developed in my corner well before the seminar, in the wake of my reflections on Griffiths' theorem and Lefschetz's brushes (\*\*)), which happen to "work" (without any conjectural ingredients what's more) in the case where  $X$  is a complete intersection. Moreover, in the previous paper (also by Katz) devoted to the said Griffiths theorem, it is stated in the introduction that "*the demonstration given here* (due to GROTHENDIECK) is the translation into purely algebraic terms of the original, more or less transcendental, demonstration of GRIFFITHS". This comment may give the impression that we are spoilt for choice between several demonstrations of Griffiths' theorem in car. quel-conque, and that I have been given the honour of choosing my own. In fact, as far as I know, there is no other. Moreover, from the work I was obliged to put into it, I doubt that this proof is a simple "translation" of Griffiths' proof, any more than the proof of any of the great key theorems in stale cohomology was a "translation" of an already known proof, or (while we're at it) than mastering the stale cohomology of schemes was a matter of "translating into purely algebraic terms" the familiar theory of ordinary cohomology.

I have reviewed *the three* references to me in the texts of N. Katz's talks (there is only one in all eight of Deligne's talks!). All three seem to me to reflect the same deliberate intention. Finally, I would like to point out that in the text of the last paper in the volume, by N. Katz, devoted to the "congruence formula mod.

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(\*\*) It was these reflections, along with my reflections on the theory of evanescent cycles in abstract algebraic geometry (another of my "purely algebraic translations of transcendental theory" 1), which gave rise to the SGA 7 seminar.

$p$ " of a function  $L$  in car.  $p$ , my name does not appear (\*) - not even for the ordinary cohomological expression of the function  $L$ . In fact, the analogous expression in terms of crystalline cohomology (which remained conjectural), had led me to conjecture the congruence formula for several years. I had communicated this conjecture to Deligne, who had found a surprisingly simple demonstration, thanks to his symmetrical Künneth formula (discussed in SGA 4 XVII 5.4.21). I presume that Katz, who was well acquainted with this sort of thing, was also well aware of the origin of the conjecture, without seeing fit to mention it. (He presents in the text a different and much less elegant demonstration of it than Deligne's).

A funny detail is that at the end of the introduction to this final presentation of SGA 7 II, we read that Deligne's demonstration "should appear in the reissue of SGA 5" (which SGA 5 had not yet had the chance to see its first "edition"). This suggests that five years before the SGA 4 1/2 - SGA 5 operation, Deligne still intended (as was normal) to include in the future published version of SGA 5 the additions he had made since 1966 to the theory of stable cohomology, developed in SGA 4, SG4 5 (\*).

III Mebkhout's philosophy (Colloque de Luminy, June 1981, article on the 'perverse bundles' of Beilinson, Bernstein and Deligne).

I will repeat here what I reported on this subject in the previous note.

1. Deligne told me that he had learnt about the 'God's theorem' (\*\*) in a conversation with Mebkhout at a Bourbaki seminar - at any rate, this was before the summer of 1980. This tallies with what I know from Mebkhout, namely that the theorem in question had been communicated by Deligne to Bernstein and Beilinson in October 1980, to be used immediately.

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(\*) This is not entirely correct - he appears there (so it's a fourth reference to me), in a breath with Deligne, on page 410, to thank us for having explained to the author various equivalent reformulations of the form in which he presents the congruence formula. The funny thing is that, of the three numbered references he gives for these brilliant variants, none is found in the presentation, so that these thanks-

clements take on the appearance of an amiable hoax! (It's not the first one I've come across in L'Enterrement...)

(\*\*) I presume it's the lack of any reaction (from any of the people who were in the funeral) that makes it so difficult to understand.

the blow) to the swindles that took place in SGA 7, which must have encouraged Deligne to take the next step in his escalation: the large-scale swindle of the SGA 4 1/2 - SGA 5 operation.

(\*\*) See the note "L'inconnu de service et le théorème du bon Dieu", n° 48<sup>2</sup>.

by them in their proof of the Kazhdan-Lusztig conjecture (\*\*\*)). Deligne added that he had not cited Mebkhout in his article with Bernstein and Beilinson, as he was not sure what part Kashiwara played in this theorem (\*\*\*\*).

2. Deligne did not deny that the Luminy Colloquium in June 1981 (where he himself was the star attraction) would not have taken place without Mebkhout's work in the preceding years. He only made a point of adding that the role of MacPherson's ideas seemed to him to be "even more essential". He did not suggest that there would be anything strange or abnormal about Mebkhout's name not appearing in the Colloquium Proceedings.

IV Duality formalism in cohomology, derived categories ("The right reference", "State 0" of derived categories).

1. Deligne tells me that he only became aware of Verdier's article (\*), which (among other things, and without naming me) took up the formalism of homology and cohomology classes associated with a cycle (which I had developed in SGA 5 in 1965/66) *after the* publication of SGA 4 1/2 in 1977, i.e. at least a year after the publication of the article in question. This therefore seems to contradict the impression I had that Verdier's brilliant operation in 1976 was a sort of 'trial balloon' for the considerably larger operation by Deligne et al, which followed the year after.

Deligne told me that it was clear to him, from reading Verdier's article, that he was simply expounding some of the ideas I had developed in SGA 5. He was even pleased that Verdier had finally taken it upon himself to provide a reference. (The idea that the publication of SGA 5 might have provided a more adequate reference must not have occurred to him... .) To a question from me along these lines, Deligne replied that he had not noticed that my name did not appear in Verdier's article - adding that he admitted that he had not even thought of

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(\*\*\*) See the footnote of 28 May to the note "Iniquity - or the meaning of a return" (n° 75), and also the note "A feeling of injustice and powerlessness" (n° 44).<sup>12</sup>

(\*\*\*\*) See the comments on this subject in the previous note "Duty done - or the moment of vérité", in particular p. 784, and the footnote to "Kashiwara".

(\*) This is the article cited in the note 'Les bonnes références' (the right name for this book).  
!), n° 82.

(12 May) For comments on this hardly believable version by Deligne, see the note "Gloire à gogo-or ambiguity" (n° 170(ii)), pages 930, 931.

to ask himself the question. I had the impression that he was tacitly implying that this sort of thing was the least of his worries and not worth dwelling on. ...

2. In the article by Beilinson, Bernstein and Deligne (often cited in l'Enterrement I), written by Deligne and presented by him at the Colloque de Luminy (\*\*), the duality in stellar cohomology (which I developed in 1963) is called the "Verdier duality" (\*\*\*)�.

I asked Deligne about this strange name. He replied (with a touch of embarrassment this time) that it was because 'everyone' called him that. I didn't ask him to tell me who 'everyone' was, or why, even though he, Deligne, knew perfectly well whose theory it was.

This reminds me of something that had struck me a long time ago. When talking to me at least, or writing to me, Deligne never used the expression 'derived category' without adding 'de Verdier'. It gave me an unpleasant impression every time, and I never stopped (until I discovered l'Enterrement) to look into the meaning, let alone to dot the i's and cross the t's. I would probably have stopped to think about it. I would no doubt have stopped there, if I'd taken the trouble to have a slightly curious look at 'SGA 4 1/2', and at 'État 0' of Verdier's 'thesis', which is exhumed there. (For details on the latter, see II 3 above).

## V The Eulogy

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(\*\*) On the subject of this 'memorable Colloquium' and the article in question, see the note "L'Iniquité - ou le sens d'un retour", n° 75.

(\*\*\*) This operation was carried out in several stages. At my suggestion, Verdier developed after 1963 a theory of "six operations" duality in the context of ordinary topological spaces, following the masterpiece that I had developed in the coherent and staggered algebraic context. This duality had been christened by my cohomology students, appropriately enough, "Verdier duality" or "Poincaré-Verdier duality", without any mention of my modest self. In the 'good reference' of 1976, Verdier takes up again, in the analytic context and without naming me, part of the formalism that I had developed in the coherent framework in the fifties (without having to change anything). As a result, this duality, in the analytic context, is still called the 'Verdier duality', or sometimes the 'Serre-Verdier duality', again without mentioning me personally.

- even Mebkhout follows the general trend! But (in a stroke of genius) it is quite clear that algebraic coherent duality is only a "purely algebraic translation" of transcendental analytic theory, just as étale duality is such a "translation" for transcendental topological theory. It was therefore only natural that they should also be called "Verdier duality" (Serre and Poincaré being forgotten for the moment, because they are far away). According to what Deligne told me, this is what 'everyone' hastened to do. Curtain...

1. The IHES jubilee booklet containing my Eloge Funèbre (\*) was not written by its founder and first director, Léon Motchane (as I had thought). The identity of the author of the booklet, which I learned from Deligne, is of little importance here. He confirmed that it was indeed he who had written the passage about me, and that this passage, like the one about Deligne himself (due to the author of the booklet), had indeed received his 'green light' before being sent to the printer. The text he had devoted to me was initially longer, and had been (with his agreement) truncated by the author of the booklet. Deligne had also revised and corrected the text that concerned him. These texts therefore represent Deligne's point of view, concerning his work and mine.

2. I asked Deligne if I was mistaken, assuming that in none of his publications did he suggest that he had learned anything from me. He confirmed this, with just one reservation. This concerned the biographical note he had written for the Fonds National de la Recherche Scientifique (Brussels), on the occasion of the award of the "Prix quinquennal". This prize had been awarded to him (in 1974, I believe) in recognition of his demonstration of Weil's conjectures. It is true (he added) that this biographical note is not part of a mathematical publication, and its distribution has remained more than limited. I myself was not aware of its existence. At my request, he sent me a photocopy in the days that followed, and I intend to come back to this notice in the following note.

Deligne's systematic disavowal of me did not seem to pose any problem. He didn't seem to find anything strange about it, worthy of attention. Given this attitude, I didn't feel prompted to ask him any questions along these lines - I don't think I would have got anything more out of him.

To conclude this retrospective, I would only add that as far as the 'material facts' in the strict sense of the term are concerned, I have no doubts about Deligne's good faith, which seemed obvious to me (\*\*). The only exception in this respect is his assertion that the seminar

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(\*) See the two notes "L'Éloge Funèbre (1) - ou les compliments" and "L'Éloge Funèbre (2) - ou la force et l'aureole", n° s 104, 105.

(\*\*) (12 May) With hindsight, however, certain reservations have emerged with regard to this impression, such as those referred to in a previous b. de p. note ((\*) p. 802). It also transpired that Deligne had omitted to point out to me two gross material errors in my notes, which he could hardly have overlooked (I had missed the fact that he revealed part of the 'yoga of the weights' in Hodge I in 1970, and

SGA 5 (from 1965/66) would logically depend on the results of SGA 4 1/2 (\*) (developed from 1973, alongside Deligne's lectures on his proof of Weil's conjectures). It is true that by "capturing" some of the talks given at the SGA 5 mother seminar (especially the one on the cohomology class associated with a cycle), with the connivance of Illusie (who was responsible for editing SGA 5) and many others, he obtained the brilliant result that SGA 5 is full of references to SGA 4 \*s, in such a way as to give the impression (to a reader who is not very attentive, or very well in the loop) that SGA 5 does indeed depend on SGA 4 1/2, which is presented in every respect as an "earlier" text. This is a sleight of hand that is undoubtedly unique in the annals of our science, and which seems to me to distinguish the seventies of our century from all the other eras that mathematics has known.

(<sup>164</sup> 1) As far as the 'philosophy of weights' is concerned, which stems from Weil's conjectures, the 'filiation' seems to me to be summed up as follows.

a) As stated in sub-note n° 46<sub>9</sub> of the note "My orphans". Serre had communicated to me, as part of the "philosophy" behind Weil's conjectures, a sort of "yoga of *virtual* weights", at the level of the A-adic cohomology of finite type scheme over a body. He had not tried to give a precise explicit formulation, and the relationship between what happened for different A's remained entirely mysterious.

b) One of the two main motivations that guided me from the early sixties onwards, to develop a 'yoga of motifs', was precisely to link together the 'virtual weight structures' for different A's. (See on this subject the note 'Souvenir un rêve - ou la naissance des motifs' (Remembrance of a dream - or the birth of motifs), and in particular p. 208. (On this subject, see the note "Souvenir d'un rêve - ou la naissance des motifs" (n° 46), and more particularly p. 208). From then on, . it became clear that this structure had to be found on all possible 'realisations' .

of a pattern, not just the A-adic realisations - and in particular over the base field C) on the De Rham-Hodge production.

c) Having been made aware by me of this philosophy of virtual weights, the ultimate source of which is motive, Deligne adds an important clarification to this yoga, with the presumption that the

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that he had been talking about motives since 1979).

(\*) It is true that this statement was made, not on Deligne's spontaneous initiative, when he came to give me 'material details' to enlighten me and show his complete good faith, but under the unexpected pressure of the need to 'keep face', when I had just told him in person how I felt about the incredible SGA 4 1/2 - SGA 5

operation. On this subject, see the last part (18 February) of the previous note "Duty done - or the moment of truth".

structure of virtual weights on a pattern is linked to a *filtration* (necessarily canonical) by *increasing weights*. This filtration should therefore be found on all realisations of the pattern - both the A-adic realisations and (on the C body) the De Rham-Hodge realisation.

This "presumption" of Deligne was the starting point of his theory of "mixed" Hodge structures (which I call "Hodge-Deligne structures"), and one of the two essential technical ingredients of his formal definition of them (the other being De Rham filtration, which I had introduced as early as the 1950s). It was the success of his attempt to describe a "Hodge cohomology" for separate schemes of any finite type on

C, which can be considered as the main (if not the only) 'evidence' that we have to We are now discussing the validity of the "presumption" that weights are filtered from patterns.

Of course, it was part of my major programme of work on motifs, of which Deligne was informed first-hand and on a day-to-day basis, to make explicit a notion of "Hodge coefficients" on a finite type scheme over C, such that a "Hodge realization" corresponds to a pattern over X, and that for smooth and pure patterns over X (e.g., a "Hodge realization" corresponds to a smooth and pure pattern over C), a "Hodge realization" corresponds to a smooth and pure pattern over C.

When we take the "motivic cohomology on X in dimension  $i$ ", we find the notion (more or less already known) of "families of Hodge structures" (studied in particular by Griffiths in the 1960s). Moreover, for a variable X, these categories of "Hodge coefficients" had to satisfy a formalism of six operations, reflecting the same formalism at the level of patterns. Deligne's contribution represents a first step towards the fulfilment of this programme - namely (essentially) the description of the category  $\text{Hdg}(X)$  for X reduced to a point (\*), and that of the "realisation" functor i.e., essentially, the construction of a cohomological theory on

(C-separated schemes of finite type, with values in this category of Hodge- structures) Deligne.

(<sup>165</sup>) (22 February) Since his visit last October, and even since his letters at the end of August (\*\*), my friend Pierre has been with me, the cream of the ex-students and the good boys, full of the best.

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(\*) To do this properly, Deligne's definition would have to be supplemented by the introduction of a suitable *triangulated* category  $\text{Hdg}$  (is this also the category derived from  $\text{Hdg}$ ?). That he failed to do so seems to me to be one of the first signs (among others) of the disaffection with the yoga of derived categories and the six operations that prevailed until the "turning point of the perverse Colloquium" in 1981.

(\*\*) See the note "Le devoir accompli - ou l'instant de vérité" (n° 163), where I 'situate' this visit, as follows

He was obviously touchingly willing to clear up the unfortunate misunderstandings that had crept in between us, and to make me feel his goodwill and good faith. It had been agreed that he would keep confidential, until the planned pre-publication of *Récoltes et Semailles* by my university (USTL), the content of his readings of my notes, and even their existence. I don't know whether he was entirely true to his word - but I do have the impression, from various echoes that have come back to me (\*\*\*)<sup>1</sup>, that he must have said something to both of them, to suggest that this might be a good time to show some thoughtfulness to the master (the one we sometimes talk about in small groups, but carefully refrain from naming in public...).

I have the impression that, deep down, my friend doesn't believe (or doesn't want to believe, at least) that I'm actually going to publish *The Burial*, at the same time as the first part of *Harvest and Sowing*. This is very much in keeping with the image of the 'sugar daddy', scrupulous about naming anyone who might feel sorry for him, and quite willing to admit in public the various failings of his own making that come to mind. The reading of this section on 'Fatuity and Renewal', of which I heard a brief echo before my friend went on holiday and before I sent him the introduction to *L'Enterrement*, did not worry him in the least, quite the contrary - it would rather have stimulated an air of self-satisfaction that has become quite familiar to me in him - this air that is a little condescending or at least protective towards the master who is now decidedly dead. It's not at all the same with *L'Enterrement*, where the cards are suddenly laid squarely on the table! I suspect that reading the introduction must have come as a shock to him - and it's a pity I wasn't feeling it at the time, perhaps something would have happened. Anyway, he

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"than the two letters of the end of August (received after the silence of nearly two months, which had followed my sending the introduction and the table of contents of the *Burial*).

(\*\*\*) For example, I received an undated *Illusie* preprint (I imagine it must be last-minute) from a paper from an unnamed seminar (a paper which, it is specified, does not correspond to any oral presentation in the seminar). Incredibly, my name appears in the title, but yes: "Deformations of Barsotti-Tate groups, after A. Grothendieck", by Luc Illusie! And in the introduction there's more 'Grothendieck' than you can shake a stick at - I thought I was dreaming. Something must have happened...

There was a letter with it, in which he asked for my advice on points of homotopic algebra in the style of Grothendieck, and wondered why "people (i.e. Quillen et al.)" in *K-theory* work with bundles rather than with the complexes (pseudo-coherent or perfect) of the panoply I introduced more than twenty years ago. One wonders why... In my reply, I must have implied that it wasn't up to him or any of my ex-students to ask me such questions. I haven't heard from him since.

gave himself time to compose himself, before coming to see me, out of the blue, five minutes before he was due to move to the United States. And he turned up in such good spirits, and the meeting took place in such a family atmosphere, so 'cakey', that it seems to eliminate, 'par l'absurde' so to speak, that the aforementioned sugar daddy could himself take seriously a certain text that hardly resembles him (let's say no more about this text, which is best forgotten.... ), or even circulate it among people who are just as reasonable and 'good' in every way, as my friend Pierre himself and as the ex-deceased as he always knew him... (\*).

As he had promised, and in the very days following his return to Bures, my friend sent me this biographical note that he had mentioned to me, which he had written in 1974 (or 1975) for the Fonds National de la Recherche Scientifique (Belgian) (\*) It's a fairly short text, two short pages, which I read with interest at the time and which I have just reread (this is the third reading, I think). At first glance, though, I didn't get the impression that there was anything new in the text, and that it deserved a closer look in L'Enterrement. It is true that the technique of escamotage, with which I was already sufficiently familiar in my friend's work, is illustrated here in a particularly striking way, in a compact text of about a hundred lines. My name appears four times (as does Serre's, and Weil's three times) - with nothing to suggest that he may have met me other than as an anonymous listener at my seminar (on an unspecified theme) in 1965-66. In three of the four passages where I am mentioned, I am mentioned in the same breath as another mathematician (twice Serre, once Rankin), so as to avoid giving the impression that I might have played some kind of special role with him. This is a technique that has already proved its worth elsewhere (\*\*). As it won't take long, I'll take the liberty of quoting in extenso the three passages in which my modest person appears,

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(\*) However, at no time was there any hesitation in my intention to make all my notes on the Burial public, in the same way as the first part of Harvest and Sowing; and I have, of course, left no ambiguity on this subject.

(\*) This biographical note is mentioned for the first time in the last footnote to the note "Le nerf dans le nerf - ou le. nain et le géant" (n° 148). See also the end of the previous note n° 164 (part V 2).

(\*\*) I'm thinking here of the laconic one-line reference, quoting Serre (without naming him) and "the Grothendieck's conjectural theory of motives", in Deligne's announcement (at the Nice Congress) of his results in Hodge theory. For further details and comments, see sub-note n° 78f of the note "La

to enlighten the reader who, like me, does not have the text of the biographical note. The third paragraph follows on from the reference (just made) to the year 1965-... 66, spent "in the ideal atmosphere of the École Normale Supérieure as a foreign boarder" (\*\*\*) :

"In Paris, I attended Grothendieck's seminar and J. P. Serre's course. I had three hours of lessons a week but, despite a lot of hard work, the rest of the week was barely enough for me to assimilate them <sup>(165)</sup> 1). From Grothendieck I learned the modern techniques of algebraic geometry, from Serre the fascinating beauty of number theory <sup>(165)</sup> 2). Serre's lectures were devoted to the theory of elliptic curves, where... ",

to continue on the charms and variety of these Serre courses. Readers who are not in the loop will think that it was these courses, three a week, that were the object of the 'happy and relentless work' referred to by the author (implying: no work is needed to assimilate the 'greatest natural generalities' of a Grothendieck seminar...). ( ).<sup>165</sup> 1

In the fifth paragraph, in connection with his demonstration of Weil's conjectures, we read:

"My most notable achievement was to prove the 'Weil conjectures' (...). I probably did this because I am familiar both with Grothendieck's work and, in a completely different field, with Rankin's work on modular forms."

You'll admire the dubious 'sans doute' (no doubt) and the 'dans un tout autre domaine' (in a completely different field) suggesting that my work has nothing to do with modular forms (\*)), and above all the 'tant avec' (so much with) with which I have the honour of being introduced, to put on the same footing

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victim" (n° 78).

(\*\*\*) For some reason that escapes me, Henri Cartan is not named here. Perhaps it is because Deligne, encouraged by a certain deliberate statement I made about him (see the note 'L'être à part', n° 67<sup>2</sup> ii, was anxious to avoid any appearance that he might have been someone's pupil. The situation of 'normalien' immediately gives rise to the association of ideas 'pupil of Cartan', and such an association would have been strengthened by mentioning Cartan by name.

(\*) It is true that 'modular forms' represent a regrettable hole (among many others) in my mathematical culture, just like the analytical theory of numbers, which I've never yet 'got to grips with'. But I am sufficiently well informed to know that an understanding of the mo-

foot of the extensive groundwork I had done (\*\*), with a 'one-off' technical idea borrowed from Rankin.

Finally, in the next paragraph, which refers to Deligne's work on Hodge theory, it is stated:

"Inspired by arithmetic, and more particularly by Grothendieck's conception of the deep meaning of Weil's conjectures, I generalised (in a non-trivial way) his theory to the case of arbitrary varieties and (in collaboration with Sullivan) to other invariants of "form" than cohomology alone. The roots of this theory go back a long way, with Picard's treatise on "algebraic functions of two independent variables" ((. around 1890)), but today we probably know little more than a vague skeleton."

I had to take the trouble to recopy this passage to realise that 'Grothendieck's conception of the profound meaning of Weil's conjectures' was my brilliant ex-student's masterly 'thumb' way of not naming the *words*, although he could not be reproached for having passed them over in silence! There is no doubt that 'his [hence, *my*] theory', about which I am only now wondering (this whole passage had escaped my attention in previous readings), can only mean the famous theory of motives, which there was no question of mentioning by name for four years already (and which will not be mentioned again for another eight years i). The formulation was even so vague and, to put it bluntly, incomprehensible except to a small handful of people in the know (who no doubt will not have had the opportunity, as I have since, to read this pre-Funeral Eulogy), that it was not even worth pointing out here that this 'theory' (which he had generalised) was, however, entirely conjectural! The 'generalisation' in question can hardly mean anything other than the Hodge-Deligne theory, given the context. This is a little symbolic satisfaction that my friend is giving himself, by asserting here (without fear of ever being contradicted, given the location, and the vague elusiveness)

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dular forms is hardly conceivable without the ideas coming from algebraic geometry, which gives the theory its "geometric" content, and that the most profound questions of the theory of modular forms are intimately linked to the presence (for a long time tacit) of *motifs*. As we shall see, they also appear, just as tacitly, in the next paragraph of the biographical note (aka Funeral Eulogy (3)!).

(\*\*) On the notion of schema and the development of a formalism of scalar cohomology, to which Deligne is careful to allude to, except in the preceding quotation by the kindly and impersonal euphemism "modern techniques of algebraic geometry".

of formulation) that the Hodge-Deligne theory (which is still in its infancy) would "generalise" the vast picture of motifs that I had shown him. In the latter, however, a fully matured 'Hodge theory' appears as one of the 'planes' of the picture among many others (\*). As for "other invariants of form", it was "well known" to me from the sixties (as part of my "yoga of motives") that "arbitrary" algebraic varieties (as Deligne insists) had a "motivic homotopy type", whose higher  $\square_i$  ( $i \geq 2$ ) generalise the motivic "geometric" fundamental group, and can be explained (for a given fibre functor on a field of numbers  $K$ ) as affine algebraic pro-groups on  $K$ .

As for the reference to Picard as the 'root of this theory', it seems to me that this is an entirely bogus passage, introduced for the double reason of 'doing good', and at the same time introducing the final paragraph, which immediately follows it (\*). The term 'vague skeleton' also seems to me to be the expression of another 'symbolic satisfaction' that my friend is paying himself, by treating inwardly and yet without appearing to do so (always in the same 'thumb!' style) this vast vision from which he has secretly drawn inspiration while keeping it buried (\*\*), as nothing more than a 'vague skeleton'.

In the end, these all-purpose escamotages turned out to be more interesting than I had anticipated, when I was about to point them out in passing, out of a sense of conscience.  
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(\*) (27 February) For further details on this subject, see in particular the note "La Mélodie au tombeau - ou la suffisance" (n° 167).

(\*) This final paragraph will be the subject of the note (n° 165) which follows this note.

(\*\*) The vision of patterns has remained 'buried' in two ways. On the one hand, with regard to the *outside world*, the mathematical public, by refraining from any allusion to the notion of pattern (except in the half-line "thumb!" of Hodge I,<sub>1</sub> in 1970, cf. note 78<sup>¶</sup>), until 1982 when the notion was exhumed "with great fanfare", under the tacit paternity of Deligne (see notes n° 51 and following). But on the other hand, even for his own personal use, I see that this vision was stripped by Deligne of its true *souffle*, of what made it *something other* than a collection of all-purpose recipes (for finding one's way around the cohomology of algebraic varieties), but a dreamforce vast and deep enough to serve as an inspiration, a line on the horizon, for perhaps generations of arithmetical geometers.

The term "vague skeleton", with which Deligne refers (always tacitly) to this vision, captures the *gravedigger's* attitude in which he maintains himself, in his relationship to this dream and to the worker from whom the dream springs. These are not the attitudes in which one can still feel a breath (as he had once felt), nor embody a dream. You don't embody a dream by *using* it for your own ends (and denying it at the same time...), but only by *making yourself its servant*.

What strikes me most about it now is not (as it did on my first, quick and superficial readings) the perfection of the "pouce !" style, already familiar to me to no end, but rather that this text, written nine years before the *Éloge Funèbre* (\*\*), foreshadows it in a striking way, and this (it seems to me) in two ways. On the one hand, through the *vague* rigour that must surround every appearance of my modest person (as opposed, here, to the luxury of technical detail that accompanies the evocation of Serre's course). On the other hand, and in the same vein, by the complete silence that is shown around étale or A-adic cohomology, as a new and essential tool that I developed out of nothing, and without which Weil's conjectures would probably not be demonstrated even a hundred years from now! In fact, as in L'*Éloge Funèbre*, the word "cohomologie" is not mentioned in connection with my name - nor is there any allusion to the fact that Deligne's demonstration of Weil's conjectures was simply *the last step* in a long journey, the longest and most innovative part of which was accomplished by someone other than him, even before my brilliant pupil appeared on the mathematical scene (\*).

<sup>(165)</sup> As I point out a few lines further on, the wording irresistibly suggests that the "three hours of lessons a week" refer to the "lessons given by J. P. Serre" just mentioned, and which will be mentioned again two sentences later. The fact is that Serre only gave one lecture a year (at the Collège de France), for one hour a week. If we try to remove the ambiguity by interpreting the text as referring to Serre's "courses" during successive years (contrary to what the context suggests), we come across another inconsistency, because Serre changed his subject every year, and by no means limited himself to elliptic curves (as is stated two sentences later).

While Serre's person is used here by my friend to try to give the lie to the role that was mine in the crucial years of his training as a mathematician, it is interesting to note that the one and only reference that I know of in the literature, where it is said that Deligne was my pupil, is from the pen of Serre, who thus repeats (without pointing them out) the flagrant omissions of my brilliant ex-pupil himself. This is a report by Serre in May 1977 on the work of Pierre Deligne, for the

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(\*\*\*) see the two notes "L'*Éloge Funèbre* (1) - ou les compliments" and "L'*Éloge Funèbre* (2) - ou la force et l'aureole", n° s 104, 105.

(\*) This contribution by another is glossed over by Deligne under impersonal terms such as "techniques [or elsewhere, "powerful tools"] of algebraic geometry".

International Committee responsible for distributing the 1978 Fields Medals. This report was made public after the Fields Medals were awarded at the 1978 Helsinki Congress. The report begins as follows:

"Deligne's first works, directly inspired by Grothendieck, whose pupil he was, concern various technical points of algebraic geometry. I shall confine myself to mentioning them: . . ."

Later, Serre also mentions the influence of my ideas and results in the proof of Weil's conjectures, and (via motives) in Deligne's work on modular forms, but not in the Deligne-Mumford work on the modular multiplicity of algebraic curves of type  $(g,i)$ , nor in the idea of Hodge-Deligne cohomology, whose relation to the yoga of motives and Weil's conjectures seems to have escaped him. (It is true that Deligne did his best to hide it).

The speech on Deligne on the occasion of the award of the Fields Medal would have been another opportunity, in accordance with established practice, to publicly\*-recall this link to me which had been kept quiet until then by the person concerned. For some reason that escapes me, the mathematician in charge of presenting Deligne's work was not J. P. Serre, but N. Katz, the 'co-author' with Deligne of SGA 7 II (see note no.<sup>o</sup> 164 (II 5)). Needless to say, N. Katz makes no reference to the link in question, even though he knew it well and had first-hand knowledge of it (on the other hand, he makes good, in passing, a number of rather embarrassing omissions about me by the illustrious laureate...).

(<sup>165</sup>) The choice of qualifiers here ('modern techniques' for me, 'fascinating beauty' for Serre) is certainly no accident. I can clearly see in it my friend's intention to (symbolically) evacuate the very *fascination* which, from the moment we met (and perhaps even before that) bound him to my person and my work, which he saw being made and unfolding before his eyes, day by day.

On other occasions, I have noticed a deliberate intention on the part of my friend to view and present my publications (in particular the EGA ("Eléments de Géométrie Algébrique") and SGA ("Séminaire de Géométrie Algébrique du Bois-Marie") as a sort of "compilation" of more or less technical results, which "everyone" has always known, and for which I would make the praiseworthy effort of putting them down in black and white, in order to provide at last

the missing references and that they would not be mentioned again. He knows, however, what he's talking about: that each of the volumes of the EGA and SGA presents ideas that I introduced and of which for years I was the sole owner and advocate, and techniques that no one had dreamt of (except me), and which I had to develop, test and perfect with tireless patience, before they were perfectly honed, ready to enter the realm of the 'well known'. He knows this better than anyone, but at the same time, this deliberate intention that he has displayed for more than a decade has ended up becoming 'second nature', and he himself has become the first (if not the only) dupe.

I was struck by this only a few weeks ago, when my friend, who had been very thoughtful towards me since his visit in October, sent me a copy of an exchange of letters with Dr Heinze (in charge of 'Ergebnisse der Mathematik' at Springer) about a project to republish EGA (many volumes of which are out of print or about to be). In his reply, Deligne unreservedly recommends the complete republication, "ne varietur" to little avail, saying that with one exception (the second part of EGA III, where the presentation would have been better using the derived categories *sic!*), this treatise "has aged very well". Its great merit is that it provides indispensable references: "Thanks to it [EGA], in algebraic geometry (as opposed to analytic geometry, for instance) one can march securely on the ground without having to worry if this or that is indefed in the littéra- ture". (He goes on to make a number of constructive suggestions about possible appendices to some of the volumes, and about mathematicians who might be able to provide them...)

It is typical of Springer's relationship with me that this correspondence (about a republication of books I had written) continued *with Deligne*, without Springer having thought it necessary to inform me of the project beforehand. It was more than a month later (in a letter dated 24.1) that Dr. Heinze mentioned to me in passing, as if as a matter of conscience, that Mr. Professor Deligne "had been so kind to give me a copy of his letter of 19.12.84<sup>✉✉</sup> (that was really too kind...), and that "of course, we [Springer] would be interested to know your opinion on this subject [the republication project]" (that is really too much of an honour...). I replied that, in view of Spinger's publishing procedures (they were thinking of publishing SGA 7 and SGA 5 in Lecture Notes, without even informing me, let alone asking for my agreement), it seemed to me perfectly superfluous to inform Springer Verlag of "my

opinion", which is clearly irrelevant. That's where things stand...

(<sup>166</sup>) (23 February) In the end, I didn't get to my real point yesterday, when talking about my friend Pierre's biographical sketch. The encounter with the 'vague skeleton' (aka, theory of motives) was an unforeseen episode, just as I was about to move on to the final paragraph of the notice, immediately following the last passage quoted. So here, at last, is the final word in the 'biographical note', which is what I wanted to get to from the start:

"To conclude, I would like to emphasise how precious contact with the work of mathematicians of the past (from 1800 to the present day) is to me, whether direct or relayed by scholars more erudite than myself, such as A. Weil and J. P. Serre. We 'are dwarfs perched on the shoulders of giants', and the most beautiful modern mathematical theories are motivated by the hope of solving some of the problems they bequeathed us.

Pierre Deligne

As is often the case, my first reaction to these lines, a sort of profession of faith in this case, stopped at the surface, at the literal meaning - but I must have sensed, however, that beyond the literal meaning there was something fishy going on. This quotation (from a famous mathematician, no doubt, whom I was supposed to have read, 'like everyone else') didn't come back to me. I sensed a deliberate attempt at modesty, even humility, which had all the hallmarks of a pose, and which simply didn't correspond to the simple reality of things. If each generation were 'smaller' in size than the previous ones, the human race would have long since died out, reduced to a paltry mass of homunculi! I'm well aware that human creativity is no less today (and no doubt no greater) than it was a hundred years ago, or a hundred centuries ago. I am also well aware, speaking only of maths, that the ideas and work of people I have known well, without excluding myself from their number, would have been to the credit of even the greatest mathematicians of the past. And I am also well aware that my motivation in doing maths, and certainly not that of most of my former friends in the mathematical world (\*), does not lie in the 'hope of solving some of the problems' bequeathed by my predecessors.

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(\*) Including, incidentally, Pierre Deligne himself!

! If it were otherwise, our science would be powerless to renew itself - it would have ceased to be creative.

What must have shocked me even more about this borrowed profession of faith, or to put it better, *pained* me, was that I was well aware above all that the person who was making it, more than any other person in the world that I had known, had been given 'means' that had amazed me, and that I had also known him to have a 'freshness' in his approach to mathematical things, by which he was called upon to do great things, as few mathematicians have had the privilege of doing. There was a sadness in me, and also a kind of spite, because behind the *pose* of someone who claims to have found humility in dealing with the great men of the past, I sensed an *abdication*. An abdication of that creative force within him, which he seemed to have forgotten a very long time ago, and which made him *something* quite *different* from what was suggested by that derisory image of the dwarf perched on the shoulders of a giant (\*).

This is the first time, since I first read the biographical note, that I have tried to pinpoint the feelings that this reading first aroused in me. In the days that followed, and without any deliberate intention on my part, it continued to work. It was this last passage in particular that kept running through my mind, like something decidedly unusual that hadn't 'gone away'. Behind the apparent absurdity of the profession of faith that closes this<sup>3</sup> short biographical text, I must have sensed a *meaning*, which was no doubt directly perceived at an unconscious level, and which gradually rose to the surface layers, without there being any reflection as such, as far as I can remember. After all, I knew that my friend Pierre was not in the habit of haunting the writings of the past any more than I was. While he certainly read more than I did, it wasn't the old grimoires, but rather the latest reprints and preprints circulating in well-informed circles, of which he was always the first to have access. And I also knew that it was not from Picard or other venerable precursors of the last century, or even of this century, that my friend had drawn the inspiration that had nourished his work since (and even before) my departure from the mathematical scene! And if it is indeed true that he had enjoyed 'perching on someone's shoulders', not in a public and rhetorical profession of faith, but secretly and *genuinely*-

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(\*) (25 February) This impression of 'abdication' is strongly associated with that created by a certain 'third part' of my Éloge Funèbre. See the reference to it at the end of the note "L'Éloge Funèbre (2) - ou la force et l'auréole" (n° 105), p. 459-461.

*ment*, I was, after all, in a good position, since I had been thinking about a certain funeral, to know *who* had been the one who was, in a way, paying for it 1 In place of the one who is never-named (\*\*\*) (and who nevertheless remains ever-present...) we verbally substitute 'the great men of the past', to whom, in the preceding paragraph, we have just tacitly attributed the authorship of the motives (alias 'what is scarcely the case today').) we verbally substitute 'the great men of the past', to whom in the previous paragraph we have just tacitly attributed the paternity of the motives (alias 'what today is little more than a vague skeleton') - thus making the *true* identity behind the substitutionary figure more striking...

I have observed many times that there is a force in man, apparently of a universal nature, that pushes him to express against all odds, often in a roundabout and symmetrical way, desires and intentions (both conscious and unconscious) that cannot be manifested openly, thus giving them an outlet and satisfaction that may seem derisory (in 'rational' terms and according to the current consensus), but which are nonetheless substantial. It is a force, in a sense, that pushes us, as if in spite of ourselves, to proclaim the truth of our being to whoever will listen (and there is indeed 'someone' in each of us who has a keen ear. . . ), *even though* what is 'proclaimed' in this way would be the greatest secret and would be anathema, both to others and to ourselves. The ideal terrain for the expression of this force is the dream, and this is one of the reasons why the dream is the most powerful key of all to our self-knowledge. But because of the intimate, personal nature of dreams, which speak to us about ourselves to no one but ourselves, this means of expression is by no means sufficient for us, since it is improper to assert the truth of our being *before others*, and even, symbolically, before the whole world. It is thanks to this that behind every piece of nonsense that seems to defy reason, a 'meaning' is hidden - or to put it better, nonsense is the *privileged means of expression*, chosen by the unconscious with infallible instinct, to *proclaim this meaning*, both hidden and ostentatiously displayed for all to see (\*)!

That's probably what I felt darkly, in the days that followed my reading of this 'nonsense'<sup>1</sup> : the 'dwarf' (born to be a giant) perched on the shoulders of a 'giant'.

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(\*\*\*) Or, if we can't avoid it, we call it "by the tape", in the de rigueur "inch!" style... (\*) For another particularly ostentatious example of a *meaning* proclaimed by apparent nonsense, see the note "The joke - or 'weight complexes'" (n° 83). See also the comments in the note "The surface et la profondeur" (n° 101), particularly at the end of the note (p. 440), and in the note that follows it, "Éloge de l'écriture" (n° 102).

(with much more modest means than those of the so-called 'dwarf', perched on top of him while denying him... ), one of the reasons (\*\*) for my difficulty in becoming clearly aware of the *meaning* revealed by this nonsense was undoubtedly my reluctance to recognise myself in this cookie-cutter image of the 'giant'; or rather, perhaps, to recognise myself in a certain *pose* or *brand image* which was indeed mine and which, through the unexpected medium of this grating nonsense, suddenly appealed to me! It wasn't until weeks later, in the note of 18 December "Le nerf dans le nerf - ou le nain et le géant" (n° 148), that I finally returned to the unusual image of the dwarf and the giant, this time by working on the pieces, at a time when the context of my reflections on L'Enterrement was just about ready for it.

This image immediately revealed itself (on the very same day) as a crucial 'image-force' for understanding my friend's relationship to me, and more profoundly and above all, for the beginning of an understanding (destined no doubt to remain forever fragmentary) of my friend's relationship to himself, that is to say, also of the particular form taken by *the division in his own person*. And insofar as the Burial was implemented, above all others, by my friend, ex-pupil and ex-heir (\*), it is this same image that now appears to me as the neuralgic force obstinately at work throughout this long Burial, as its true *nerve*. It is at the centre of my thinking in the fortnight following the crucial moment of its appearance in the notes, throughout the nine notes that follow, between 18 December (with the note already quoted, "Le nerf dans le nerf - ou le nain et le géant") and the note of 3 December, "Le Frère ennemi - ou la passation" (n° 156).

The 'validity' of this image's role as a neuralgic force in my thinking

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(\*\*) Another reason, which seems to me to have been the main obstacle, is a certain *inertia*, or more precisely, a kind of pusillanimity in 'believing the testimony of one's eyes, even though what one sees is quite unheard of, never seen before and ignored and denied by everyone'. I was confronted with this again recently in the note "Le devoir accompli - ou l'instant de vérité" (n° 163). See in particular the b. de p. note (\*\*) on page 782, where I explore this kind of 'incredulity' in the face of the obvious. ...

(\*) It is true that in this "implementation", he acted in close connivance with "the entire Congregation". But it is possible that the same image of strength that I perceived in my friend was also present in him. (See the note "Le Fossoyeur - ou la Congrégation toute entière", n° 97.) But it is possible that this same image-force that I perceived in my friend was also present at the level of a "collective unconscious" in the said Congregation, finding expression in the individual unconscious of many of its members, and in particular, in some of those who were my pupils (and not only in Deligne).

(12 May) This intuition has come a long way since these lines were written, and now it imposes itself on me with the force of evidence. On this subject, see the note "The messenger (2)" (n° 181).

The question of the *reality*, in the psyche of my friend himself, of such an image-force, expression of deep conflicts and motor for irrepressible acts of compensation (\*) - this question, it seems to me, cannot be decided by a 'demonstration', i.e. by a so-called 'objective' approach which would be supposed to win the support of any interlocutor of good faith and sufficiently informed. As far as I'm concerned, there is no doubt about this reality, and my deep conviction is *not the* result of such a 'demonstrative' approach. It is true that it has deepened in the course of the fifteen days of reflection mentioned earlier (a reflection which I will not attempt here to summarise or assess). But it was there from the very first day - from the moment I took the trouble, for the first time since reading the book, to write down in black and white what it inspired in me, as if dictated by a silent voice (\*\*) that would have 'reminded' me of what, deep down, I already 'knew'. I had to 'know' it, by means of faculties of perception that are by no means extraordinary, but incomparably more unleashed than those we commonly allow to come into play at the level of a *conscious* awareness of things. These mechanisms of repression of what is perceived 'somewhere' within us, and which does not 'fit' with the routine logic of our received ways of seeing (or rather, of *not* seeing) the reality around us - these mechanisms, needless to say, are as strong in me as in anyone else. If there is a difference in this respect between me and others, it is that I have come to realise their silent action in me, and especially since I sometimes 'meditate': that I sometimes take the trouble, prompted by an indiscreet curiosity, to *put down* on these things that I wish to know, which has the effect of *bringing to* the surface of consciousness what was obscurely perceived in the deeper layers and of giving it form.

The initial perception is transformed in the course of the *work*, which gives it shape and brings it out into the open. This work is at the same time a *decantation*, through which little

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(\*) By using the term 'irrepressible', I in no way mean to suggest that the presence of this force has become a kind of inescapable inevitability, beyond my friend's control. The action of such a force within us is 'irrepressible' only insofar as we take pleasure and persist in evading our knowledge of it, in order to cash in on the various benefits and gratifications that we 'buy' through this deliberate 'ignorance'. The price is exorbitant, it's true, but ignoring that price too is part of the same deal.

(\*\*) This image of 'dictation' by a 'silent voice' has occurred to me more than once, I think, in writing of *Récoltes et Semailles*, and each time as a matter of course. This is by no means the repetition of some 'stylistic effect', but reflects (it seems to me) a common aspect, more or less obvious from one situation to another, of the process of discovery.

little by little, the conscious translation of perception (into intelligible words) is freed from the subjective a-priori that have tainted it without my knowing it. In this case, one of these distorting a-priori (detected in the last of the notes quoted earlier) is the inveterate mechanism in me that leads me to 'see myself as yang', and this even in situations where, visibly, it is the yin side of my being, 'the woman in me', that provides the key to understanding (or at least, *one* of the keys, or one of the 'illuminations', indispensable for a nuanced understanding). I've spoken elsewhere about the *signs*, all 'subjective' but nonetheless unmistakable, that tell me the *progress* of such work (\*), and others too that warn me when I'm on the wrong track, or when there's a momentary stumbling block, which ends as soon as it's detected.

(<sup>167</sup>) (25 February) Most of yesterday was spent writing a long letter to a young colleague, Norman Walter, who seems motivated to take up pattern theory, unimpressed by a decidedly unpromising economic climate. This time it was eight tight pages (typewritten), on the 'six operations' for the most important categories of patterns and 'categories of coefficients'. This made me realise once again, with amazement, that in the twenty years or so that the question has been asked (admittedly, not in the literature. . . ), *none* of the 'good' categories of 'usual' coefficients (sic!) for the cohomology of schemes has yet to be *defined*, *with the sole exception* of the "A-adic coefficients" for A prime to the basic scheme X; and even then, this work, in the framework of course of the triangular categories (indispensable for the six operations formalism), done in Jouanolou's thesis, has never been published. I myself have never held a copy of this student's thesis work in my hands (\*\*). These are striking signs of the general disaffection with the foundations programme that I undertook in the sixties, and which I certainly would not have suspected would never be published.

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(\*) On this subject, see the note "The child and the sea - or faith and doubt", n° 103.

(\*\*) Jouanolou's thesis, written without any real conviction (which distinguished it from that of all my other 'students before I left'), took a long time to complete, and was not defended until after 1970. As with Deligne's thesis, I don't remember being informed of the examination, and even less being asked to sit on the jury. Jouanolou did not see fit to send me a copy of his work. I wrote to him last year to ask for one. He informed me (without comment) that, to his regret, there were none left . .

(12 May) My memory misled me here - in fact Jouanolou's thesis was defended as early as 1969. For more details on this subject, see the final note (not yet written at the time of writing) n° 176<sub>7</sub> , in the sequel 'The tenth nail (in the coffin)'.

would not continue in the same vein, but that it would be broken off (or "sliced up"...) as soon as I left the mathematical scene...

When the prime number A is *nilpotent* on the scheme X , the category of "A-adic coefficients on X ",  $Z^*(X)$  let us say (\*), should be none other than that of "crystalline coefficients", with *Frobenius* operation *F* and *filtration* at the end. The construction in form of this cat-

The triangulated theory, not to mention the six operations, is still waiting for someone to get round to it. As for the 'reconnection' of the 'ordinary' A-adic case (although nowhere to be found!) and the previous 'crystalline' case, via a 'mysterious functor' that I had already glimpsed in the late

sixty, to arrive at the definition of the category of coefficients  $Z^*(X)$  without restriction on A, it is still not done even in the simplest non-trivial case of all,  $X = \text{Spec}(Z)_A$  !

(\*) The sign \* after the indication of the base ring for the chosen theory (here, the ring  $Z_A$ ) indicates that we are working, not with "constructible bundles" without more (A-adic in this case, in a suitable sense) but with "constructible" *complexes* of bundles, objects of suitable triangulated categories (whose description in form can be tricky, even though the category of constructible bundles, in this case  $Z_A(X)$ , would already be known). When working with patterns (by which, more often than not, we mean "iso-patterns" i.e. "patterns with isogeny close to it", forming a Q-abelian category), the natural categories of coefficients for "realising" such (iso)patterns in them must themselves be Q-abelian, so here we will take  $Q_A(X)$ ,  $Q^*(X)$ . When we want to work with all A's at once, the most natural thing is to work with an "adelian" category of bundles (or complexes of such), whose base ring is the ring of adels  $Z^\wedge \otimes Z$  Q, obtained by "tensorising" the product of all the categories of coefficients  $Z^*(X)$  by Q.

Note that when the prime number A is not prime to the scheme X , then in the description of the "A-adic coefficients" on X , the nilpotent elements of  $Q_X$  cannot be neglected - they intervene in the neighbourhood of the fibre  $X(A)$  of X in A. A fortiori, the same will be true of the A-adic coefficients on X , which brings them closer to the coefficients (just as hypothetical for the moment) of De Rham-Mebkhout, which will be discussed in the next paragraph. In fact, I have the impression that the two main types of coefficients, the adelic coefficients and the De Rham-Mebkhout coefficients (on condition that the latter are provided with all the richness of structure alluded to below), are of comparable "fidelity", as (weakened) descriptions, or "realisations", of the same *motif*, very closely circumscribed by the one as by the other. On the subject of this 'fidelity', I put forward some conjectures in the 1960s, similar to those of Hodge and Tate (which my friend buried with the rest...). I intend to come back to them in the volume of Reflections that will be devoted to the 'vast array of motifs'. There is a strong kinship between the two types of coefficients (adelic, De Rham-Mebkhout, the latter taken here 'within isogeny'). The advantage of the latter over the former, which makes them appear "finer" in certain respects, is that the natural base ring for them is Q, whereas it is the ring of (much larger) adels for the adelic theory.

As for the De Rham-Hodge coefficients  $\text{DRHg}^*(X)$  (\*) for a general scheme, I had no precise idea how to describe them, and Deligne did not manage to define them in a really satisfactory way. The innovative idea here is due to Zoghman Mebkhout - and we know under what adverse conditions he had to work, and what was the fate of his person, once the scope of his ideas had been (very partially) recognised. The fact remains that we finally have a reliable guideline for approaching a construction in the form of  $\text{DRHg}$  categories\* ( $X$ ), in terms of conditions of finitude, holonomy and regularity on

"crystal" complexes (absolute - i.e. relative to the absolute base  $\text{Spec}(Z)$ ?), with perhaps the additional data of a "De Rham filtration" and another "filtration by the weights" - and with the hope that we will manage to do something, moreover, which holds up without being restricted to the null characteristic, and which for a given positive characteristic gives back more or less the "hatibuels" (sic!) crystal coefficients. The extraordinary thing is that I seem to be the only person in the world who feels the task - Zoghman Mebkhout himself, no doubt instructed by bitter experience, doesn't seem to have the slightest desire to reflect for even one more day on the fundamental questions of *his* philosophy.

! It would be wrong of me to be surprised, as I see Deligne preaching by example with the theory of Hodge, cutting short his own impetus, which had animated him "in my time" and given rise to an approach rich in promises (unfulfilled...). I suspect that the formalism (not even yet in limbo) of Hodge coefficients (above complex algebraic varieties  $X$ ) should be more or less contained in that of the coefficients that I used to call (following my language reflexes of the sixties) "De Rham coefficients", or also "De Rham-Hodge coefficients", to recall the link between the De Rham *filtered* object and the associated *graded* object (called "Hodge"). But given the crucial role of Mebkhout's philosophy in understanding these categories of coefficients (which are still hypothetical, of course), it would probably be better to call them "*De Rham - Mebkhout coefficients*" ( $\text{DRM}$  notation\* ( $X$ )) or, at a pinch, "*De Rham-Hodge-Mebkhout coefficients*",  $\text{DRHM}^*(X)$ . When  $X$  is of type on the field of  $C$  complexes, we should be able to reconstruct the hypothetical cate-

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(\*) (12 May) As we shall see below, this 'improvised' name and notation proved to be inappropriate. In the end I opted for the notation  $\text{DRM}^*(X)$  or  $\text{Meb}^*(X)$ , a dual of  $\text{DRD}^*(X)$  or  $\text{Del}^*(X)$ , for the coefficients of De Rham-Mebkhout and De Rham-Deligne respectively. The latter were left behind by their father in 1970, and adopted by me with full knowledge of the facts in the year of grace 1985, as one of the basic ingredients (along with the Mebkhout coefficients) of the Grothendieckian panoply...

gories of Hodge coefficients  $\text{Hdg}^*(X)$  (which I would certainly not call Hodge-Deligne, whereas Deligne seems to me to have done everything to hide the problem, far from highlighting it!), in a more or less "tautological" way, as well as the six operations above, starting from the De Rham-Mebkhout coefficients, to which we simply add an additional structure (of a transcendental nature) known as the "Betti" structure. It therefore seems to me that the main questions that arise for the description of the "categories of "natural" coefficients" for the cohomology of algebraic varieties (\*) are currently as follows

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- 1) Description of the category of  $A$ -adic coefficients  ${}^Z(X)$ , for  $A$  given prime number and for *any* scheme  $X$  (not necessarily "prime to  $A$ "), and of a formalism of the six operations for these coefficients. (This question appears more or less equivalent to that of the "mysterious functor").
- 2) Description of the DRM category\*  $(X)$  of the "De Rham-Mebkhout coefficients" for any scheme  $X$ , or possibly, analogous categories  $\text{DMR}^*(X/S)$  for relative schemes ( $\text{DMR}^*(X) = \text{DMR}^*(X / \text{Spec}(Z))$ ), and a formalism of the six operations for these coefficients.

It is possible that for 2) there are several possible variants, depending on the richness of structure that we decide to introduce into these coefficients. The "theorem of the good God" (alias Mebkhout) shows us a priori (for  $X$  of finite type on the field of complexes, at least) that there must exist a formalism of the six variances for crystalline coefficients à la Mebkhout, without having to introduce "on top of everything else" filtrations à la De Rham or/and by weight. A third important type of additional structure that will inevitably exist on the De Rham-Mebkhout crystal complex  $K$  on  $X$  associated with a pattern (or "absolute coefficient") on a general  $X$  scheme, will be the giving for any prime number  $p$  of a "Frobenius".

$$K(p)^{(p)} \rightarrow K(p),$$

where  $K(p)$  denotes the restriction to the subschema  $X(p)$  deduced from  $X$  by reduction mod.  $p$ , and where the superscript  $(p)$  denotes the Frobeniusé of  $K(p)$ , i.e. its inverse Frobenius image.

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(\*) In a sense, these questions are preliminary (or tacitly assumed to have been resolved) to the development of the yoga of motives with all the precision and generality that is its due, and which I saw as early as the 1960s.

$X(p) \rightarrow X(p)$ . Thus, depending on the additional structures (among the three we have just named) that we may propose to introduce on a crystalline complex, we can foresee a priori a total of *eight* variants for a notion of "De Rham-Mebkhout coefficients". It will only be possible to show us which of these variants actually give rise to a formalism of the six operations. It is also true that for the purposes of the yoga of motifs, when we set out to find simple 'algebraic' objects that 'stick' as closely as possible to the motifs, in order to describe their structure as faithfully and richly as possible, it is the 'richest' coefficients that a priori appear to be 'the best'. In fact, it is in their great richness that lies the main charm of Hodge's coefficients - to the point where we could even hope to reconstruct from scratch the category of patterns on  $C$  (if Hodge's conjecture were true), and even those of the patterns on all  $X$  of finite type on  $C$ .

This reminds me that it is possible for some of the structures to be "super-fetatory", that they follow from the others (but in a way that is, it is true, so hidden that it will be difficult to explain in down-to-earth terms) (\*). For example, on the De Rham cohomology (relative on  $S$ ) of a scheme  $X$  smooth on another  $S$ , I demonstrated (towards the end of the sixties) (\*\*) the existence of a canonical (absolute) connection without curvature, which I called *the Gauss-Manin connection*. It follows that the Hodge-Deligne structure associated by Deligne has a smooth scheme  $X$  on  $C$  (and surely even the one associated with any scheme of type

(\*) As a remark along the same lines, I would like to point out the need to pay attention to the possible compatibilities, more or less hidden, to be imposed on the set of structures associated with a given type of "cohomological coefficients". I am thinking here, above all, of the compatibilities (of a more or less algebraic nature) which are automatically realised in the case of "motivisable" coefficients (i.e., which arise from a pattern). It is plausible that they will have to be imposed in the categories of coefficients envisaged, if we wish to have a formalism of the "six operations" (independently even of the aim of "defining" the motives as closely as possible). I'm thinking in particular of the holonomy and infinite regularity conditions for Mebkhout coefficients, and also (if we use a De Rham filtration as an additional structure) the Griffiths conditions linking De Rham filtration and the Gauss-Manin connection. These examples make it quite clear, I suppose, to what extent the fundamental task of describing the "right" categories of cohomological coefficients, with the "six operations" constraint, will oblige us to explore and make full use of all the structures envisaged to date on the "cohomology of algebraic varieties", and the relations that can link these structures. In fact, from the outset, this was the main aim of the yoga of motifs - to provide a *unity* behind a disparity, and at the same time, a common thread for recognising oneself in this disparity.

(\*\*) (2 May) In fact, it was as early as 1966.

finite  $X$  over  $C$ ) is canonically equipped with such a connection, relative to the prime subbody  $Q$ ). If the motivic cohomology itself can already be reconstructed from of its "Hodge realisation", this means that on any Hodge structure that could be called "motivic" or "algebraic" (i.e. coming from a pattern), there would be such a canonical Gauss-Manin connection. It would not be difficult, therefore, to describe other, more subtle, canonical structures associated with a Hodge-Deligne structure, and whose existence "follows from the pattern": existence of operations of certain Galois groups profinis on  $\text{Bet}(K) \otimes_{\mathbb{Z}} \mathbb{Z}_A$  (where  $\text{Bet}(K)$  is the "network" underlying the Hodge-Deligne structure  $K$ ), and "Frobenius structure" on "reductions mod  $p$ " (for almost all  $p$ ). It is precisely this rich multiplicity of structures with no apparent links, whose hidden link is "*the motif*" common to all these structures - it is this richness that for me represented (and still represents) the particular fascination of the theme of the cohomology of algebraic varieties, and the fascination of "motifs", which are like the delicate common melody that gives life and meaning to this theme with its innumerable variations (\*).

If there is anyone, apart from me, who has heard and felt this melody and has allowed himself to be imbued with it for a long time, as it burst forth and unfolded before him, it is Pierre Deligne. If there is anyone to whom I entrusted something living, something delicate and vigorous into which I had put the best of myself, nourished over the years by my strength and my love - it was him. It was something made to unfold in the open, to grow and multiply - something that was seed and bosom, ready to transmit the life that was within it. This brief contact between yesterday and today was a bit like a *reunion* with something I'd lost sight of for a long time - a reunion with something I'd lost sight of for a long time - a reunion with something I'd lost sight of for a long time.

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(\*) March 26) After my short reflection on the (closely related) questions of the various types of "coefficient categories" (for "identifying patterns"), and the "algebraic conditions" that an "algebraic" cohomology class (i. e. coming from an algebraic cycle mentioned at the beginning of yesterday's note (n° 176), I have decided to include a reflection on motives, "coefficients", and standard conjectures, already in volume 3 of the Reflections (containing the last part of Harvest and Sowing). I now believe that I have the principle of a description in the form of "the" triangulated category of patterns on a diagram, at least in the crucial case (to which we should be able to reduce ourselves by passages to the limit) where the diagram is of finite type on the absolute basis  $\mathbb{Z}$ . The only new ingredient compared with my ideas of the sixties is the "philosophy of Mebkhout" (expressed by the "theorem of the good God"). In addition, I've supposedly solved the problem (which I'm sure you can now afford!) of the "mysterious functor", which plays a crucial role in the complete description I'm now envisaging.

not with words or concepts or inert objects, but with something filled with intense *life*. And this contact also made me realise once again that this 'thing' I had left behind is vast enough and deep enough to inspire the entire life of a mathematician who would give himself body and soul to it, and of other mathematicians after him - because his life would undoubtedly not be enough for the task (\*).

It's a strange and welcome coincidence that this meeting should have taken place at the very moment when I've just had another 'meeting', just as unexpected: the meeting with this text in which my friend expresses himself, while refraining from naming it, about the thing that was closest to my heart, of all the things I've put into his hands. "We probably know little more today than a vague skeleton. .

These words have continued to haunt me over the past three days. I recognise the smugness - the smugness of someone for whom "nothing is beautiful enough for him to deign to rejoice in it". And, without looking for it, the memory of the "*tomb*" (\*\*) came back to me. The same impression came back to life in me, expressed by the same silent, insistent image. This living thing that was dear to me, I had once thought I was entrusting it to loving hands - and it was in a tomb, cut off from the benefits of the wind, rain and sun that it languished for the fifteen years I had lost sight of it. Today I find her bloodless, "a vague skeleton... . .", the object of the condescending disdain of the man who was willing to *make use of her*, and who can never *give himself away*.

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(\*) (26 March) It now seems possible that I may have overestimated the scale (but not, admittedly, the scope) of the task. On this subject, see the previous b. de p. note, dated the same day.

(\*\*) On the subject of this strong and long-unspoken impression that haunted me after the "second round-nant" in my relationship with Deligne, see the note "Le tombeau" (n° 71).

## THE FOUR OPERATIONS

(on a body)

(<sup>167</sup>) (22 April) The name of the note that was to follow on from this one had long been planned: 'The Four Operations' (a name that will be explained in detail at the beginning of the next note (\*)). I thought I'd devote a note, or two at the very least, to this 'tidying up' (of an investigation that seemed finished at the time). Nearly two months have gone by since then, and given the influx of unexpected twists and turns, I haven't quite got round to it yet. A year on, it's as if the surprise scenario of the discovery of L'Enterrement is being repeated, albeit in a different key.

Finally, in the table of contents, the famous "Four operations" have come to designate not one note or two, but a whole copious set, a little cluttered I'm afraid, of *thirty* notes and sub-notes (\*\*). They are grouped into eight parts (1) to (8), with (I hope) suggestive names, from (1) 'The hoard' to (8) 'The sixth nail (in the coffin)'. Along the way, I had to rework from top to bottom the four notes (\*\*\*) that had formed the 'first draft' of the 'Four operations' (between 26 February and 1 March). I explained myself at the beginning of the note 'Le seuil' (n° 172) of 22 March (exactly one month ago), about this departure from the spirit followed everywhere else in the writing of Récoltes et Semailles.

The four notes in question are: '*Le silence*', '*Les manœuvres*', '*Le partage*', '*L'Apothéose*' (n° s 168, 169, 170, 171) (\*\*\*)<sup>12</sup>, devoted successively to an overall sketch of each of the four 'great operations' of concealment and appropriation, first in my work, then in that of Zoghman Mebkhou. I would advise the reader to confine himself first to reading these four notes, excluding the footnotes (which are more copious here than in any other part of Harvest and Sowing), and the sub-notes (which are also exceptionally numerous and extensive) referred to in the 'main' text. He could continue in this vein with the following four main notes

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(\*) (12 May) After splitting this former note "Silence" (n° 168) into four, the "next note" is "The four operations ("setting in order" an investigation)" (n° 167).<sup>13</sup>

(\*\*) (12 May) Since these peremptory lines were written, this number has increased by a further fifty per cent. and nothing proves that (like a sea...) it won't rise again...

(\*\*\*) (12 May) These notes, which had become prohibitively large, were finally split into several notes: s 168 (i)-(iii), 169 (i)-(v), 170 (i)-(iii), 171 (i)-(iv).

*Le seuil*", "*L'album de famille*", "*L'escalade (2)*", "*Les Pompes Funèbres - "im Dienst der Wissenschaft"*" (n° s 172-175), which are no longer technical in nature.

Readers wishing to take a more detailed look at the tortuous intricacies of these 'four operations' will be able to include the footnotes and sub-notes in a second reading, and even (if they have not read the first part of Burial, or if they feel the need to refresh their reading memories), to refer as they go along (as I have often done) to the passages of Burial I (or 'The robe of the Chinese Emperor') to which it refers extensively.

The essential content of each of the thirty notes that make up (or describe and comment on) "The Four Operations" is, in each case, non-technical. It seems to me that it can be understood by any interested and intelligent reader, even if he or she is by no means an expert in the cohomology of algebraic varieties, nor even a mathematician or even remotely 'scientific'. However, for those who are reluctant to get involved and get caught up in all the mysteries of the 'art of the con', I would particularly recommend the following sub-notes, which seem to me to be the richest in substance, and whose interest clearly exceeds that which can be gained by 'dismantling' the sometimes abracadabrious and always artfully put-together 'tricks' (for the use of those who just want to be bamboozled...). These are the sub-notes '*L'eviction*' (n° 169<sub>1</sub> ), then '*Les vraies maths...*', ' . . . and '*nonsense*"', "*Shenanigans and creation*" (forming the first three of the five sub-notes grouped under the name "The Formula") and finally the four sub-notes to the note "The Apotheosis" (n° 171), concerning the strange adventure of Zoghman Mebkhout: "*Eclosion d'une vision - ou l'intrus*", "*La maffia*", "*Les racines*", "*Carte blanche pour le pillage*" (n° s 171<sub>1</sub> à 171<sub>4</sub> ). These are eight sub-notes (out of a total of twenty-one (\*)) that I particularly recommend to the reader.

As for the other thirteen sub-notes, the reader who doesn't care about their 'documentary interest' could nevertheless read them, in moments of leisure, in the spirit in which he or she would read a romanesque detective adventure, where the improvised amateur detective (in my modest person) follows the trail and gathers the 'clues', some tenuous and elusive and others so enormous that no one could see them any more ; These clues eventually add up to a colourful and indisputable *picture* (of manners), in which a 'second Mon-

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(\*) (12 May) Now twenty-seven, not counting the sixth nail in the coffin (which has seven pleasant, delectable notes).

sieur Verdoux (alias Landru), smiling and affable, proceeds to cut up and carve up his innocent victims, under the tender (and even admiring) eyes of all the good people in the neighbourhood. They have long since become accustomed to the rather peculiar smell, which obviously doesn't bother anyone any more. Some of them have even taken a leaf out of the book of their friendly, clever neighbours, and the chimneys are purring and chirping like crazy.

The 'detective', fully edified, has only to tiptoe away: clearly, there is unanimous agreement here, and all is for the best in the best of worlds...

(<sup>167</sup> <sup>¶</sup>) (26 February) (\*) It seems to me that I have come full circle, more or less, on Burial. An incomplete tour, to be sure, and a provisional one - but for the moment, I don't think I'll go much further. I feel I need to take a step back, and that now is the time to finish. All that's left for me to do is to take stock of what I've learnt in the course of this impromptu meditation that was the writing of Harvest and Sowing.

By far the largest part of my work has been the reflection on Burial. This reflection continued on two distinct levels. First of all, after the much-needed 'act of respect' that was the double note 'Mes or-phelins' and 'Refus d'un héritage - ou le prix d'une contradiction' (n° s 46, 47), there was the gradual discovery of the Burial 'in all its splendour'. I'd been sniffing it for seven or eight years - this 'wind of discreet derision' towards a work and a certain style, and this equally discreet, unflinching 'end of refusal' reserved for those who still pretended to be inspired by it and who, in one way or another, 'bore my name'. This is the aspect of Burial, by a fashion and by a "flawless consensus", which is examined in the note "The Gravedigger - or the entire Congregation" and in those that precede it (n° s 93-97), forming Cortège X alias "The Funeral Van". This aspect, which had remained unclear over the past few years because I hadn't bothered to give it any detailed thought, became considerably clearer in the course of the work, without, however, adding anything genuinely new for me.

The new development, however, which I was confronted with for the first time on 19 April last year, or the 'news item' if you like, is a certain large-scale *operation* which

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(\*) This note, which was originally intended to be called 'The Four Operations' and to follow on from 'The melody at the tomb - or sufficiency' (note no.° 167), predates by almost two months the note (of an introductory nature) which precedes it, 'The detective - or life in rosé' (note no.° 167<sup>¶</sup>). I advise you to read the latter first.

was built around my work, and that of the only mathematician who, after I left the mathematical scene, took on the thankless and perilous role of 'Grothendieck's successor': Zoghman Mebkhout.

The discovery on 19 April (of the 1982 volume Lecture Notes 900, in which the motives were exhumed after twelve years of dead silence (\*)) and without any mention of myself) was the starting point for what might be called an *investigation*, in the narrower sense of the term: an investigation into the fate that had been reserved for my work, first and foremost by those who had been its first and principal custodians, namely my students. This investigation brought to light a good number of facts, some more unexpected than others, which over the days and weeks came together to form a picture, somewhat external, of what the Burial had been and who the main players had been. This picture is undoubtedly not complete, but it is rich enough in perfectly precise and irrefutable details to satisfy my curiosity in that direction. This is the first of the two 'levels' of reflection to which I referred earlier. It corresponds essentially to the 'first breath' of reflection on the Burial, continuing from 19 April until around 10 June, and ending with the 'illness episode'.

This is also, more or less, the 'Burial I' (or 'The robe of the Emperor of China') part of my notes. To this must be added the note "L'Éloge Funèbre (1) - ou les compliments" (n° 104), which is dated 12 May, but was dropped (somewhat arbitrarily no doubt) into the later and final "La cérémonie Funèbre", forming part of "Enterrement II". I would add to this 'investigation', forming the 'first level' of the reflection, the note that follows on from the note cited above, namely 'L'Éloge Funèbre (2) - ou la force et l'auréole' (n° 105), (\*), continuing moreover in the comments on the following note 'Le muscle et la tripe (yang enterre yin (1))' (n° 106). These last two notes are from the end of September - early October. Also, in the tradition of 'Eloges Funèbres', i.e. the (very rare) written documents in which Deligne expresses himself to some extent about me, we can add to this survey the two notes recently prompted by Deligne's biographical note, namely

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(\*) (19 April) For a correction concerning these "twelve years", see the sub-note "Pre-exhumation", n° 1681.

(\*) This note was planned for the day after 12 May, when the previous note was written.

"L'Éloge Funèbre (1) - or compliments. I then realised that the text I had just looked at a little more closely was a veritable mine, which I was far from having exhausted... (For some details on L'Éloge Funèbre, see the beginning of the note "L'Apothéose", n° 171).

"Requiem pour vague squelette" and "La profession de foi - ou le vrai dans le faux" (n° s 165, 166). Finally, there is the note "Les points sur les i" (n° 164), giving a number of details (mainly material), most of which were provided by Deligne himself during his visit to my home last October (\*\*).

After the illness episode, which put an end to all intellectual activity for more than three months, the 'second wind' of reflection (or the 'second level' of which I spoke earlier) was motivated by an effort to understand the *meaning* of this set of facts, some of them really very large, not to say incredible, that the investigation of April and May had brought to light. The central part of this reflection is 'The key to yin and yang', largely independent of the theme of the Burial itself, which nevertheless reappears periodically, each time reviving a meditation on myself, my life and existence in general.

It is clear, moreover, that the two levels of reflection, 'investigation' and 'meditation', are by no means independent or clearly separated, but that they interpenetrate. In concrete terms, this is reflected in the fact that, throughout the first part of Burial, there is already an effort to understand the meaning of what I was discovering as the days went by, and also by the appearance, in the second part, of material facts added to those already obtained in the course of the preliminary 'investigation'.

For the time being, my aim is to make an 'assessment', or a broad summary, of the *facts that* have emerged from day to day throughout the investigation - facts that I have never yet taken the trouble to order in any coherent way. This will therefore be an *ordering* of what I now know about this 'large-scale operation' targeting my work (\*) and that of Mebkhout. Depending on whether it was Mebkhout's work or mine that bore the brunt of the operation, and depending on which part of my work was targeted, I can in fact distinguish *four* main operations ('the four operations', in short), which I would like to review first. It so happens that the order in which they have come to my attention in the course of reflection also coincides (apart from a mini-reversal of the last two) with the chronological order in which they were set in motion, after my 'departure' in 1970.

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(\*\*) On the subject of this visit, see the note "Le devoir accompli - ou l'instant de vérité" (n° 163).

(\*) According to the facts known to me, this refers exclusively to the part of my work, between 1955 and 1970, devoted to the development of my ideas on the *cohomology* of schemes and on (co)homological algebra.

(and even before).

(<sup>168(i)</sup>) I The "*Patterns*" operation

Inspired by some of Serre's ideas, and also by the desire to find a certain common 'principle' (or 'motif') for the various purely algebraic 'avatars' known (or suspected) for the classical Betti cohomology of a complex algebraic variety, I introduced the notion of '*motif*' in the early 1960s. Throughout the 1960s, and especially from 1963 onwards (\*\*), and in addition to my work writing foundations, I developed a rich and precise 'yoga' (or 'philosophy') on this theme. This vast theory, which remained conjectural and will doubtless remain so for a few more generations (\*\*\*)<sup>1</sup>, nonetheless immediately (and still today) offered a very reliable guide for recognising oneself in situations where the cohomology of algebraic varieties is involved, both for guessing 'what one is entitled to expect' from it, and for suggesting 'the right notions' to introduce and, sometimes, for providing approaches to demonstrations. I say on this subject in the Introduction to *Récoltes et semailles* ('The end of a silence', p. xviii):

"Of all the mathematical things I had the privilege of discovering and bringing to light, this reality of patterns still appears to me as the most fascinating, the most charged with mystery - at the very heart of the profound identity between "geometry" and "arithmetic". And the 'yoga of patterns' to which this long-ignored reality has conducted me is perhaps the most powerful instrument of discovery that I have unleashed in this first period (\*) of my life as a mathematician."

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(\*\*) 1963 was the year of the strong 'start' of stale cohomology (developed in the SGA 4 seminar in 1963/64), which at last brought abundant water to the mill of motivic reflections, which until then had been rather speculative. It was the following year that I developed the formalism of the "motivic Galois group", the detailed conceptual foundation of which was developed (following the programme of theory I had submitted to him) in N. Saavedra's thesis, published only in 1972 (Springer Verlag, Lecture Notes n° 265).

(\*\*\*) (8 April) It now seems to me that this theory is not as far 'over the horizon' as it may have seemed to me. If only we finally got round to it! On this subject, see the comments in the note 'L'avare et le croulant' (° 177) dated 27 March.

(\*) If I'm referring here to 'that first period of my life as a mathematician', it's with 'yoga' in mind.

Apart from provisional sketches of a possible explicit construction (among many others) for the category of semi-simple patterns on a body, the ideas I had developed on this theme in my personal notes remained at the stage of oral communication. I was far too absorbed in the many other tasks of writing basic texts (\*\*) to find the leisure of the few months required to develop my handwritten notes into an overall 'masterpiece' of the inner vision that had developed within me, sufficiently 'researched' to appear to me to be publishable. From 1965 until I left the mathematical scene in 1970, Pierre Deligne was my privileged interlocutor for my motivic (and other) meditations, and the only one who fully assimilated the yoga of motives and felt its full significance.

Further details on the subject of the 'yoga of motifs' (more detailed than in the part of the Introduction from which the passage quoted is taken) can be found at the end of the note 'My orphans' (n° 46) and especially (concerning in particular the genesis of yoga) in 'Souvenir d'un rêve - ou la naissance des motifs' (n° 51). For the insertion of the 'yoga of motifs' into the formalism of the six operations (which remains, even today and since my departure, ignored by my cohomology students, as a fundamental structure in homological algebra...), see the note "La mélodie au tombeau - ou la suffisance" (n° 167). For the connection between the ideas (entirely overlooked in the literature) surrounding the yoga of weights (which is one of the essential ingredients of the yoga of patterns) and the theory of Hodge-Deligne (directly derived from the latter yoga), see the note "Dotting the I's" (n° 164 (part II 4)), as well as the sub-note (n° 164<sub>1</sub>) which follows it.

(<sup>168(ii)</sup>) The 'Motifs' operation consisted, first of all and immediately after my departure from the mathematical scene, in the systematic *suppression* of the yoga of motifs and of the very word 'motif';

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de géométrie algébrique anabelienne", which seems to me to be of comparable depth and scope. There is some mention of it in "Esquisse d'un Programme", which will be included in the "Réflexions" following "Récoltes et Semailles".

(\*\*) These are mainly the EGA texts (Elements of Algebraic Geometry, in collaboration with Jean Dieudonné) and SGA ("Séminaire de Géométrie Algébrique du Bois Marie"), the latter written alone or in collaboration (with students in particular), following guiding ideas and masterminds of my own devising. During the years 1959 to 1969, the average 'output' of these texts, all of which without exception became standard reference texts, was about a thousand pages a year. This work on the foundations came to a halt overnight, as soon as I left the mathematical scene. On this subject, see the note "Yin the Servant, and the new masters" (n° 135).

and then/ after a silence of twelve years (\*), and with the exhumation (in 1982) of a narrow version of yoga, with the disappearance of my modest and deceased person, as having something to do with the said yoga.

The first obvious evasion of yoga, in the form of the 'yoga of weights', occurred as early as 1968, i.e. before I left, in Deligne's article (in Publications Mathématiques) on the degeneration of spectral sequences. It is first mentioned in the note 'Poids en conserve et douze ans de secret' (preserved weights and twelve years of secrecy) (written before the discovery of the 'memorable volume' of exhumations), and in detail at the beginning of the note 'L'éviction' (notes n° s 49, 63).

This evasion-probe, in the absence of any reaction (\*\*), continues and is accentuated by Deligne's Hodge I, II and III articles, which set out the fine generalisation of Hodge's theory developed by him in 1968/69. Although this theory stems directly from the yoga of motives (as mentioned above), there is no reference to it in Hodge II or Hodge III - a fact made all the more glaring by the fact that Hodge II is Deligne's thesis, (\*) As for the short 'announcement' of Hodge I (at the International Congress in Nice in 1970), Deligne confines himself to a sibylline half-line reference to 'a conjectural theory of Grothendieck's motives' (in one breath with a bogus reference to Serre, obviously intended to give the impression (\*\*)). The cover-up continued with the presentation of the "yoga of weights" at the International Congress in Vancouver (1974), where neither Serre's name nor mine was mentioned.

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(\*) (8 April) For a correction concerning these "twelve years", see the sub-note "Pre-exhumation" (n° 168(iv)) which follows this note "Silence".

(\*\*) It was from me in the first place that such a reaction could and should have come. Whereas with hindsight the lack of honesty in the presentation of this article is obvious to me (cf. note cited, n° 63), I myself did not have the rightness (or the honesty) to take note of it, in the presence of a 'slight uneasiness' when I held the article in my hands and skimmed through it. On the role of a certain complacency or ambiguity in me, which came to the fore in the course of reflecting on Burial, see the note 'Ambiguity', n° 63<sup>¶¶</sup>. At the conscious level at least, the thought of the possibility of professional dishonesty, in Deligne or in any other of my students, had never occurred to me; or rather, - I pushed it aside on various occasions when dishonesty was blatant and signalled to my attention by this never-identified 'malaise'.

(\*) There was a sort of connivance between Deligne and me to conceal his relationship as a pupil to me, being Of course, he was far too brilliant for me to claim to have been his 'master'. I update and examine this complicity in the note 'L'être à part' (n° 67).<sup>¶</sup>

(\*\*) This refers to Serre's article on the Kahlerian analogues of Weil's conjectures, which had been the 'detona-

more pronounced. In this paper, no more than in Hodge I at the International Congress in Nice (1970), he does not breathe a word about an important part of the yoga he took from me, in the motivic context (which remains rigorously silent): the behaviour of the notion of weight by the 'six operations' and, first and foremost, by  $Rf_!$  and  $Rf^*$ . This is just one example among many of a practice that has become commonplace, and of which Deligne seems to me to have been one of the very first promoters: that of reserving exclusive knowledge of the 'great problems' that arise in a given field of mathematics for a restricted group of 'people in the know' (or even for himself alone), so as to ensure his total hegemony, instead of making them available to the scientific community and allowing everyone to draw inspiration from them (\*\*\*)<sup>1</sup>. As far as I know, this problem is not mentioned anywhere before it was solved by Deligne in his 1980 article "Weil II" (in the case of  $Rf_!$ ), without of course mentioning me (who had communicated to him the relevant conjecture in the motivic context, of which the A-adic context he deals with is a reflection, in the same way as the context of the De Rham - Hodge coefficients would be...).

To the (very fragmentary) extent that I know Deligne's work or can form an idea of it, I think I can say that the yoga of motifs that he took from me was the main source of inspiration throughout his work. He kept this source hidden, maintaining until 1982 (\*) a deathly silence around the notion of motif. The only exception

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to the triggering me on the 'standard conjectures'"'. It's a fine article, and there's no question here of trying to play it down. But I am well aware that Deligne himself would be hard pressed to explain how this article would have been a 'source' for his generalisation of the Hodge theory - and no doubt nobody ever thought of asking him. Having witnessed at close quarters the birth of the Hodge-Deligne theory, I know very well what its source was (see on this subject note no. 164 already quoted) - and that it was by no means in Demazure's paper on the B. A. BA of the definition of grounds! He cites this article as a reference to "Grothendieck's conjectural theory of motives", so as to give the impression to any reader who was not really well informed (and there were not many who were well informed...) that the said "conjectural theory" was reduced to the presentation in question by Demazure, thus taking advantage of the absence of any more detailed published trace on the yoga of motives.

(\*\*\*) On the subject of this new mentality, of which I had never encountered any trace until the time of my From 1970, see the note "Yin the Servant, and the new masters", n° 135, and the end (dated 28 February) of the note "The manoeuvres" (n° 169)(x). It is this mentality that I wanted to capture in the name '*The hoard*' given to all the notes and sub-notes (n° s 168- 169<sub>8</sub>) relating to the first two of the 'four operations' around my work.

(x) This ending became the note "Le magot" (n° 169(v)).

(\*) (8 April) For a correction, see the sub-note already quoted "Pre-exhumation" (n° 168 (iv)).

(unless I am mistaken (\*)) is the "half control line" of 1970, which is just as incomprehensible (\*\*) to anyone other than him and me (and, at a pinch, to Serre perhaps) as his cryptic reference two years earlier (in the article on the degeneracy of spectral sequences) to "weighty considerations" which had led me to conjecture "a particular case" of his degeneracy result (cf. the note already quoted "L'éviction", n° 63).

(<sup>168(iii)</sup>) There's a sudden change of scene with the publication of the 'memorable volume' Lecture Notes 900 (\*\*\*) . The motifs are exhumed with great fanfare, and part of the original yoga is finally revealed. In this volume, where my name appears two or three times 'in passing' and as if by the greatest of coincidences, nothing could lead the reader to suspect that I had anything to do with the ideas developed there. These ideas are presented in such a way that there can be no doubt in the reader's mind that the brilliant main author of the volume, Pierre Deligne, has just discovered them and is presenting them there all hot off the press. It is true that, no more than in Nice or Vancouver he claims that it was he who discovered the yoga of the weights which is explained here for the first time in literature, nowhere is it clearly stated here that it was he who came up with all these beautiful ideas developed (apparently) for the first time in the volume, centred moreover around a beautiful theorem of which he is indeed the author. This is the "thumb!" style in which he is a master, on which I comment first in the note "Thumb!" and in 'La robe de l'Empereur de Chine' which follows (n° s 77, 77<sup>¶</sup>); see also the earlier notes, written in the emotion of discovering the 'memorable volume': 'L'Enterrement - ou le Nouveau père', 'La nouvelle éthique - ou la foire d'empoigne', and 'Appropriation et mépris' (n° s52, 59, 59).<sup>¶</sup>

In fact, not only were all the main ideas in volume LN 900 concerning motifs known to me as early as the sixties (when Deligne had every opportunity to hear them from me from 1965 onwards), but the central problem of the book had been raised by me (and, of course, communicated to Deligne) as early as the end of the sixties. For

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(\*\*) As explained in the previous b. de p. note, the purpose of this thumb-reference was not to be 'understandable' or to inform, but to (doubly) mislead. As for the filiation of ideas from motifs to Hodge-Deligne structures (described in the two notes quoted above), I have every reason to believe that I am the only person in the world, apart from him, who knows it.

(\*\*\*) Springer Verlag, Lecture Notes in Mathematics, n° 900, Hodge cycles, Motives, and Shimura varieties, by P. Deligne, J. S. Milne, A. Ogus, K. Y. Shih.

For further details, see the note "Dotting the I's" (n° 164) (in part I of this document).

As I pointed out in the Introduction to *Récoltes et Semailles* (in "La fin d'un se-cret", p. xviii), Deligne was not the only one to whom I spoke in detail about the yoga of motives, even if he was the only one to make it his own intimately. If the very existence of this yoga, and later my role in discovering it and developing and deepening it, were completely concealed for about ten years (\*), this concealment could only have taken place with the connivance of a good number of mathematicians whom I counted among my friends, and in particular, with that of each of my (commutative) 'cohomology students' (\*\*). This concealment was done for the dubious 'benefit' of one, but through the acts and omissions of a good number.

Apart from Deligne and my other cohomology students, it is the responsibility of the *co-authors* with Deligne of the "memorable volume" LN 900 that seems to me to be most heavily involved, namely that of J. S. Milne, A. Ogus and K. Y. Shih. These are mathematicians whom I do not know personally, and there is no reason for me to prejudge their bad faith; as far as I am concerned, however, this in no way detracts from their full responsibility as co-authors of this unusual volume.

(<sup>168(iv)</sup>) (8 April) I was recently made aware of Deligne's article "Valeurs de fonctions  $L$  et périodes d'intégrales", published in 1979 (proceedings of Symposia in Pure Mathematics, Vol.

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(\*) According to an "annotated bibliography of motives" that Deligne was kind enough to send me last August, "there were still two sporadic works in the literature on motives after my departure, one and the other in 1972 (in N. Saavedra's thesis, prepared with me, and in a report by S. Kleiman). The next reference, by Langlands, was in 1979. After that, it's LN 900 in 1982. Unless I am mistaken, the word 'motif' does not appear in any of Deligne's published texts between 1970 and 1982 - nor is there any allusion in any published text (with the exception, at most, of the biographical note examined in notes n° s 165, 166) to the fact that he might have learned something from me..."

(8 April) On the subject of "unless mistaken", see correction in the sub-note "Pre-exhumation" (n° 168 (iv)).

(\*\*) I think I can say that all my pre-1970 pupils, with the sole exception of Mrs Sinh (who was only They were aware (but had not necessarily assimilated) of my ideas on motives, on which I gave a series of detailed talks at the IHES (in 1967). Those of them who have remained connected to the theme of the cohomology of algebraic varieties therefore seem to me to be in solidarity with the burial that has taken place of the yoga of motives, on the initiative of the main 'interested' Deligne. I am referring here in particular to J. L. Verdier, L. Illusie and P. Berthelot, each of whom has been more active than a mere accomplice in some of the other three "operations" we will be discussing.

33 (1979), part 2, pp. 313-346), in the same volume as the aforementioned article by R. P. Langlands "Automorphic representations, Shimura varieties and motives. Ein Märchen Corvallis" (pp. 205-246). The latter article (but not Deligne's) was included in the annotated bibliography on motives that Deligne had sent me last August, and I had been under the impression that Langlands' article was the first and only mention of motives in the literature after my departure, before the exhumation of 1982 (apart from the papers by Saavedra and Kleiman cited in the penultimate footnote).

In fact, in the article quoted by Deligne, there is a 'chapter 0' entitled 'Motifs', introduced by : "It recalls. *part of* the formalism, *due to Grothendieck*, of motives" (my emphasis). The presentation given is such that it is clear that the general principle of construction that I had given for a category of (semi-simple, it is implied) motives over a body, was multivalent - moreover in section 0.6 it is said that "*one of* Grothendieck's *definitions* of motives is obtained by... . ". In this respect, the presentation is honest. It is true that the part of the "yoga" of motives set out here is the most elementary part, which practically already existed in the literature (in the talks by Manin, Demazure, Kleiman, Saavedra), and where my authorship was therefore particularly notorious. (On the other hand, it would seem that the concealment of my person - and that of Serre - in the yoga of weights, and later in the motivic Galois group, went off without a hitch...)

As I have already had occasion to point out (in the note 'L'escalade (2)', no.<sup>o</sup> 174), it would seem that after the provisional culmination of 'Operation Burial' in 1977 (with the 'SGA 4 1/2 - SGA 5' operation), there was a relative lull until the 'apotheosis' of the Colloque Pervers in 1981, which marked the end of any hint of restraint in the dismemberment of a corpse. (See the note 'L'Apothéose', n<sup>o</sup> 171.) Deligne's article is obviously written in the context of this lull. I presume that Langlands' interest in motivic yoga had forced him to finally 'let the cat out of the bag' (already revealed) about the motives, at a time when it was not yet psychologically ripe to simply pass over in silence the name of the deceased. In the three years that followed, there was in fact a startling 'escalation' (to use the expression in the note 'The manoeuvres' that follows this one), between this timid 'pre-exhumation' of the motifs, and the 'exhumation with great fanfare' that took place with the 'memorable volume' LN 900 in 1982.

(22 April) The (mini) discovery described on the previous page continued and grew considerably in the days that followed. I became aware of the article by R. P. Langlands quoted above, and also and above all, the very next day, of the 'sixth nail' in my coffin (\*), in the form of the book by (my ex-student) Neantro Saavedra Rivano, entitled 'Tannakian Categories'. So there's still a substantial "continuation of the story".

(of the "Motifs operation"), which I have developed in the series of sub-notes (n° s 175<sup>¶</sup> to 175<sup>¶</sup>) grouped together under the appropriate name, "The sixth nail (in the coffin)". I thought it preferable to refer this sequel to the end of the investigation "The Four Operations", because the new facts that appear throughout it, and especially in the note "The Apotheosis" (n° 171) and its four sub-notes (\*\*)/, seem to me to be essential to situate this "sequel" properly and give it its full meaning.

(<sup>169(i)</sup>) (27 February) I now come to the second of the "major operations": II The "*spread cohomology*" operation.

As with the reasons for the decision, it is useful to start by briefly explaining the context.

The idea of the existence of a theory of "cohomology" of an algebraic variety over any field  $k$ , which would associate with such a variety (at least if it is projective and smooth) "cohomology spaces" whose field of coefficients would be of zero characteristic (for example a p-adic field), and whose properties would be modelled on the well-known properties of Betti cohomology (defined by transcendental neighbour when the base field is the field of complexes) - this idea can be found "between the lines" in the statement of Weil's famous conjectures (1949). It was in cohomological terms, at any rate, that Serre explained Weil's conjectures to me, around 1955 - and it was only in these terms that they were likely to 'hook' me.

At the time, nobody had the slightest idea how to define such a cohomology, and I'm not sure that anyone other than Serre and myself, not even Weil if that's the case, had the slightest idea that it should exist. We only had a good geometric grasp

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(\*) This is the sixth of the "nails" in the order of their discovery, but the first of the six, seen in the chronological order in which they were deftly "laid" by my friend Pierre, with patented equipment supplied (for the service of science) by the well-known Funeral Company Springer verlag GmbH (Funeral Service "Lecture Notes in Mathematics")...

(\*\*) (11 May) Since these lines were written, the note quoted has been split into four separate notes (n° s 171 (i) to (iv)) and expanded by a further eight subnotes (n° s 171 (v) to (xii)).

direct than on  $H^1$ , via the theory of abelian varieties and their points of finite order (developed by Weil), and via Albanese or Picard varieties associated with a non-singular projective algebraic variety. This construction of  $H^1$  suggested that bodies of coefficients

The "natural" bodies were to be the  $A$ -adic bodies  $Q_A$ , for  $A$  *distinct* prime number of the characteristic.

For  $A$  *equal to* the characteristic (when the latter is non-zero), Serre's very partial results, which were particularly convincing in the case of algebraic *curves*, suggested that it should be possible to take as a base body the body of fractions of the ring of Witt vectors of  $k$  (assumed to be perfect). One could therefore hope that there would be an  $A$ -adic theory (with a grain of salt for  $A = p$ ) for *any* prime number  $A$  - and in a suitable sense, they should "all give the same result". Finally, when  $k$  is of zero characteristic, so that we have (at least in the case of the non-singular projective  $X$ ) the spaces of Hodge cohomology (which made sense for any  $k$ , since Serre introduced the "coherent" cohomological theory of algebraic varieties) and those of De Rham (which I had introduced inspired by the differentiable De Rham cohomology), These provided immediate cohomological theories with all the desired properties (\*), and they should still give "the same result" as the hypothetical  $A$ -adic cohomologies.

These questions were central to my thinking and to my published and unpublished mathematical work between 1955 and 1970 (the year I left the mathematical scene). Leaving aside my work on coherent cohomology (the 'six operations' formalism, the Riemann-Roch-Grothendieck formula), we can say, roughly speaking, that most of my cohomological work consisted of finding answers, or broad outlines of answers, to these questions. From the point of view at least of the conjectures of Weil's conjectures, acting as my main source of inspiration, my thinking on the cohomological theme has materialised in four major *currents*, or '*threads*', closely interwoven to form a single, vast weave.

*Thread 1.* With the assistance of collaborators (\*\*)), I have developed a formalism for the *cohomo-*

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(\*) In the 1950s I developed the formalism of cohomology classes (de Hodge and de Rham) associated with an algebraic cycle.

(\*\*) The main collaborator in the development of the formalism of stale cohomology was Artin. The  $A$ -adic adaptations are developed in my ex-student P. Jouanolou's thesis (which, unfortunately, he did not bother to publish, which I have never held in my hands, and which has become impossible to find). I

*mology of A-adic* schemes, for A prime with residual characteristics, having all the known properties (and beyond . . .) of the familiar "discrete" cohomology of topological spaces. Apart from three open questions (\*\*\*\*) of a technical nature, it can be said that we had, 'in principle' by 1963, and 'in fact' by 1965/66 (with the developments of the SGA 5 seminar, following on from SGA 4 in 1963/64), a *complete mastery* of this cohomology, within the general framework of so-called 'étale' cohomology - in the form of the duality formalism of the 'six operations'. The principle of the definition of étale cohomology dates back to 1958, and I proved the necessary and sufficient "key results" for the complete formalism (including theorems of the "weak Lefschetz" type and notions of cohomological depth in the étale context) in February and March 1963.

*Thread 2.* With the *yoga of patterns*, I discovered the philosophy that allows us to link together the different A-adic (and other) cohomologies of a variety, as so many

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I intend to give more details about the development of scalar cohomology in some "historical" comments that I intend to attach to the Thematic Outline (to be published in the Reflections following R and S).

(\*\*\*) These three "open questions" are as follows:

a. The "cohomological purity conjecture" (scalar version) for a regular subscheme  $Y$  of a regular scheme  $X$ . The relevant statement is proved when  $X$  and  $Y$  are both smooth on a regular base scheme  $S$  (a sufficient case for most applications), and also by Artin, making full use of the resolution of singularities in the case where  $X$  is excellent of characteristic zero.

b. Even more serious is the question of the validity of the *finiteness theorem* for  $R^i f_*$ , for  $f$  a separate morphism of finite type of Noetherian schemes (excellent if necessary), when  $f$  is not assumed to be clean. We need this result to define  $Rf_*$  (and two others among the "six operations") in the A-adic "constructible". I have proved the finiteness result under the hypotheses of resolution of singularities and of "I would point out, however, that in the context of torsion coefficients (as opposed to A-adic coefficients), the formalism of the duality of the six operations (thus including Poincaré's duality) had been established by me in 1963 without finiteness conditions. This implied, for example, "finiteness" for  $H^i$  with constant or locally constant coefficients (torsion or A-adic) for a smooth (not necessarily clean) scheme over an algebraically closed field.

c. Validity of the "dualité theorem" on an excellent regular pattern. Situation similar to b).

The situation was significantly improved by Deligne's elegant proof (in 1973?) of the finiteness theorem, for a morphism of schemes of finite type over a regular scheme  $S$  of dimension  $\leq 1$ . This case covers most applications (algebraic schemes over a field, schemes of finite type over  $\mathbb{Z}$  in particular). In the same situation of a scheme  $X$  of finite type over a regular scheme of dimension 1, and using similar simple arguments, Deligne also manages to prove the biduality theorem.

These are the different "realisations" of a "motif" that is common to all of them, and which is the "motivic cohomology" of this variety. This philosophy was born in the early 1960s, with a 'yoga of weights' directly inspired by Weil's conjectures (and by an idea of Serre's inspired by them, concerning a notion of 'virtual Betti numbers' associated with an algebraic variety (\*)). In 1964, with the impetus of the start of A-adic cohomology, it was enriched by the crucial notion of a "motivic Galois group".

*Thread 3:* Inspired by the ideas of Monsky-Washnitzer, who had constructed a cohomological (with constant coefficients) "p-adic" theory for *smooth* and *affine* algebraic varieties in car. p 0, in 1968 I came up with a general definition for a "p-adic cohomology", which I also call *crystalline cohomology* (\*\*). This theory was supposed to encompass (so-called "crystalline") "coefficients" that were not necessarily constant or locally constant, and to give rise to a "six operations" formalism just like the A-adic theory. It was immediately clear, at least, that for *smooth* varieties, this cohomology has the expected relationship with De Rham's cohomology, and that it generalises Monsky-Washnitzer's cohomology (\*).

(\*) On this subject, see sub-note no.<sup>o</sup> 469 to the note "My orphans" (no.<sup>o</sup> 46).

(\*\*) This terminology is now (and has been for a long time) established by usage, as is the expression 'crystalline site'. The two new ideas (compared with those of Monsky and Washnitzer) which led me to this theory, are that of *crystal* (of modules etc), linked to an idea of "growth" over "thickenings" (infinitesimal in particular) of a starting diagram, and secondly, the introduction of a structure of *divided* powers in the ideals for increasing the envisaged thickenings, so as to ensure the validity of a "formal Poincaré lemma" (with divided powers). Thanks to these two ingredients, the De Rham cohomology of a smooth scheme on  $k$  can be interpreted as the "ordinary" cohomology, with *coefficients in the structural bundle of rings*, of a suitable "crystalline site".

Strangely enough, the crucial intuition of crystal (as well as the more far-reaching one of topos) seems to have been left behind by my students, as well as the common thread (omnipresent in my cohomological reflections) of the 'six operations'. This, it seems to me, is the main reason for the regrettable stagnation in crystalline cohomology after my departure, and also in the (closely related) theory known as 'Hodge-Deligne', since the first strong start of both.

It seems to me at least plausible, not to say obvious, that in both directions, the philosophy developed (in general indifference...) by Zoghman Mebkhout would have an essential role to play. But his timid suggestions in this direction (to Berthelot in 1978) obviously fell on deaf ears, coming from such an insignificant person...

(\*) P. Berthelot's thesis, which takes my ideas as a starting point, provides additional justification for them. duality formalism for clean and smooth varieties, which is sufficiently rich to allow the

*Thread 4.* The unifying geometrical notion, linking by a common "topological" intuition stale cohomology and its immediate variants (linked to Zariski topologies, fpqc, fppf etc), crystalline cohomology, and finally the Betti cohomology defined in the transcendental context, and (more generally still) the beam cohomology of any topological spaces, is the notion of "*site*", and, beyond this, more intrinsic and more hidden, that of *topos*. From 1964 onwards, *topos* gradually came to the fore. I discuss the significance of this notion, which is central to my work but has now been banished from geometry, in the note "Mes orphelins" (n° 46),

pp. 180-182, from which I shall confine myself here to extracting the following passage:

"This pair of concepts [schemas and *topos*] contains the potential for a vast new re-ordering of both algebraic geometry and arithmetic, as well as topology, through a *synthesis* of these "worlds", which have been separated for too long, in a common geometric intuition". (\*)

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at least to write a *crystalline* cohomological expression for the ordinary L-function of such a variety over a finite field. But, as I pointed out in the previous b. de p. note, we are still a long way from a mastery comparable to that which we have in A-adic cohomology, which would be expressed by a formalism of "six operations" for general "crystalline coefficients". These (according to what Deligne recently told me) have not yet been *defined*, any more than the correct "Hodge coefficients" (above complex algebraic varieties) 1 For some comments on the "coefficient problem", which I believe is crucial for an understanding of the cohomology of algebraic varieties, see the note "La mélodie au tombeau - ou la suffisance" (n° 167). This problem was clearly present for me throughout the sixties, but has been buried (among many others, and by the care of my cohomology students) until today...

(23 April) On this subject, see also the note "Le tour des chantiers - ou outils et vision", n° 178.

(\*) I propose elsewhere (in sub-note n° 136<sub>1</sub> to the note "Yin the Servant (2) - or generosity" (n° 136), to call by the name of *arithmetic geometry* this "new science" still in its infancy, "It was born in the early 1960s in the wake of Weil's conjectures, and of which the "yoga of motives" is "like the soul, or at least like one of the most neuralgic parts". By this name, I would like to suggest

"the image of a "geometry" that would be developed "above the absolute base" Spec Z, and which would have "specialisations" both in the traditional "algebraic geometries" of the different characteristics, and in "transcendental" geometric notions (above the basic bodies).

The language of topos, and the formalism of stale cohomology, were developed in the two consecutive and inseparable seminars SGA 4 (in 1963/64) and SGA 5 (in 1965/66) (\*\*). The first was done in collaboration with others (\*), and developed, in addition to the language of topos, the key results of stale cohomology, including the key statements of starting in duality (six operations style). The second, in which I was practically alone (\*\*), develops in much greater detail a complete formalism of duality, including the fixed point formulae leading to the cohomological theory of *L-functions* (which constitutes an important part of the set of Weil conjectures). I wrote about this double seminar in the note "La dépouille...". (n° 88), in the following terms:

"The set of two consecutive seminars (SGA 4 and SGA 5, which for me are like a single "seminar") develops out of nothingness both the powerful instrument of synthesis and the power of synthesis.

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C, R, or  $Q_A \dots$  ), via the notions of analytic or rigid-analytic "varieties" (or better, *multiplicities*), and their variants.

(loc. cit. p. 637). I write above (same page):

"Over and above the construction of the new algebraic geometry, and through to the "mastery of stale cohomology" (and that of the A-adic cohomology which follows from it), it is the development of a master builder of this new science still in the making, which was in my eyes my main contribution to the mathematics of my time."

(\*\*) A second edition (in three volumes) of SGA 4, entirely recast in relation to the original edition (especially as regards the language of sites and topos, and the categorical complements) appeared in Lecture Notes (Springer Verlag) in 1972-73, n° s 269, 270, 305. For the vicissitudes of SGA 5, see the details given below. An 'Illusie edition' of a copiously dismantled version of the original seminar was published in the same Lecture Notes (n° 589) in 1977, *eleven years after the end* of the oral seminar.

(\*) The development of the language of sites and topos, based on my initial idea in 1958, was mainly carried out by under the impetus and with the help of M. Artin, J. Giraud, J. L. Verdier. For details, see the promised historical commentary, already quoted in a previous b. de p. note.

(\*\*) The only exception (if my memory is correct) is provided by j. p. Serre who made some fine lectures on finite groups and the SerreSwan module associated with the Artin conductor, which I needed for the development of the "general fixed point formula" I had in mind. It was planned that these talks would appear in SGA 5, but seeing the way things were going. Serre had the good sense to make them available to the mathematical public by publishing them elsewhere. For all the other talks, I was the only speaker, or, if there were others towards the end, they followed the detailed notes I had developed for the seminar. The task of the editors (sic) was therefore limited to finalising the notes I had made available to them.

and discovery represented by the *language* of topos, and the perfectly perfected and perfectly efficient *tool* of scalar cohomology - whose essential formal properties were better understood at that time than even the cohomological theory of orbital spaces. This work represents the most profound and innovative contribution that I have made to mathematics, at the level of a fully completed project. At the same time, and without wishing to be, while at every moment everything unfolds with the naturalness of the obvious, this work represents the most far-reaching technical 'tour de force' that I have accomplished in my work as a mathematician. For me, these two seminars are indissolubly linked. They represent, in their unity, both the *vision* and the *tool* - the topos, and a complete formalism of stale cohomology.

While the vision is still rejected today, for over twenty years the tool has profoundly renewed algebraic geometry in what I consider to be its most fascinating aspect - the 'arithmetic' aspect, apprehended by intuition and by conceptual and technical baggage of a 'geometric' nature.

\* \*  
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(<sup>169(ii)</sup>) *The operation 'étale cohomologie'* consisted in *discrediting the unifying vision* of topos (such as 'nonsense', bombinage, etc.), and by the same token, and by assimilation, the role which had been mine in the discovery and development of the cohomological tool; and on the other hand, to *appropriate the tool*, i.e. the *authorship* of the ideas, techniques and results which I had developed on the theme of étale cohomology. Here again, the 'beneficiary' of the operation was Deligne (\*), and it was his exceptional ascendancy (no doubt due as much to his exceptional means as to his implicit position as 'heir' to my work) that made an operation of this scale (of debunking and appropriation) 'pass', without apparently making a single wrinkle. ...

It was in fact in 1965/66, in the SGA 5 oral seminar and through the texts already

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(\*) There were, however, substantial repercussions for *Verdier*, as we shall see later: firstly in 1976, when he gave the 'kick-off' for the dismantling of SGA 5 with his 'memorable article' (see 'episode 3' of an escalation below), and then in 1981 at the 'Colloque Pervers' (which we shall first discuss in the note 'Le partage' (n° 170 devoted to 'operation III').

SGA 4, that the young newcomer Deligne had his first apprenticeship in the theory of schemes, homological algebra (Grothendieck style) and the new techniques of scalar cohomology (born two years earlier) (\*\*\*) - techniques which were to form the basis of all his subsequent work.

In the operation (which I have elsewhere called the 'SGA 4 1/2 - SGA 5 operation') mounted by my brilliant ex-student, I can discern four inseparable 'm a. n oeuvres'.

*Manoeuvre 1: Discrediting* the SGA 4 - SGA 5 mother-seminar as a "gangue of nonsense" and other such niceties: this is done on the fly (and "mine de rien") in the various introductory texts to the volume, by Deligne, called by the strange name "SGA 4 1/2" (subtitle: Cohomologie étale) published in Lecture Notes of Mathematics n° 569 (Springer Verlag). For details of the debunking of the SGA 4 double seminar, see

- SGA 5, where Deligne learned his trade and found the basic tool for all his later work, the note "La table rase" (n° 67).

*Manoeuvre 2. Sabotaging* an overall editing of my SGA 5 (\*) oral presentations. Normally, this should have been done within a reasonable timeframe (a year or two at the most), by my cohomolo- gist students (for lack of other reliable volunteer writers), who had the privilege of learning a good part of their profession, as well as ideas and techniques that they and the other seminar listeners had been the only ones to know for many years. It was also the best (and quickest) way to

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(\*\*\*) This is what I recall (having somewhat forgotten) in the note (of 27 May last year) 'L'être à part' (n° 67<sup>¶</sup>). I would add that it was in this same SGA 5 seminar that the young Deligne also learnt from me (but 'as if he had always known', it must be said) the art of putting the description (or 'theory') of an interwoven and at first sight complex situation down in black and white, in a form that is at once convenient, striking, clear and rigorous. This did not prevent him, twelve years later, after having ransacked the seminar, from displaying an air of disdainful condescension and contempt towards what remained of it (and the SGA 4 section which formed its basis).

(\*) As I indicated three notes (de b. de p.) above, there were detailed notes for each of my oral presentations. It would have taken me several months to write them up. If I didn't do it, and as early as the year (1966) when the seminar ended, it was because, in principle, volunteers (???) had taken on the task of writing them up in detail. This dragged on until I left in 1970, when I 'gave up' entirely on this kind of question in favour of tasks that seemed to me (quite rightly) more essential and more urgent. On this subject, see the note "Le feu vert" (n° 68), where I ask myself for the first time about the meaning of what happened with "that unfortunate seminar". That was on 27 April - and I discovered the reality, the 'breath' of the 'massacre' on 12 May, two weeks later... .

for them to familiarise themselves with a substance and with ideas and techniques, which during oral presentations tended to go a bit 'over their heads' (with the exception of the ever-dashing Deligne, needless to say). The fact remains that this drafting, or rather *non-editing*, *dragged on for eleven years* - until the precise moment (as if by chance) when Deligne gave Illusie the 'green light' to take charge, at the end of the day, of the drafting and publication of this unfortunate SGA 5, which had until then been left to its own devices by mutual agreement - the moment when it became clear that it would be published (in 1977) *after* a certain volume written by Deligne himself - This one, composed (in 1973 and the following years) initially for the needs (at least as I first thought) of popularising the 'ingredients' ('inputs') of scalar cohomology indispensable for his demonstration (of the last part) of Weil's conjectures, was baptised for the occasion with the unusual name 'SGA 4 1/2'. (This name, however, does not seem to have puzzled or surprised, or even shocked, anyone to date apart from me... (169<sub>1</sub>) (\*)) For details, see the notes on 'The green light' and 'The reversal' (n° s 68, 68'), where the meaning of the volume called 'SGA 4 1/2' begins to dawn on me, as well as the notes on 'Silence' and 'Solidarity' (n° s 84, 85).

*Manoeuvre 3.* To *dismantle the original SGA 5 seminar*, of which the published version (by the 'care' of my ex-student Luc Illusie) now represents no more than an outrageously mutilated 'corpse'. I give an account of this shameless dismantling, or to put it better, the *massacre* of what was a splendid seminar entrusted to the hands of my students, in the note of the same name (n° 87) - one of the longest and most revealing of the reflections on Burial.

*Manoeuvre 4:* *Breaking up the unity of my work* on spread cohomology, the work represented by the two inseparable parts SGA 4 and SGA 5, by 'cutting it in two', 'by the violent insertion, between these two parts, of a foreign and disdainful text' (\*\*), answering to the name of

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(\*) On this subject, and for further details on the original and true *meaning of* the acronym APG (from which my name and person were eventually ousted), see the sub-note "Eviction" (n° 169<sub>1</sub>) which follows this one ("Manoeuvres", n° 169), and was originally intended as a b. de p. note here.

(\*\*) This passage in inverted commas is quoted (from memory) from the note "the remains..." (n° 88) - the same one where, for the first time in my reflections on Burial, I 'pause' to finally become aware of the place of the SGA 4 - SGA 5 seminar within 'my fully completed work'. As for the deeper, 'carnal' experience of the 'breath of violence' attacking this central, harmonious and living part of my work, it was revealed to me in a dream on

the very night following this reflection. It found its written expression the next day, in the note ". . and the body" (n° 89).

unusual "SGA 4 1/2" (\*\*\*)). This ingenious name says exactly what it's supposed to say - all you had to do was think of it! With this name alone, the volume presents itself as the central and fundamental text on stale cohomology, intended to *replace* the "dense expositions of SGA 4 and SGA 5", "which may be considered as a series of digressions" \*/ "some of which are very interesting", it is true, but which the central text "should allow the user to forget". Moreover, there is no need for my brilliant ex-student and friend to compromise himself here in long and useless speeches: this lapidary name alone, "SGA 4 1/2", states and lays down the unanswerable evidence of the *anteriority* of this text in relation to the "digressions" called SGA 5 (which, as it certainly could not have been otherwise, were indeed published *after* it. . . . ), and by the same token it also establishes a (supposed) *logical dependence*

of SGA 5 compared with the "previous" text.

This implausible claim that SGA 5 is logically dependent on the apocryphal text is confirmed in the introduction to the text (\*), where the author announces without batting an eyelid (and apparently without anyone before me - these days - finding anything special in it...) :

" . . . its existence [that of "SGA 4 1/2] will make it possible to publish SGA 5 *as is in the near future*" (emphasis added) -.

read: a ransacked and plundered *corpse*. ... Although I had already been aware of my friend's 'Motifs' operation for over a week, it took me two days (from 26 April, with the note 'La table rase', to 28 April, with the note 'Le renversement' (notes n° s 67, 68<sup>¶</sup> )) to grasp the meaning of the 'mystery' represented for me by my brilliant pupil's obviously preposterous assertion - and to understand, at the same time, the meaning of the seemingly innocuous acronym 'SGA 4 1/2', which I hadn't even considered in the previous two days.

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(\*\*\*) Subtitle: Cohomologie étale - by Pierre Deligne... The subtitle says it all! (\*) I would remind you that Deligne confirmed this same delusional thesis to me in person during his last visit to my home (last October) - albeit without any real conviction, and without even pretending to be interested in my work. clarify how my seminar, which formed a harmonious and coherent whole without having waited for him, would depend on Deligne's work, which emerged seven years later. ... This short scene on a station platform, where we were waiting (with his little daughter Natacha) for the train that would take them back to Paris, is recounted at the end of the note devoted to this visit, "Le devoir accompli - ou l'instant de vérité" (n° 163).

The same imposture of "logical dependence" is clearly suggested in Illusie's introduction to SGA 5 (<sup>169</sup> 2) (\*\*). It is further rendered plausible, for the uninformed reader, by the innumerable references to "SGA 4 1/2" with which the late editors of my papers (\*\*\*)(or at least those that were kindly included in the massacre edition) have stuffed their essays. Many of these references are in no way bogus references, but refer to two of the original seminar papers (one written by Illusie, the other - particularly crucial - by Deligne (\*), which were incorporated without further ado into the volume entitled 'SGA 4 1/2' - without asking me or even informing me, but as something that (in the absence of the late master) rightfully belonged to them... .

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(\*\*) For details, see the sub-note "Good Samaritans" (n° 169<sub>2</sub>) to this note (n° 169), originally intended as a b. de p. note.

(\*\*\*) (9 April) after detailed verification, the 'late editors' in question (and that's an understatement...) are limited to my dear ex-students Luc Illusie and Jean-Pierre Jouanolou. Bu- cur's and Houzel's drafts were ready before I left, and Illusie didn't go so far as to slip in references to a text called 'SGA 4 1/2', which didn't see the light of day until some ten years later. He and Jouanolou were content to wait for Deligne's 'encouragement' before writing what was incumbent on them eleven years after the completion of the seminar and, in the case of the papers they had already written 'in my time', to fill them with empty references to the pirate-text of their brilliant friend and protector.

(\*) This is the talk "The cohomology class associated with a cycle, by A. Grothendieck, written by P. Deligne". It is also specified that this presentation was "*inspired* by Grothendieck's notes, which *formed a state 0 of SGA 5 IV*" - by which it is suggested, no doubt, that it was an act of charity to rid SGA 5 of this sad state (zero), in order to make of it the beautiful presentation that we have here in a brilliant volume...

As for the paper by Illusie (ex-chapter II), which disappeared from SGA 5 only to reappear (in reworked form) as an appendix to Deligne's paper on finiteness theorems in stale cohomology, it developed the relevant finiteness theorems for  $R^i f_*$  (under assumptions of 'purity' and 'resolution', see the note on b - de p. (\*\*\*)) page 841), and theorems such as "generic Künneth" and "local generic acyclicity". No one before me had ever thought of *formulating* only such statements in co-homology - Moreover, the so-called "outdated" demonstrations in the oral seminar, in addition to dependence principles (allowing e.g. to deduce from a finiteness statement for the functor  $Rf_*$  the similar statement for  $L^f$  and for  $R\text{Hom}(\cdot)$ ), introduced a uniform technique for using the strong form (à la Hironaka) of singularity resolution, which has proved its worth elsewhere - and it was *there* and nowhere else that Deligne and my other cohomology students learned it. It was subsequently used, in particular, in my demonstration of the 'algebraic De Rham' theorem for smooth varieties over the field of complexes, and in that of the theorem of Mebkhout-the-named, known as the 'Riemann-Hilbert theorem', also known as the 'theorem of the good God' (which Mebkhout did not have the advantage of learning the method in SGA 5, of which she was the author).

This act of brigandage also enabled my ex-student Deligne to achieve this brilliant *role reversal*, to present me on the cover of the book (and without consulting me either...) as his *collaborator* (in the development of the cohomologie étale!) (\*) - a collaborator who is a little 'confused' around the edges (\*\*). It's true, but a 'collaborator' all the same...

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disappeared...).

Seven years later (??) Deligne found an elegant method to prove in a few pages the finiteness of  $Rf_*$ , as well as the biduality theorem (very close technically), under (if not optimal, at least) very unrestrictive hypotheses (see b. de p. note quoted). Nothing, either in Deligne's paper or in his friend's appendix, could lead the reader to suspect that I had anything to do with the notions introduced and used (such as local acyclicity and its "generic" variant), or with the statements proved (of finiteness, biduality, and Künneth and generic acyclicity), and with the links between them. My name is absent both from the text and from the bibliography, which consists of four references to Deligne, all after 1970, i.e. when I 'left'.

I find myself once again, at the turn of this explanatory b.p., faced with the deliberate intention of wiping the slate clean of the origins and roots of what my brilliant students handle with such mastery (as if they had always known...) - that is, of *erasing the traces of a past*, the past before my 'death'.

(16 March) For the special role reserved for Deligne's "finitude" complements, see the sub-note "Le cheval de Troie" (n°<sup>169</sup> 3) to the present note "Les manœuvres".

(\*) This staging (in which I appear as the 'collaborator' of my pupil Deligne) is all the more The fact that it had been seven years since I had made it clear and public that I no longer intended to publish maths (and even less so as a 'contributor', you might think...).

(\*\*) In his summary (of which he sent me a copy) of "SGA 4 1/2" for the Zentralblatt (in September 1977), Deligne takes great pleasure in talking about the "*confused* - albeit rigorous - state of SGA 5" (my emphasis), which (as you might have guessed) the new text was supposed to "remedy"...

(\*\*\*) These are finiteness results (already mentioned in three b. de p. notes above and in the one quoted there), filling in a few pages two gaps in the SGA 5 mother seminar, plus an exposé on fixed point formulas "modulo"  $A^n$  and  $p$ . The problem of explaining such formulas, and the relevant conjecture for a mod  $p$  expression of the Artin-Weil function  $L$  for a finite type scheme, over a finite field had been posed by me as early as the SGA 5 seminar, and were surely part of the problems (unworthy of any mention in Illusie's introduction to SGA 5) posed in the SGA 5 seminar. finite type, over a finite field had been posed by me as early as the SGA 5 seminar, and were certainly part of the problems (unworthy of any mention in Illusie's introduction to SGA 5) posed in the closing lecture (a lecture that disappeared from the field and well, with many others, from the Illusie edition). Deligne had found a very elegant common solution, using the "symmetrical Künneth formula" (which he developed, for the sake of the argument, in one of the apocryphal papers in SGA 4). It was understood (and taken for granted) that these results would be included in the written version of SGA 5, from which they were directly inspired. It hardly needs to be said that in the eight-page presentation devoted to this formula in the volume known as "SGA 4 1/2", my name is not mentioned.

As for the "SGA 4 1/2" pirate text in addition to the two papers already mentioned, which have been returned to their original context in SGA 5, and to a number of digests of some of the results of SGA 4 - SGA 5, which are particularly important for arithmetic applications, plus an original chapter on applications to trigonometric sums, and apart from "State 0" of Verdier's "thesis"-sic (which will be discussed later with "operation III"), it consists of a handful of additions (very useful, of course (\*\*\*)) to the cohomology formalism developed in SGA 4 - SGA 5. There would be enough here to make a nice article, a bit heterogeneous, of about thirty pages (or about fifty, including the chapter "Trigonometric sums"). If my brilliant ex-student had had any decency, it would have gone without saying to include these few additions, each in its own place, in the two or three lectures in SGA 5 from which they were inspired and which they completed. Instead, they serve as a pretext for the pure and simple deletion of Lecture II of SGA 5 (with the blessing of Illusie, who was responsible for writing it and who 'supplements' it by transforming it into an appendix in 'SGA 4 1/2' to the chapter on finiteness theorems), and to rename the biduality theorem in stale cohomology (which I had worked out in 1963, on the model of the "coherent" analogue that I had discovered in the fifties) "Deligne's theorem" (\*) (which the aforementioned Deligne was moreover going to generously "cede" to \*on

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(\*) The *biduality theorem*, or "local duality theorem" (the two names are those I gave it), both in the coherent context and in the "discrete" (étale, in particular) context, is in the nature of a "local" Poincaré duality theorem, valid for "varieties" (algebraic or analytic, or "moderated" spaces etc) which can have any singularities. It is an entirely new type of theorem, in the arsenal of "basic facts" in the cohomology of spaces of all kinds, and it is an important and profound complement to the "six operations" duality formalism that I have developed, to express with maximum flexibility and generality all phenomena of the "cohomological duality" (Poincaré type) type. Along with the introduction of the functor  $Lf^*$  (the "unusual" inverse image), it is one of the main innovative ideas I have introduced into the duality formalism of varieties and spaces "of all kinds"; in a way, both form the "soul" of the overall yoga of the "six operations".

In the coherent case, the demonstration of the biduality theorem is trivial. This does not prevent it from being what I unhesitatingly call a 'profound theorem', because it gives a simple and profound view of things that would not be understood without it. (On this subject, see J. H. C. Whitehead's observation on 'the snobbery of the young, who believe that a theorem is trivial because its proof is trivial', an observation that I take up and on which I embroider in the note 'The snobbery of the young - or the defenders of purity', No. 2.)

27.) In the discrete case, the demonstration is also profound, using the full force of Hironaka's resolution of singularities.

friend Verdier, four years later, as part of the "package" known as the "Verdier duality"...).

(<sup>169(iii)</sup>) The operation 'cohomologie étale' continued throughout the eleven years, from 1966 to 1977, which elapsed between the end of the SGA 5 seminar and the publication, one after the other, of the saw-cut volume 'SGA 4 1/2', followed by the massacre edition (known as the 'Illusie edition') of SGA 5 (\*). It was achieved, above all, thanks to the joint participation, in deed and in omission, of my five 'cohomologist' students: *P. Deligne*, *L. Illusie*, *J. L. Verdier*, *J. p. Jouanolou*, *P. Berthelot* (\*\*). It is Illusie's responsibility (apart from Deligne's) that

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To attribute the authorship of such a theorem to Mr X (Verdier first, in this case, for the discrete analytic case, then Deligne for the discrete étale case, until the two friends agree to award the whole to Verdier alone), on the pretext that he has copied an already known demonstration in a neighbouring context, or that he has been able to extend the conditions of provisional validity (which I had identified in 1963) - and this without even thinking it useful to recall its origin - is what was called 'in my day' a swindle. (which I had set out in 1963) - and this without even thinking it useful to recall its origin, is what was called 'in my day' a swindle. All I have to do now is wait for the relevant purity and resolution theorems to be proved, so that (in staggered cohomology) I can perhaps once again claim authorship at least of the biduality theorem (in the optimum framework, this time, of excellent diagrams) - at a time when the great *ideas* that inspire and give meaning to theorems have become the object of general contempt.

(11 May) I should point out that the validity of the biduality formalism in the analytic case was of course known to me as early as 1963, when Verdier learned of it from me. In SGA 5 I always pointed out in passing the validity of the ideas and techniques I was developing. In the mass-murder edition of SGA 5, Illusie took care to remove all trace of such comments.

(\*) (12 March) It seems to me to be inaccurate now to consider that the "Standard Cohomology" operation would have ended in 1977 with this double publication 'SGA 4 - SGA 5', which would be its 'culmination' (as I write two paragraphs below). I have been misled here by the deliberate intention (sometimes convenient, but artificial) of wanting to 'divide' the 'Burial' operation (of the deceased master and his faithful) into four separate operations - whereas these are in fact indissolubly linked. The real 'culmination', or rather the *apotheosis* of the 'Staggered Cohomology' operation, and at the same time of the whole Burial, took place four years later at the Colloquium (known as the '*Pervers Colloquium*') at Luminy in June 1981 (which will be discussed above all in connection with 'Operation IV'). At this colloquium, where all-round cohomological formalism (coherent and sprawling) was the focus of general attention, *my name was no longer mentioned...*

(\*\*) This solidarity was expressed, for each of these five former students, firstly by *omission*, by refraining from making any effort to contribute to making available to everyone a vast body of new ideas and basic techniques, through which they had learned their trade and from which they were the first to benefit in order to 'launch' them, but which they insisted on reserving for themselves for ten years; and after 1976, by their *si- lence* in the presence of the nevertheless very large operations of a Verdier (in 1976) and a Deligne (assisted by Illusie, the following year). In addition to Deligne and Illusie, Verdier played an

active role in the 'Spread Cohomology' operation, giving, with 'the right reference' (see 'episode 3' below), the 'kick-off' to the dismantling of

seems to me to bear the brunt of the responsibility, since it was he who assumed responsibility for the murder-publishing, making himself Deligne's docile instrument (\*).

There can be no doubt about Deligne's intention to appropriate the 'true' authorship of stellar cohomology. It is evidenced by the very spirit of the whole "étale co-homology" operation, which is undoubtedly unique in the annals of our science. It is also expressed, discreetly at first in 1975, in Deligne's biographical note (where any allusion to a cohomological tool that I had put in his hands, and which could have played a role in his demonstration of the last part of Weil's conjectures (\*\*), is absent), and in a dazzling way eight years later, in the brief but eloquent set of three texts (from 1983) that I have called "Funeral Eulogy" (in three parts) (\*\*\*)� They are examined with the care they deserve in the two notes "L'Éloge Funèbre (1) - ou les compliments" and "L'Éloge Funèbre (2) - ou la force et l'auréole" (n° s 104, 105) (and taken up, in a more penetrating light, in the later note "Les obsèques du yin (yang enterre yin (4))", n° 124). As for Deligne's autobiographical (and by no means funereal) 'eulogy', I give an overview in the two notes 'Requiem pour vague squelette' and 'La. profession de foi - ou le vrai dans le faux' (n° s 165, 166) (\*\*\*\*)

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of SGA 5, thus showing his friends that the time was definitely ripe for the large-scale operation that followed the following year without a hitch. As for Jouanolou, his active contribution was limited to '*going with the flow*', happily peppering his presentations with de rigueur references to the pirate-text, and doing his best to gloss over the composer of the themes with variations that he unfolds with mixed conviction...

(\*) Illusie was also *Verdier's accomplice*, covering up the previous year's deception. by refraining from any allusion, in the introduction to SGA 5 or elsewhere, to my talks on the homology formalism and that of the homology class associated with a cycle.

(\*\*) (12 March) Neither in this text, nor (to my knowledge) in any other text, is there any allusion to the following. The fact that a substantial part of these conjectures had already been established by someone other than him. On this subject, see the sub-note ""The" Conjecture" (n° 169<sub>4</sub>) to this note on "Manoeuvres".

(\*\*\*) In my reflections on L'Enterrement, the encounter with L'Éloge Funèbre, on the same day (12 May last year), when a certain picture of a massacre broke into my investigation, marked an important moment. The long reflection 'The key to yin and yang' (which gives its name to the second part of Burial) was triggered five months later by an unusual 'association of ideas' that emerged the day after this encounter. It was triggered by a certain deliberate intention (tacit, admittedly, but nonetheless very much in evidence...) to 'reverse roles' in the two 'minute portraits' that I had just looked at a little more closely...

(\*\*\*\*) for details of this autobiographical note, see also the final note of b. de p. (dated 29 December) at the end of the note "Le nerf dans le nerf - ou le nain et le géant" (n° 148). This notice was published by the "Fonds National de la Recherche Scientifique" (Belgian), rue d'Egmont 5, 1050 Brussels.

The operation culminated in 1977 (\*), with the publication (in the right order) of "SGA 4 1/2 (sic) - SGA 5". This was the (provisional) culmination of an eleven-year long *escalation* in the burial of my work and my person, each new stage of which was emboldened by the tacit encouragement found in the previous stages, by the general indifference and apathy (if not an eager welcome...) towards their doughty nature. I've already mentioned some of these stages, with the 'Motifs' operation reviewed earlier. I've identified three other episodes, more directly linked to the 'Spread Cohomology' operation, which I'd now like to review.

*Episode 1* concerns the fate of a certain conjecture of the '*Riemann-Roch dis-cret*' type. I had introduced it in 1966 during the SGA 5 oral seminar, in the final lecture in which I had identified and commented on a number of open problems and unpublished conjectures. This presentation was lost in the Illusie edition, where no allusion is made (and not without reason...) to the conjecture in question, or indeed to any of the many questions raised in it. However, seven years after the seminar, the conjecture reappeared in the analytical context under the pen of Mac-Pherson, without any allusion to an SGA 5 seminar (or to a schematic context), and under the unusual name of 'Deligne-Grothendieck conjecture'. This is the well-known article (\*\*) in which Mac-Pherson proves this conjecture in the analytic context.

During his visit last October, Deligne told me that in 1972 he had limited himself to

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Brussels, on the occasion of the award of the "Quinquennial Prize" to Pierre Deligne, in 1975.

In this two-page autobiographical note, as in the minute portraits that make up the 'Éloge Funèbre', the art of thumb-sucking is exercised as much on the theme of 'motifa' as on that of A-adic cohomology. In both texts, written eight years apart, the neuralgic point around which the reflexes of appropriation are concentrated seems to be Weil's 'conjecture'.

(12 March) In an even more absolute and definitive way than in the 'textes Éloges' examined in the four notes cited above, the intention to appropriate bursts forth and spreads out in the *Colloque de Luminy* of June 1981 (see the b. de p. note of that same day, page 853, above). Or to put it better, an appropriation which had hitherto been symbolic and by *intention*, and which had previously been expressed in groping manoeuvres (encouraged by the eager support of some and the indifference of all), became an *accomplished fact* at the brilliant Colloquium (at least in the unanimous consensus of all the brilliant mathematicians assembled on this memorable occasion, and in the general euphoria).

(\*) (12 March) This is a provisional "culmination"! See the first of the b. de p. notes dated of today, in the same note "Les manœuvres" (p. 853).

(\*\*) Mac Pherson, Chern classes for singular algebraic varieties, Annals of Math (2) 100, 1974, pp. 423-432.

*communicate* my conjecture (which he had learned, along with the other SGA 5 listeners, during the oral seminar) to Mac-Pherson. He told me that he was surprised by the name given by Mac-Pherson, without taking the trouble to write to him on the subject to get him to rectify the situation. On this subject, see the note 'Dotting the I's' (n° 164, part II 1), and for further details about the conjecture itself, the long sub-note n° 87<sub>1</sub> to the note 'The massacre' (n° 87) (\*).

*Episode 2* concerns the vicissitudes of the SGA 7 seminar, devoted to questions of *monodromy in stellar cohomology*, which took place between 1967 and 1969 under the joint initiative and direction of Deligne and myself. Deligne had made several contributions, the most important being his demonstration of the Picard-Lefschetz formula in the stale context. As with SGA 5, the drafting of the oral presentations took several years - it was a repeat of the (beginning of the) scenario of the (non-)drafting of its unfortunate predecessor.

! It was published anyway in 1972 and 1973 (in Lecture Notes n° s 288, 340), by Deligne, at a time when I had disappeared from the mathematical scene for three years - On his initiative, the seminar was *split into two parts*, the first presented as directed by me, the second as directed by him and N. Katz (who Katz had simply been one of several lecturers during the second year of the seminar) (\*\*).

In the first volume, SGA 7 I, published under my name, the detailed theory of evanescent cycles, which I had presented in a series of papers opening the seminar, was 'slashed' into a twenty-page summary by Deligne (the other papers had been written within a reasonable time by myself and other seminar participants). As for volume II, which appeared under the joint Deligne-Katz signature, and in which my contribution to the development of the main themes and results was no less than in volume I, this contribution was systematically omitted. I give details on this subject in the note 'Prélude à un massacre' (where I try to define the meaning of the mini-operation SGA 7) and especially in

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(\*) This conjecture will therefore appear for the first time, in its original and complete form, only in Harvest and Sowing, almost *twenty years* after I recommended it to my students.

(\*\*) For the meaning I discern in this *cut*, which no mathematical reason justified, see note "Prélude à un massacre" (n° 56) quoted below, and also the sub-note "L'éviction (2)" (n° 169<sub>1</sub>) to the present note "Les manœuvres".

Dotting the I's (part II 5), n° s 56, 164.

I shall confine myself here to pointing out the biggest oversight. It concerns the transposition I made, in the context of stale cohomology, of the cohomological theory of "Lefschetz brushes" and of the "irreducibility theorem". This transposition of classical results, proved (when they are indeed proved...) by transcendental means, was (as is often the case) not at all automatic. I remember spending days, if not a whole week on it. As far as I know, there is no other known demonstration of the main facts than the one I came up with at the time, using spectral sequences and the 'well-known' structure (which I had determined in 1958) of the 'moderated' fundamental group of an algebraic curve (\*). This theory is reproduced in SGA 7 II, in a paper by Katz (exp. XVIII) and according to the notes I had given him. In the introduction to the volume, Lefschetz's theory of brushes is presented (along with the Picard-Lefschetz formula proved by Deligne) as one of the two "key results" of the seminar, without any allusion being made to any role that I might have played in any of the themes developed in the volume. The only reference I know of in the literature to any such role for Lefschetz's theory is a laconic and ambiguous footnote (\*\*) (after the title ("Pinceaux de Lefschetz "i of Katz's talk, and the name of its author) "D'après des notes (succincts) de Grothendieck".

In Deligne's article "La Conjecture de Weil I" (<sup>169</sup> 4) (\*\*), which appeared in the same year (1973) in "Publications Mathématiques", Lefschetz's theory of brushes appears as an important technical ingredient in his demonstration of Weil's conjectures. In this article, Deligne does not even pretend to ignore my role in the A-adic trace formula (which is another crucial ingredient in his demonstration, for which he claims authorship).

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(\*) In the introduction to Katz's paper, which is about to be quoted, he seems to generously attribute this theorem to my former student Michèle Raynaud, who explained it in the SGA 1 seminar in 1960/61.

(\*\*) This note is ambiguous, in that it is careful not to assert authorship, which could just as easily be attributed to the author.

The fact that Grothendieck's notes (which are 'succinct!') are followed in no way implies that there are not several demonstrations (some of them earlier) from which he would have done me the honour of choosing. The fact that I follow Grothendieck's ('succinct!') notes in no way implies that there are not several demonstrations (some of them earlier) from which he would have done me the honour of choosing my own. This (as elsewhere in the same volume) is a typical example of the 'thumb' style dear to my friend Deligne, who has obviously set an example.... .

(\*\*\*) See the sub-note ""The" "Conjecture"" (n° 169<sub>4</sub>), taken from a b. note on the page here.

was still too notorious in well-informed circles) (\*); on the other hand, when he takes care to formulate the results of Lefschetz's theory that he is about to use, no allusion is made to my person. He simply refers to the relevant lectures in SGA 7, and it is unlikely that any unfortunate reader will ever find there the elusive footnote by his friend Katz...

*Episode 3:* The last episode I know of in the "escalation" took place in 1976, a year before the "culmination" with the "SGA 4 1/2 - SGA 5" operation. It was the publication in Astérisque (n° 36 (SMF), p. 101-151) of an article by J-L. Verdier entitled "Classe d'homologie associée à un cycle". Verdier was one of my five cohomology students, and (like his buddies) he had attended the SGA 5 seminar, wisely taking notes without really knowing what he had got himself into. In the ten years that have passed since then, he (like his buddies) has ended up finding his way around. The fact remains that in this article he takes up a certain number of ideas that I had developed in the seminar in question, at length and 'in front of listeners who begged for mercy', around the biduality theorem and above all, around the formalism of homology and cohomology classes associated with a cycle (\*\*). In this article, my name is not mentioned (except once, as a joke).

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(\*) However, the following year, in his autobiographical note (examined in the two notes already cited, n° s 165, 166) Deligne could not deny himself the satisfaction, however symbolic, of retracting this role. It is true that this was a text with a very limited circulation, which perhaps no mathematician 'in the know' ever held in his hands except me. But three years later, in the volume entitled "SGA 4 1/2", which was destined to become a standard reference text, the same trick was pulled off (albeit with an even more skilful touch, given the circumstances...), this time for a wide audience of 'users', non-specialists in stellar cohomology. For a dismantling of this masterly deception, see the group of sub-notes "The Formula" (n° s 169<sub>5</sub> - 169<sub>8</sub>) to the present note, as well as the two sub-notes that precede it, "The Trojan Horse" and "The Conjecture" (n° s 169<sub>3</sub>, 169<sub>4</sub>).

(\*\*) The idea of defining *the homology* of a scheme (or "space"... ) as its hypercohomology with values in a suitable "dualising complex" goes back to the 1950s (in the coherent framework), and had been taken up again by me, with a luxury of details, in the étale framework during the SGA 5 seminar. The methods that I had developed on the theme of the cohomology class (first) and homology class (second) associated with a cycle, from the second half of the fifties (in the coherent framework), and of which I presented a synthesis (spread version) in SGA 5, were 'all-purpose techniques', applicable to both continuous (De Rham, or Hodge style) and discrete 'coefficients', and in the schematic as well as the analytic or differentiable framework (among others). The need for such a theory had, moreover, been one of my main motivations for developing (as early as the 1950s) a formalism of cohomology 'with supports' in a closed system (with the very useful spectral sequence 'of the passage from the local to the global'), intended to provide an 'algebraic' equivalent of cohomology 'with supports' in a closed system.

of a very particular kind... ), and no reference is made to any SGA 5 seminar of which the author may have heard. Details can be found in the two notes "The right references" and "The joke - or 'complex weights'" (always the same weights, no mistake...) n° s 82, 83.

It was from this 'memorable article' that the formalism of duality on complex analytic spaces, for analytically constructible discrete coefficients, reproducing only variator that which I had developed (as early as 1963 and especially, in SGA 5 in 1965/66) in the stale schematic context, surreptitiously became the "Verdier duality" - waiting for five years later (in the euphoria of the Luminy Colloquium in June 1981) for the same sleight of hand to be performed for stale duality. But here I am anticipating (as I have already done with the episode of the 'memorable article' itself) the *third* major operation, this time with Verdier as the main (if not the only) 'beneficiary' - an operation that will be discussed below (\*).

(<sup>169(iv)</sup>) Verdier's article shed an unexpected light on the fate of SGA 5 in the hands of some of my former students. It showed me what kind of 'blessing' they could find in the exclusive knowledge they had of the ideas and techniques I had developed in SGA 5, for their benefit above all others. It also showed me, without doubt, the connivance and solidarity of all my cohomology students with this kind of operation. When I called this article 'the right reference', I didn't think it was such a good name - it did become (as was confirmed to me from various quarters) a standard reference text, which none of them could ignore. This is what eventually became clear to me in the notes "Silence" and "Solidarity" (n° s 84, 85). I knew that I should not be surprised that in the Illusie edition of what was once the SGA 5 seminar, no allusion was made, at any point, to a formalism of homology (and of homology classes associated with cycles) that I would have developed in that seminar - and indeed there was no need to mention it, since (ten years later) his friend Verdier had already taken on the task of providing the missing reference to the general satisfaction (\*).

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for the classical (and elusive) 'tubular neighbourhood' of a closed subspace. It was also on this occasion that I developed for the first time (in both the coherent and discrete contexts) statements of the type "cohomological purity" and "semi-purity".

(\*) See the notes "Sharing", n° s 170 (i) - (iii).

(\*) As for the *cohomology* variant (just touched on in Verdier's article, which Deligne refrains from mentioning), I'd like to point out the following.

The 'good reference' provided by Verdier, like the 'memorable volume' containing Deligne's partial exhumation of the motifs, is for me pure plagiarism. The same cannot be said of the text known as "SGA 4 1/2" (\*\*). Some of the shapes are still there, in the de rigueur "thumb!" style, which excels in constantly *suggesting* the false, without ever (or almost...<sup>(169) 3</sup> (\*\*\*)). My first confrontation with 'SGA 4 1/2' and with the particular form that this style takes (that of disdainful depreciation (\*)) is in the note 'La table rase' (n° 67).

But the operation in question strikes me above all, more than a banal plagiarism could, by a certain dimension of impudence. None of the other three operations reaches this extreme dimension for me (\*\*). And it reaches me more strongly than any of the other three, perhaps, because even more than that it touches me like an *act of violence*.

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to quote), it was awarded (as we have seen) to Deligne. As I am duly presented as the author of the presentation pirated by Deligne, there was no major reason to conceal the disappearance of SGA 5 from my presentations on this theme. Illusie mentions it 'in passing' in the introduction to his book, without the matter being deemed worthy of explanation (and nobody before me seems to have been surprised, in fact. . . ). On the contrary, in the second sentence of this introduction, it is clearly stated that

"the *only significant changes* with respect to the original version concern exposition II [finitude theorems], which is not reproduced, and exposition III [Lefschetz formula ]. . . "(emphasis added).

Given the little and given the context, I shouldn't be surprised if my ex-pupil affects not to see any *other* 'important changes' in the living, harmonious body that I had once entrusted to his hands and those of my other pupils, a body reduced in the Illusie edition to the state of a misshapen corpse! And it is just one 'change', *not* 'important', among many others, that two inseparable friends *shared out* one of the 'packages' of presentations that I had developed with infinite care: the part awarded to Verdier having become, already a year since the publication of SGA 5, "the' good reference that everyone was waiting for" (Deligne dixit), and the part awarded to Deligne becoming "*the*" good reason for duly quoting the indispensable basic text "SGA 4 1/2" at every turn of the page, and moreover, for presenting their late master as the humble (and confused) collaborator of his most brilliant pupil. . .

(\*\*) (21 March) The ideas set out in the series of sub-notes grouped together under the name "The Formula" (n° 169<sub>5</sub> to 169<sub>8</sub>) showed me that this impression was mistaken, despite 'certain forms' that are still retained...

(\*\*\*) on this subject, see the sub-note 'The Trojan Horse' (n° 169<sub>3</sub>), taken from a b. de p. note here which was supposed to explain this "or almost...".

(\*) It is the "depreciation" that affects to make a clean sweep of the "gangue of nonsense" amassed by a "confused" ("albeit rigorous"...) and muddled predecessor...

(\*\*) (11 March) This assessment is, of course, entirely subjective. As I was writing this line, I actually

*lence*, as a *massacre* 'for the fun of it' of a fine work that I had brought to completion and in which I had put my whole self - for the benefit, before all others, of those who subsequently went on to destroy it, to make it the fodder for their own self-importance, and (under the guise of people of high standing and exquisite company) to come and display their discreet insolence and airs of complacent contempt (\*\*\*)�.

(<sup>169(v)</sup>) (28 February) The two "operations" I have just reviewed, like the fourth (known as the "Perverse Colloquy") which will be discussed below, were carried out with the participation or connivance of a large number of people, for the "benefit" (it would seem) of just one. This is a striking point in common to these three operations, confirming the reflections made in the note "Le Fossoyeur - ou la Congrégation toute entière" (n° 97).

But I see a more insidious common thread in the first two operations, centred around motifs and spread-out cohomology, concerning a certain *spirit that* has animated them. It's about a certain inner attitude towards the *possession of high-level scientific information* with limited circulation, or at the very least, confined information.

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had a moment's hesitation when I thought of the unimaginable 'operation' of the Colloque Pervers (or 'operation IV', about which more later). This memorable Colloquium was indeed a collective *apotheosis of* the Burial of my person, by that of a reckless continuator (Zoghman Mebkhout) interposed. It was on this occasion that I realised that this apotheosis is at the same time a natural extension of, and the ultimate *culmination of*, the operation 'Cohomologie étale', of which the episode 'SGA 4 1/2 - SGA 5' was, in reality, only a provisional 'culmination'. In the latter, my ex-student Deligne cannot help but make reference here and there to my modest person and my work, albeit reluctantly, and in order to distance himself from it with scornful epithets. At the Luminy Colloquium in June 1981, on the other hand, where the subject of cohomology was at the centre of general attention, my name (as well as that of Zoghman Mebkhout) was never mentioned...

(\*\*\*) This smugness and contempt are quite clearly displayed in and between the lines of this volume named "SGA 4 1/2" (probably the only one of its kind in the history of our science). They also made their appearance, in the same year as the publication of this volume (but in more discreet tones), in Pierre Deligne's personal relationship with me. (See the note "Les deux tournants", n° 66\*) I found them in the casualness of such and such a person among those who were my pupils, refraining from replying to such and such a letter talking to him about things that were close to my heart or that had upset me. I found them, in light and casual touches, between the lines in the introduction to the 'Illusie edition' (or 'massacre edition') of a work done with love, and also last year, in the paternal airs of condescension of yet another pupil (mentioned in the note 'La plaisanterie - ou "les complexes poids"', n° 83).

to a group of a few people linked by alliances of interest (or even to a single person), who use their power to *block traffic* for as long as it seems advantageous to them to reserve the exclusive "benefit".

Thus, after my 'departure' in 1970, Deligne was *the only one* (apart from myself) to have intimately assimilated the 'yoga of motives' and to have felt its full significance - to make the use of it that we know. My five cohomology students (including Deligne), and perhaps two or three other former SGA 5 auditors who had the perseverance to really assimilate its substance, were *the only ones* to have at their exclusive disposal the ideas and techniques I had developed in that seminar.

In both cases, speaking to Deligne in countless one-to-ones between 1965 and 1969, or to the restricted group of SGA 5 listeners in 1965/66, while it is true that it was 'for their benefit above all others' that I explained and developed at length before them a certain inner vision, it was *not* as representatives of some 'interest group' that I placed in their hands those things which were of value to me, it went without saying that I was addressing them as people who, like me, were driven by a natural desire to prove themselves and to make their contribution to a *common knowledge of mathematics*, by a *spirit of service* to a 'mathematical community' without frontiers in space or time (\*). And I was well aware that what I was placing in their hands were not 'curiosities' or museum pieces, but living, burning things, made to grow and spread - and this was indeed what was immediately sensed by those I was addressing (\*). If I was addressing them, it was not as a kind of *shareholder* to whom I would have entrusted shares, in the name of I don't know what

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(\*) On the subject of such a "spirit of service", see in particular the note (also quoted below) "Yin the Servant, and the new masters" (n° 135).

(\*) (10 April) This did not prevent some of them from doing their utmost, afterwards, to debunk what they have hoarded for a long time, after having had difficulty at first (apart from Deligne) in grasping its meaning and scope and in assimilating it. I see in this tone of debunking (which is added to the 'hoarding' attitude discussed below) a double *compensation*. On the one hand, they are evacuating a sense of unease (created within themselves by the misappropriation of something that is not theirs, but *everyone else's*), by pretending to *devalue* what has been misappropriated in their own eyes. On the other hand, there is compensation for the 'father', who is seen as the embodiment of a creative force that is beyond them (whereas they are unable to accept the similar force that lies within them and within the person they secretly blame... .). My 'deceased' state, and the example set by the direct heir, created a favourable context for 'venting' a secret antagonism, the 'father' now being perceived as *being in a position of weakness and inferiority*.

common "interests", but rather as *people* to whom I was linked by a *common adventure*. - people, therefore, who would be keen to act as *relays* for the 'information' I was passing on to them (even if it meant putting their own spin on it, passing it on to those around them...), just as I myself was relaying it on their behalf (\*\*).

Looking back almost twenty years, I realise that there was a fundamental misunderstanding between them and me - we weren't 'tuned in to the same wavelengths'. What I had entrusted like living things into hands that I believed to be loving, was hoarded like some kind of *hoard* that we would hasten to bury. Possession of the hoard represented a certain derisory power, certainly, given the price. . . ) - if only the power to hold back, to prevent (if only for a while) a living thing, made to blossom and swarm, from blossoming and swarming.

I have tried to grasp the two attitudes, of different essence, that confront each other in this "misunderstanding" (\*\*\*) , in the two notes "Yin the servant, and the new masters", and "Yin the Servant (2) - or generosity" (n° s 135, 136). I don't want to seem here to be positing the exemplary incarnation of the 'attitude of service', as opposed to the 'attitude of caste': that in which 'knowledge' becomes the distinguishing mark of an elite and (at a more advanced stage in the degradation of morals) the means of arbitrary power over others. As the discussion in Fatuity and Renewal (the first part of Harvest and Sowing) shows, the reality is more complex. I was able to see in myself, and in some of my actions in my past as a mathematician, the seeds of the general deterioration that I see today. And it is just as true that this '*service impulse*' in me has been a powerful driving force in the development of my written mathematical work, and more particularly in the tireless pursuit of the two series of fundamental texts, EGA and SGA (\*).

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(\*\*) It was therefore to this 'mathematical community without frontiers' that I was addressing myself, at the same time as to them and through them. I have explained elsewhere (see the b. de p. note (\*) on page 847) why I did not take it upon myself, at least in the year following this seminar, to rewrite it on line and make it available to everyone.

(\*\*\*) As I was writing these lines, and this word 'misunderstanding', the association came to me with the letter from Zoghman Mebkhout (quoted in the note 'Failed teaching - or creation and fatuity', n° 44<sup>¶</sup> ), who spoke of a 'kind of misunderstanding' between my students and myself (although he did not include Deligne). I wasn't sure at the time if I had understood what 'sort of misunderstanding' he was talking about, if it was the same as the 'misunderstanding' I am talking about here - and that he had excluded Deligne, by his deliberate intention (which surprised me more than once in my friend) to see him only 'in rosé'?

It would seem that I was unable to communicate anything of this impulse, or of the attitude that reflects it, to my students. The work I had undertaken, insofar as it embodied an attitude and dispositions 'at the service' of a community, came to a screeching halt after I left (\*\*\*) - as if by a sudden blow from a saw or chainsaw... (\*)).

From the echoes that still reach me here and there from the world I left behind, I can see that this spontaneous attitude, which I had in common with the benevolent elders who welcomed me when I started out, has become (like this very benevolence) a *stranger* in the world that was once mine.

(<sup>169</sup> 1) (9 March) (\*\*) The sign SGA is an abbreviation for "Séminaire de Géométrie Algébrique du Bois Marie". It designates (or at least, in the 1960s, it designated) the seminars in which I developed, between 1960 and 1969 (and in collaboration with students and others, from 1962 onwards) my programme of foundations of the new algebraic geometry, in parallel with the texts (less "advanced", and in a more canonical style) of the EGA series ("Elements of Algebraic Geometry") (\*\*\*). These seminars were held at the Bois Marie,

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(\*) This "relentless pursuit" often went against another equally strong impulse in me, that of letting go of all the "tasks" that were holding me back, and launching myself ever further into the unknown before me, which was constantly calling me (and still calls me...).

(\*\*) (10 April) In retyping these lines, I am struck by a peculiar irony of the situation, of which the meaning of this (and of the Burial as a whole) has not yet been fully grasped. It is the person who has invested himself entirely in tasks of 'service' for the benefit of a certain 'mathematical community', who finds himself ousted from his very work, and with the tacit and unreserved approval of the said 'community', by those very people who have made the *refusal of service* a caste imperative and a second nature.

The apparent paradox seems to me to be resolved to a large extent, however, by remembering that the 'community' to which this 'service impulse' in me was addressed was by no means the sociological entity (with its 'caste' of notables etc.) that was an unreserved stakeholder in my Burial; but it was that 'mathematical community without boundaries in space or time' referred to above. (For comments on the distinction and confusion between these two 'communities', see the first b. de p. note to the later note 'Respect' (n° 179).

(\*) On the subject of the "chainsaw" effect, cutting short (notably in each, or almost each, of those who were my pupils) to a lively and vigorous impetus for a work that was just beginning, see the two notes "Les cohéritiers... . ", ". . and the chainsaw" (n° s 91, 92).

(\*\*) This sub-note is derived from a b. de p. note to the main note "Manoeuvres" (see note de b. de p. (\*) page 848)

(\*\*\*) Written in collaboration with J. Dieudonné.

The IHES has been located in Bures sur Yvette since 1962. In fact, the first two seminars (between 1960 and 1962) were held in a makeshift room in Paris (at the Institut Thiers), in front of an audience of no more than a dozen people, and I was strictly on my own. The acronym SGA dates from those years, when there was no question of 'Bois Marie'. I later added this pretty name to the original 'Séminaire de Géométrie Algébrique', to make it less austere.

It goes without saying that these seminars, from SGA 1 to SGA 7, are numbered in chronological order. It goes without saying that the overall conception of each of these seminars came from me. It was inspired by my overall and long-term aim of laying vast foundations for algebraic geometry and, increasingly, for a more vast 'geometry', which I felt strongly from 1963 onwards, and which remained unnamed. (Today I would call it 'arithmetic geometry', a synthesis of algebraic geometry, topology and arithmetic (\*). The last of these seminars was SGA 7, which (unlike its predecessors) lasted two consecutive years, 1967-69, and was run in collaboration with Deligne.

The volume with the misleading name 'SGA 4 1/2' is (as explained above, pages 847 and 851) made up of texts dating from after 1973, and therefore also after the last of the SGA seminars, apart from those plundered from SGA 5, and the famous 'État 0' of a 'thesis' by Verdier (which will be dealt with in Operation III). All questions of dates aside, the heterogeneous nature of the texts making up this volume is in no way in keeping with the spirit in which I had pursued the SGA series, each volume of which presented *a large-scale foundation work* on a part of my programme which had not yet been developed elsewhere - to the exclusion, therefore, of volumes of '*digests*', or *compilations* of results already known and well developed, or even new results of a sporadic nature. At the very least, giving Deligne's volume the name SGA 8 (assuming that I agree to this) would have been inappropriate, by suggesting by such a name the idea (unfounded) of a *continuation* of the work that I had pursued in the previous seminars SGA 1 to SGA

7. As for the acronym "SGA 4 1/2" chosen by Deligne, it is not only "improper", but is in itself a *deception and a sham*. This is something that should be *obvious* to every one of the many mathematicians who, since 1977, have had the opportunity to read this volume, and who, moreover, know the meaning of the acronym.

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(\*) On this subject, see the b. de p. note (\*) on p. 844.

of the acronym SGA, inseparable from my person and my work, and thus also from a certain *spirit*. This does not prevent this imposture, in the very name of a standard reference text, from being tolerated by the 'mathematical community' for eight years, without apparently 'making any wrinkles'. Along with the Colloque Pervers of 1981, which is a natural extension of it, I see in it *the great disgrace* of the mathematical world of the 70s and 80s, a disgrace which seems to me to be unprecedented in the history of our science.

There was a precursor episode to this *operation-eviction*, aimed at giving the impression that my person would only play an occasional, messy and accessory role in the development of fundamental APG texts. It's called 'mini-operation SGA 7'. This operation is mentioned in 'episode 3' (of an escalation) in the note 'Les manœuvres' (n° 169), and above all (from the point of view that interests me here) in the note 'Prélude à un massacre' (n° 56). This concerns the publication, in a separate volume, SGA 7 II, of part of the original Semi-naire, under the names of Deligne and Katz and to the exclusion of myself (and in disregard of the role I played in the development of its main themes and certain key results). I write on this subject in the note quoted (n° 56):

"This "SGA 7" operation is in no way a *continuation* of the work followed in the SGAs, but I feel it is a sort of brutal "saw" (or chainsaw...), *putting an end to* the SGA series, with a volume that ostentatiously stands out from my person, even though it is linked to my work and bears its mark just as much as the others."

These volumes, SGA 7 I and SGA 7 II, do not yet display an air of condescension and thinly veiled contempt for the work from which they derive\*. If this step in the escalation has been taken four years later, it is because the previous steps (including this seemingly innocuous mini-operation, SGA 7) have 'passed', without ever (to my knowledge at least) eliciting the slightest reaction in the mathematical world.

I would like to end with an edifying epilogue (no doubt a provisional one) to the operation to oust me from the SGA, an ouster carried out by Deligne with the tacit approval of 'the entire Congregation'. I am referring to the very 'cool' reply I recently received from Mrs Byrnes, in charge of 'Lecture Notes' at Springer Verlag, to whom I had written to ask for clarification about a volume entitled SGA 5, published under my name in 1977 in the 'Lecture Notes', without Springer having seen fit to reply.

to ask for my agreement, or even to inform me of the publication. I learnt from his letter (received a month later) that it was all the more pointless to bother with such a formality, *since it is wrong to claim that I am listed as the author of the said volume SGA 5, edited by L. Illusie*, since I *only* appear on the cover as *the director* of this seminar.

! (And one wonders, in retrospect, what the late director was going to do at this seminar...) I wrote, just to see, to M. K. F. Springer in person, about various strange experiences I have had with Springer Verlag since 1972 (the year SGA 7 I was published under my name in the same way - it is true that I am no more 'author' of it than I am of SGA 5... . ). I'm still waiting for his reply...(\*i).

(16 March) This sub-note has been given the appropriate name, "L'éviction (2)". The sign (2) I would remind you that there has already been another memo by the same name, 'The eviction' (n° 63), to which I have had occasion to refer recently (with the 'Motifs' operation). The 'eviction' referred to (very discreetly...) in that note was the one that took place in 1970, when I left the IHES, a departure that obviously suited my brilliant young friend, who had recently moved to the area (\*). The connection between these two 'evictions', one from IHES and the other from the SGA series, seems obvious to me. I can see a striking progression, in the nature of an 'escalation': the first time, it was simply a case of me being ousted from an *institution*, to which I certainly felt very strongly attached (I could see myself finishing my days there, really!), but from which I very quickly detached myself without any residue of regret. The second time was when I was ousted from the SGA, which itself represented (symbolically, no doubt, and even more than symbolically) my work as a mathematician - a work to which I remain attached to this day. It is true that my 'ousting' from the IHES was completed fifteen years ago - although I doubt, despite everything, that the same will be true of my ousting from a work to which I had devoted fifteen good, hard years of my life.

I thought about the fact that I once made it easy for people to oust me from the SGA, by following my spontaneous impulse to introduce those of my students and collaborators who had

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(\*) (9 April) for the rest of the story, see the note "Les Pompes Funèbres -- im Dienst der Wissenschaft" (n° 175).

(\*) The episode of my departure from IHES (in 1970) is discussed in the section "The unfinished harvest" (n° 28) and in the notes "L'arrachement saluaire", "L'éviction", "Frères et époux" (n° s 42, 63, 134), and finally in the sub-note (n° 134) to the last cited note.

invested full time, at times, in the development of one of his seminars, as 'director' of the seminar in the same capacity as myself. This was not customary in my day, and is certainly even less so today. I don't know if I did the right thing. On the one hand, it didn't entirely correspond to reality, in the sense that there was no symmetry in the role I played and in that of my colleagues, even if they were brilliant and committed to the work just like me. This presentation of things is therefore in line with the 'ambiguity' (or 'complacency' towards brilliant young mathematicians) that I examine in the notes 'The Rise' and especially 'Ambiguity' (. n° s 63<sup>¶</sup>, 63<sup>¶¶</sup>). If this ambiguity instigated by me has encouraged some of those who have intensely collaborated with the SGA at one time or another to 'oust' me (more or less partially or more or less completely), I would be wrong to hold it against them! I'm simply reaping what I sowed. But that in no way prevents me from publicly acknowledging what has happened.

On the other hand, it's also true that this relationship I was establishing with certain colleagues could be perceived by them as a mark of esteem and trust (which it was), and at the same time encourage them to invest themselves fully in the task, just as I was investing myself in it. But I now think that such esteem and trust can be expressed in an equally clear and encouraging way, without being tainted by ambiguity. It was a bit like '*buying*' an investment commensurate with the task, by granting an '*advantage*', an '*advantage*' moreover which (with hindsight) seems dubious to me. Because it's a false advantage to appear to be something you're not. And it's quite clear that in the creation of an appearance that was (if not entirely false, at least) a little false around the edges, it was my responsibility before that of anyone else, of myself as the elder, that was involved.

Decidedly, the reflection is increasingly similar to that in the note 'Ambiguity', in the unexpected light of a 'situation of the case' that I had not thought of at all when I wrote it. I realise that, just as my relationship with the (by no means unrecognised) 'young genius' Deligne was wrong, because out of a false modesty I refrained from assuming the role of elder and 'master' that was indeed mine with him, so my relationship with other brilliant young people, investing themselves wholeheartedly in a task that seemed 'common' to me at the time (\*), was also wrong.

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(\*) I begin to realise that this was an illusion, at the end of the note "Le feu vert" (n° 68), p.

The reflections in L'Enterrement made it quite clear that if there was a 'common' task, it was for the space of a year or two, the time for the young man to do (let's say) a thesis (which is not bad). The very year I left in 1970 signalled my immediate and almost total abandonment of this vast set of visibly burning 'tasks', which were indeed 'burning in my hands' just the day before (\*\*). Apart from Deligne's work on Weil's conjecture, this was at the same time the start of a long stagnation in each of the major themes that had fascinated me most - a stagnation that (apart from the partial 'revival' triggered by the philosophy of Mabkhout-the-non-named\*) continues to this day (\*).

(<sup>169</sup> 2) (13 March) (\*\*) In this introduction to APG, Illusie warmly thanks Deligne, among others, for having

". a demonstration of the Lefschetz-Verdier formula,  
*thus removing one of the obstacles to the publication of this seminar*".

(emphasis mine), in other words: the obstacle of *Illusie's lack of 'conviction'* to write what he had been committed to writing for *eleven years* - which lack of conviction suddenly ends, as mentioned above, at the precise moment when the good Samaritan Deligne gives the 'green light' to the good Samaritan Illusie that he 'can go'...

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(\*\*) This immediate abandonment of a programme and burning tasks, the very day after my departure, is mentioned in the note "Instinct and fashion - or the law of the strongest" (n° 48), and especially in the double note "Co-heirs . . .", ". . . and the chainsaw" (n° s 91, 92), where I try to review (according to the echoes that have come back to me) what has become of the themes that had been taken on by my various "pre-1970" students.

(\*) (17 March) This impression of "stagnation" will perhaps take on a more. ' concrete in a note at a later date, in which I intend to make a short, annotated list of the most 'hot' topics on my agenda, which have been ignored, since my departure and with perfect consistency, by those who had been my students.

(9 April) On this subject, see the note "Le tour des chantiers - ou outils et vision", n° 178.

(\*\*) This sub-note is taken from a b. de p. note to the note "Les manœuvres" (n° 169) (\*\*) on page 849. For a more detailed dismantling of the "thumbs up" technique used to make the "user" (who is in a hurry and only wants to believe) see the sub-notes "The Trojan Horse" and "The Formula", n° s <sub>1693</sub> and 1695 - <sub>1698</sub>.

This is the '*truth* in the falsehood'. As for the *falsehood* that this passage was obviously trying to suggest, without having to say so clearly (in a tried-and-tested style that has set an example. . . ), it is that the SGA 5 seminar would depend on the formula in question (which was only established at the time of the seminar on the basis of hypotheses for the resolution of singularities, since lifted, in the most common cases, by Deligne's finiteness results presented in the 'earlier' volume called 'SGA 4 1/2' (\*\*\*)). In fact, as the two friends know as well as I do, the role of this Lefschetz-Verdier formula in SGA 5 (as in my proof of the cohomological A-adic formula of *L-functions*) had been purely *heuristic*, providing the *motivation* to look for and prove "explicit" fixed point formulae (i.e. where the "local terms" could be computed explicitly). Thus, Illusie joins forces with his friend to create the impression that SGA 5 is indeed (and in a sense that is not made clear either by him or by his friend) *subordinate to* the text which, as a result, can only be called "SGA 4 1/2".

For further details, see the note 'The Massacre' and its sub-note<sup>o</sup> 87 - In this note and all its sub-notes, I finally discovered (better late than never) that the whole of this introduction written by Illusie, and in general, the overall presentation of the Illusie edition (or Massacre edition), is a model of bad faith, served up casually and with those airs of candour that make his person so charming.

This touching impression that Illusie is trying to create, that it is *thanks* to the good Samaritan Deligne (and the second good Samaritan Illusie, needless to say) that the unfortunate SGA 5 seminar ended up being published (eleven years later, and in the state that I know), apparently 'passed' without any problem. I found this version in Serre's report on Deligne's work, written in 1977 for the International Committee for the Award of the Fields Medal. I have no doubt that Serre, who had only followed the intricacies of the oral seminar from a distance - not to mention that a lot of water had passed under the bridge since then - was completely honest. He surely took at face value (like everyone else, and without question) what was said or suggested in the introduction to Illusie, which he must have read one day, to see (and he saw nothing!) . . .

Interestingly, this same de Serre report is also the only place in the literature, to my knowledge, where it is stated (in this case, in the very first sentence of the report) that Deligne was my pupil. No publication by Deligne, on the other hand, could suggest that he was my pupil.

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(\*\*\*) See b. de p. (\*\*\* page 841 and (\*) page 850.

assume to any reader that the author might have learned something from me.

(<sup>169</sup> 3) (10 March) (\*) In the sub-note (n° 671) to the note 'La table rase', I point out two examples where Deligne went beyond his usual caution, and did indeed 'go so far as to state in plain language' the falsehood. For the curious and sufficiently well-informed reader, who does not have the aforementioned note and sub-note to hand, I would point out that, apart from the 'kindnesses' shown to SGA 4 and SGA 5, and the rather blatant 'omissions' by my humble self in a number of places (already pointed out here and there in the note 'Les manœuvres' and in his notes de b. de p.), the blatant swindles that I have identified are concentrated in paragraphs 3 and 4 of page 2 (in "Breadcrumb trail for SGA 4, SGA 4 1/2, SGA 5" - admire the beautiful procession here... .). These seventeen lines are a model of the art of 'fishing in troubled waters', and would be well worth a detailed analysis (\*).

It suffices for me to point out here that in the first of the paragraphs quoted, we read that, in order to establish "in stale cohomology a duality formalism analogous to that of coherent duality", "Grothendieck used the resolution of singularities and the purity conjecture" (\*\*). It is to add immediately that in the present volume (thanks be to Heaven and the brilliant author),

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(\*) This sub-note to the note on "Manoeuvres" is taken from a b. de p. note to this one, see b. de p. note (\*\*\*) on page 860.

(\*\*) For further details and comments on the second of the two paragraphs quoted, see the sub-note "Les double entendres - ou l'art de l'arnaque" (n° 169).<sup>7</sup>

(\*\*\*) The text follows on from "purity conjecture" with : "established in a relative framework [??] in SGA 4 XVI, and - modulus of resolution - equals its characteristic in SGA 4 XIX". The "in a relative framework" (incomprehensible to any reader who is not already in the know) is a way of hiding the fact that this theorem was established for smooth algebraic varieties in any characteristic.

(17 March) I'm just noticing the charm of the end of the paragraph quoted, which had been 'overlooked' in the first readings:

"Various developments are given in SGA 5 I. In SGA 5 III, we show how this formalism [??] implies the very general Lefschetz Verdier trace formula." (emphasis added).

The author (who on other occasions knows how to be precise) continues with "this formalism" (various developments?), which "implies the very general formula of traces"; only to point out immediately, in the very next sentence (in the next paragraph), that the said formula, "in the original version of SGA 5", was "established only conjecturally".

I have just checked in SGA 5-what are these "various developments" in Lecture I of SGA 5, the title tells me: "Dualising complexes", so also biduality theorem. why "various developments" instead of

these "key points" are established by another method" (my emphasis), which is valid "for finite type schemes on a regular scheme of dimension 0 or 1", i.e. in practically all the cases encountered by the user.

Thus Deligne endeavours to create the impression, and even clearly asserts, that the whole formalism of stale duality that I had developed remained conjectural (at least in terms of non-zero characteristics), and that 'these key points' were ultimately established only by him, Deligne, and in the present volume, i.e. by his finiteness results (those already mentioned in previous b. de p. notes, results to which he immediately refers). This would be a good way of substantiating the fiction of the famous '*logical dependence*' of SGA 5 on the text called 'SGA 4 1/2' (a dependence posited by this very name, and by the beautiful procession 'SGA 4 - SGA 4 1/2 - SGA 5'), and thereby of justifying the incredible assertion (already quoted and commented on) in his introduction:

"Its existence [of "SGA 4 1/2"] will soon allow SGA 5 to be published as is".

So here is the *Deligne version*, slipped in here and there in the text-coup-de-scie called "SGA 4 1/2", and without any ambiguity whatsoever in the passage from "Fil d'Ariane" that I have just quoted. The reality, in March 1963 I had already established the *complete formalism of the six operations* (thus going far beyond the usual "Poincaré duality"), without any other restrictive hypothesis than the one (obviously indispensable) of working with torsion coefficients "prime" to the<sup>\*</sup>residual characteristics of the schemes envisaged (\*). It is only for the *biduality theorem* in stale cohomology that my proof made use of the hypotheses mentioned by Deligne. This latter theorem, which was of a

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of 'theory of dualising complexes' or 'biduality theorem'? It wasn't much longer, and it still sounded less muddy! It reminds me that in the famous 'Finitude' paper, i.e. in the 'Trojan Horse', the brilliant author demonstrates a 'biduality theorem', without any allusion to my modest person - which theorem is also called 'Deligne's theorem' (in the introduction to the paper in question in SGA 5, written by Illusie). It all adds up...

NB. For comments on this biduality theorem (treated with such false nonchalance...), see the long b. de p. note (\*) on page 852.

(\*) Thus, the "six functors" and the essential formulae concerning them, the most crucial of which is the "formula of duality" for a separate morphism of finite type (which can be regarded as the most general version imaginable to date of Poincaré's classic duality theorem), were established by me, without at any time having to impose finiteness hypotheses on the coefficients. Moreover, Deligne knows this better than anyone, since it was *none other than he* who wrote a detailed version (based on my 1963 notes) of the SGA 4 lecture in which this duality formalism is developed (centred around the duality formula in question)!

type unknown in cohomology (of "spaces" of all kinds) before I discovered it, played only an episodic role in the SGA 5 seminar, for the demonstration of the Lefschetz-Verdier formula (\*), which formula itself played only a purely heuristic role (\*\*). In Deligne's apocryphal text, the role of the aforementioned bidualité theorem is, moreover, *nil* (apart from that of being demonstrated under helpful hypotheses, and - under Illusie's obsequious pen and with the encouragement of his friend - thus becoming 'Deligne's theorem'...).

There is no question here of minimising the interest of Deligne's finiteness results, which do indeed fill a gap (among many others) in SGA 5, as is the nature of things. No mathematical theory that is intensely alive is complete! But it has to be said that Deligne has exploited this contribution, as useful as it is modest (he has done deeper and more difficult things, and still without harm...), by *gonflanting* it excessively, to make it the "Trojan horse" of a monumental swindle: the "Stale Cohomology" operation.

This same 'Trojan horse' reappears in the above-mentioned review of the volume entitled 'APG 4 1/2', presented by Deligne for the Zentralblatt (see b. de p. (\*\*) page 851). In the last paragraph of this, I read:

"We prove that for schemes of finite type over a regular scheme  $S$  of dimension one, *the usual cohomological operations* [not to say the "six operations", which should definitely not be named!] transform any constructible bundle into a constructible bundle."

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(\*) (17 March) Nevertheless, in the second paragraph quoted, Deligne immediately goes on to point out that this formula "was established only conjecturally", and that "moreover the local terms were not calculated" ("assertion" which makes no mathematical sense, but which helps to create the impression of a "gangue of nonsense" on the subject of SGA 5, destined to be charitably forgotten...). ).

I confess that when I first read these passages, a year ago, I was dumbfounded - the meaning of these strangely 'off-the-wall' comments about a text that was recommended to be forgotten completely escaped me. With hindsight, and the benefit of a careful 'desk job', it finally became clear that there was an *intention to appropriate* the text, served up by a meticulously devised and perfectly perfected *method* of concealment ('à l'embrouille'), behind what at first sight had given me the impression of simple epidermal malice, expressed with the good fortune of a self-indulgent pen. For a more detailed examination of the method, see the sub-notes 'La Formule' (n° s 169<sub>5</sub> - 169<sub>9</sub>) in the note 'Les manœuvres'.

(\*\*) As I point out below (in the sub-note "Real maths..." (n° 169<sub>5</sub>)), this formula has been psychologically important, providing *motivation* for the development of "explicatas" fixed point formulae.

(Emphasis added.)

This is formulated in such a way as to suggest that, before the brilliant volume presented by the author, there was no finiteness theorem for any of the famous "usual operations" in scalar cohomology (\*). However, I had the pleasure of proving the first such finiteness theorem, and the most crucial of all, for the functor  $Rf_!$  (cohomology with proper support), and this moreover in the very days (if I remember correctly) that followed my discovery of the *definition* of such a functor in stellar cohomology (coinciding with the "trivial"  $Rf_*$  when  $f$  is assumed proper). This was in February 1963, before I had the honour of meeting my future pupil, and at a time when nobody except me (and Artin, at a pinch) was yet too sure whether étale cohomology really "existed". It really began to *exist* in those days.

There remained the analogous question for  $Rf_*$ , which proved to be more resistant, and is still not resolved with all the generality that (doubtless) belongs to it. In fact, I had already done the necessary "unscrewing" that same year (if not that very month) (which anyone could do in a jiffy today...) showing that, starting from the finiteness of  $Rf_*$ , we could prove that of  $L f^*$  and  $R\text{Hom}(\dots)$  (\*\*). It is true that this has since become part of the "basic folklore" of staggered cohomology, and is surely one of the "technical digressions" that my brilliant precursor "SGA 4 1/2" is destined to "make people forget"...

(<sup>169</sup> 4) (12 March) (\*\*\*) More than once since the publication of Deligne's article 'La conjecture de Weil I' (in which he establishes the 'last part' of the conjectures, which I had left in abeyance), I had noticed as a strange thing, but without dwelling on it until these very last days, that Deligne speaks of Weil's conjecture, where the custom until then had been to say Weil's conjectures. The conjectures in question in Weil's article (Number of solutions of equations in finite fields, Bull. Amer. Math. Soc. 55 (1949), pp. 497-508), and this is also how I learned them from Serre, around the middle of the fifties.

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(\*) This is very much in line with the "confused state of SGA 5" which, as stated earlier in the same review, the present volume was intended to "remedy".

(\*\*) As for the two remaining operations among the six, namely  $L f^*$  and  $\otimes^L$ , it is trivial that they transform constructible coefficients in constructible coefficients.

(\*\*\*) This sub-note is taken from a b. de p. note to the note "Les manœuvres" (n° 169); see the b. de p. note (\*\*\*)) on page 857.

quante. It is true that in this set of conjectures, heterogeneous at first sight, there is an obvious *unity of inspiration*, coming in the first place from intuitions linked to cohomological formalism (via the Lefschetz formula), and also (I presume at least) from Hodge theory.

By creating and developing such a *cohomological tool* for varieties over any basic field, I was able to prove a good many of these conjectures. I did this, assisted by Artin, Verdier and others, by devoting three well-packed years of my life to meticulous work on parts, materialising in two thousand "unreadable" pages of "gangue of nonsense" and "technical digressions", which allowed a Deligne to "slash" the last step in twenty tight pages. ... Moreover, inspired by a remarkable 'Kahlerian analogue' to Weil's conjectures, discovered by Serre, I was able to derive (with what I called the '*standard conjectures*' on algebraic cycles) the principle of at least one transposition of *Hodge's theory* onto an arbitrary basic field (or more precisely, a transposition of what, in Hodge theory, is really relevant, from an "algebraic" point of view, for the theory of algebraic cycles on complex algebraic varieties). Even if we reformulate these conjectures slightly (and obviously) in their initial (perhaps over-optimistic) form, they are valid at least in characteristic zero, and are "surely true" also in characteristic  $p > 0$  (as long as Weil's conjectures are true...).

It is surely no coincidence that the same Deligne who insists on putting Weil's conjectures in the 'singular', has also endeavoured to conceal the role played in their demonstration by the man who was his teacher, and that it is he too who has endeavoured (successfully, given the general apathy) to discredit the '*standard conjectures*' as a dead end, out of reach what is more, and as an obstacle, to put it bluntly, now overcome thanks to God (and the general apathy), that it was he who tried (successfully, given the general apathy) to discredit the '*standard conjectures*' as a dead end, out of reach moreover, and as an *obstacle*, to say the least, now overcome, thanks to God (and to his modest person), on the way to proving Weil's conjecture (\*).

(<sup>169</sup> 5) (17 March) The famous "Weil conjectures", for an algebraic variety  $X$  defined over a finite field  $k$ , concern the "*L* function" (known as the "Artin-Weil function") associated with  $X$ . This function

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(\*) (16 March) For a few details on this double escamotage-debinage, see L'Éloge Funèbre (notes n° s 104, 105), and the few words on this Éloge at the beginning of note n° 171 (x). For a more detailed examination of the art of escamotage, see all the sub-notes "La Formule" (n° s 169<sub>5</sub> - 169).<sub>9</sub>

(x) (11 May) This beginning of the former note "The Apotheosis" has been separated from it to become a

separate note "The Jewels" (n° 170(iii)).

is defined as a certain formal series with rational coefficients, the knowledge of which is equivalent to that of the number of rational points of  $X$  on the field  $k$  and on all its finite extensions. The first assertion among these conjectures is that this formal series (with constant term 1) is the series expansion of a *rational function* on  $\mathbb{Q}$ . All the other assertions concern the particular form and properties of this rational function, in the special case where  $X$  is projective connected and not singular - At the heart of these conjectures is a certain formula, presumed canonical, presenting this rational function in the form

$$(L) \quad L(t) = \frac{p_0(t)p_2(t)\dots p_{2n}(t)}{p_1(t)\dots p_{2n-1}(t)},$$

where the  $p_i$  ( $0 \leq i \leq 2n$ , with  $n = \dim X$ ) are polynomials with integer coefficients and constant term 1. The degree  $b_i$  of  $p_i$  is supposed to play the role of an " $i$ .th Betti number" for  $X$  (or more precisely, for the corresponding variety  $\bar{X}$  over the algebraic closure  $\bar{k}$  of the field  $k$ ). Thus, when  $X$  comes from a non-singular projective variety  $_{XK}$  defined over a field  $K$  of zero characteristic, by "reduction to car.  $p > 0$ ", then  $b_i$  must be equal to the  $i$ .th Betti number (defined by transcendental means) of the *complex* algebraic variety obtained from  $_{XK}$ .

by any folding of  $K$  in  $C$  (\*). The rational function must satisfy a *functional equation*, which is equivalent to saying that the roots of  $p_{2n-1}$  are exactly the  $q^n/\xi_\alpha$ , where  $q = p^f$  is the cardinal of the base field  $k$ , and where  $\xi_\alpha$  runs through the roots of  $p_i$ . (Morally, this had to "come from" the existence of a "Poincaré duality" for "cohomology", not

named and undefined, of the variety  $\bar{X}$ ). I believe that Weil also had to conjecture that for  $i \neq n$ , the zeros of  $p_{2n-i}$  were exactly the  $q^{n-i}\xi_\alpha$ , where  $\xi_\alpha$  still traverses the zeros of  $p_i$  (or, which amounts to the same thing in view of the duality condition, that the zeros of  $p_i$  group in pairs, of product equal to  $q^i$  for each). The heuristic 'reason' here is another important property of the cohomology of complex nonsingular projective varieties, this time expressed by the 'Lefschetz theorem' (the so-called 'cow' version). Finally, the last of Weil's conjectures, a 'geometric' analogue of Riemann's conjecture, is that the absolute values of the inverses of the zeros of  $p_i$  are all equal to a  $q^{i/2}$  (an assertion that

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(\*) At the time Weil made his conjectures, it was not even known that the  $b_i$ 's defined in this way were *independent* of the chosen folding of  $K$  into  $\mathbb{Q}$ . A few years later, this was to result from Serre's theory of the cohomology of coherent bundles, which gave a "purely algebraic" meaning to the finer invariants  $h^{i,j}$  of Hodge's theory.

leads to highly accurate estimates for numbers of points in  $X$  (\*)).

The rationality of the function  $L$  of a general variety  $X$  had been established by Dwork in 1960, using non-cohomological " $p$ -adic" methods. The disadvantage of this method was that it did not provide a cohomological interpretation of the function  $L$ , and consequently does not lend itself to an approach to the other conjectures for non-singular projective  $X$ .

In the latter case, the existence of a formalism of cohomology (on a "field of coefficients"  $R$  of characteristic zero), including Poincaré duality for non-singular projective varieties, and a formalism of cohomology classes associated to the cycles

(transforming intersections into cup-products), provides an essentially "formal" way of transcribing the classic "Lefschetz fixed point formula". By applying this formula

to the Frobenius endomorphism of  $X$  and to its iterates, we would obtain an expression (1) as required by Weil, where the  $p_i$ , are polynomials with coefficients in  $R$ . This must have been clear to Weil from the moment he stated these conjectures (1949), and it was clear to him in every respect.

This was as true for Serre as it was for me in the 1950s - hence the initial motivation to develop such a formalism. This was done in March 1963,

with  $R = Q_A$ ,  $A \neq p$ . There were simply two grains of salt:

- a) It was not clear a priori (although we were convinced that it must be true) that the polynomials  $p_i(t)$ , which a priori had coefficients in the ring  $Z_A$  of the integers  $A$ -adiques, were in fact *ordinary integers*, and moreover, independent of the first number considered  $A$  ( $A \neq p = \text{car. } k$ ).
- b) The rationality of the function  $L$  for a non-singular projective  $X$  could only be deduced for a general  $X$  if the resolution of singularities was available.

The problems raised by a) played a crucial role, of course, in the birth and development of the *yoga of patterns*, and in the subsequent formulation of the *standard conjectures*, closely related to this yoga. They also stimulated thinking about finding a *p-adic cohomological* theory (later realised by the "*crystalline*" theory), as a possible approach to proving the completeness of the coefficients of  $p_i$ , once we knew (e.g. via an affirmative solution to the standard conjectures) that they were rational and independent of  $A$  (*including* for  $A = p$ ).

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(\*) From this last of Weil's conjectures, it follows at the same time that the writing ( $L$ ) of the function  $L$  is *unique*.

In any case, by 1963 we had the expression (L) of the function  $L$  (but which a priori depended on the choice of  $A$ ), the functional equation, and the correct behaviour of Betti numbers by specialisation. All that remained was to solve question a), to prove the assertion for the absolute values of the roots of  $p_i$ , and finally (for good measure) the Lefschetz relation on the zeros of  $p_i$ . This was done ten years later in Deligne's article "La conjecture de Weil I", Pub. Math. de l'IHES n° 43 (1973) p. 273-308.

As ingredients of this demonstration by Deligne, there was therefore no need for a formula of fixed points more sophisticated than the "ordinary" formula, which was available (without anything "conjectural") from the beginning of 1963. The only other cohomological ingredient in Deligne's paper, if I am not mistaken, is the cohomological theory of Lefschetz brushes (étale version) that I had developed around 1967 or 68, supplemented by the Picard-Lefschetz formula (proved in the étale framework by Deligne), both of which were set out in the APG 7 II volume referred to (and from which my name, as it happens, has almost disappeared...).

On the other hand, the "more sophisticated" fixed point formula, known as the "*Lefschetz-Verdier formula*", played an important *psychological role* in encouraging me to find the cohomological interpretation (L) of the *L-functions*, valid for any variety  $X$  (not necessarily non-singular projective). Verdier's formula reminded me that there must be fixed point formulae without non-singularity conditions on  $X$  (as was already well known in the case of the ordinary Lefschetz formula), but above all, it drew my attention to the fact that there are fixed point formulas concerning cohomology with *coefficients in any* ("constructible") *bundle*, interpreting an alternating sum of traces (in spaces of cohomology with coefficients in such a bundle) as a sum of "local terms" corresponding to the fixed points of an endomorphism  $f: X \rightarrow X$  (when these are isolated). In this heuristic motivation, the fact that this Lefschetz-Verdier formula "remained conjectural", because  $p > 0$  (for lack of the resolution of singularities, and hence of the "biduality theorem"), was *entirely irrelevant* (\*).

As so often, the essential step here was to find '*the right wording* (in

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(\*) (20 March) It was so true that last year I had long since forgotten this fact entirely, and was stunned to read (in Deligne's column) that the Lefschetz-Verdier formula 'was established only conjecturally in the original version of SGA 5'. I return to this point in my reflections on the following day and the day after (18 and 19 March). (In subnotes n° 169<sub>6</sub> and 169<sub>7</sub>.)

in this case for a "cohomological formula of  $L$ -functions"). Verdier's formula suggested that I use an arbitrary (constructible)  $A$ -adic bundle, instead of the usual bundle of coefficients (which until then had remained implicit), namely the constant bundle

$Q_A$ . By copying Weil's definition of the "ordinary"  $L$  function, it was therefore necessary to define a "with coefficients in  $F$ ". Once you think about doing this, the definition is self-evident

This is the one given in my Bourbaki lecture of December 1964 (Formule de Lefschetz et rationalité des fonctions  $L$ , Séminaire Bourbaki 279), which need not be repeated here. In addition, the plausible "local terms" of the Lefschetz-Verdier formula (in terms of the given bundle of co-efficients, and the Frobenius correspondence) were also essential. Finally (either you're cheeky or you're not!), why not write the formula here, abandoning even the cleanliness hypothesis of the "orthodox" Lefschetz-Verdier formula, but working with cohomology with *clean support*?

Thus, the essential step, this time again, had been to find the 'right statement' (in this case, *the right formula*), *sufficiently general* and, by the same token, *sufficiently flexible* to lend itself to a demonstration, by 'passing' without problems through recurrences and 'unscrewings'. I wouldn't have been able (and no one to this day would be able) to demonstrate directly 'the' formula for 'ordinary'  $L$ -functions, for any  $X$  (or even smooth, but not clean),

or vice versa), in terms of an  $A$ -adic cohomology (with proper supports) with coefficients in the *constant*  $A$ -adic bundle  $Q_A$ , without going through the faisceautic generalisation. (No more than I would have been able, in car.  $p > 0$ , to prove the *ordinary* Riemann-Roch-Hirzebruch formula,

if I hadn't first generalised it as a beam formula for a proper *application* of smooth algebraic varieties - and no one, as far as I know, could do that even today...).

In the Bourbaki paper in question, I simply give the general statement of the formula for functions  $L$  "with coefficients" in an ordinary  $A$ -adic bundle, and I show how, by very simple unscrewings, we can be reduced to the case where  $X$  is a smooth projective curve. I knew that once I got there, it was a *foregone conclusion* - because dimension one is sufficiently "in hand" for the proof of the formula in question to become a matter of routine (\*). At that point, I didn't bother to come up with a good formula.

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(\*) If I speak here of "routine work", this is in no way meant in a pejorative sense. Nine-tenths, if not much more, of mathematical work is of this type, both for me and for any other mathematician who happens to have moments that are precisely *something else*, creative moments.

of fixed points in dimension one and to prove it, it seemed to me that it should rather be up to Verdier to play. The following year he gave a formula for fixed points, known as the "Woodshole formula", which was sufficient to overcome Frobenius and the application to *L-functions*. I read his statement, which did not really satisfy me, because it seemed to me that the conditions he imposed on his cohomological correspondence (for the purposes of a demonstration of which I have no knowledge) were a little artificial - I would have liked a formula that applied to any endomorphism of an algebraic curve. The SGA 5 seminar was the first good opportunity to develop such a formula to my liking (it is, unless I am mistaken, the one that appears in Lecture XII of the Allusie edition, having miraculously survived the vicissitudes that befell that unfortunate seminar). Weil's conjectures had been an initial motivation, and a precious guiding thread, for me to "launch" into the development of a complete formalism of scalar cohomology (and others). But I was well aware that the cohomological theme, which had already been at the centre of my efforts for eight or nine years and was to remain so for the next few years until I left in 1970, had an even wider scope than the conjectures of Weil that had led me to it. For me, the Frobenius endomorphism was not an 'alpha and omega' for cohomological formalism, but one endomorphism among many others. ...

It seems to me that Deligne's initial motivation for his 'SGA 4 1/2 - SGA 5 operation' was the intention of appropriating the traces formula alone, and by extension and as a 'corollary', that of the *L* functions. Moreover, I believe that both 'pieces' were too big, and that even today, notwithstanding 'SGA 4 1/2' and the Colloque pervers et tutti quanti, 'people' (even those who are not very well informed) 'know' that it was not he who created the A-adic cohomological tool, and that he did not prove Weil's conjecture on his own. That notwithstanding, in order to finish with the operation "Cohomologique étale", I would still like to follow somewhat here the twists and turns of my friend and ex-student Deligne in his presentation of the central theme (\*) of the volume called "SGA 4 1/2", namely, "the" formula of traces, leading to the formula

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After Verdier, I myself spent some time cranking up the delicate, well-oiled techniques available in order to find and prove a formula for fixed points in dimension one that satisfied me (provisionally at least). This was 'routine' work, just as Verdier's had been.

(\*) Nowhere in "SGA 4 1/2" does it say that the "Report" is the "central theme", not that the "Report" is the "central theme".

cohomology of  $L$  functions. It is the subject of the "Rapport sur la formule des traces" (cited in [report] in his book, loc. cit. p. 76-109).

It is in *four* places in the volume that Deligne makes comments of a somewhat 'historical' nature on the formula of traces. Readers of this volume who are not already in the know, and whether or not they read the four passages (which we are going to review), will get the impression that a certain Grothendieck (author or director of a rather vague seminar subsequent to the volume "SGA 4 1/2", This seminar should not be read) seems to have had some idea, a rather confused one of course, about *L-functions*, before the author of this brilliant volume finally came up with comprehensible statements and demonstrations that make sense. In the whole volume, the only precise reference to this quidam is to a certain Bourbaki paper (from 1964, in a "Remarque 3-7." (loc. cit. p. 88), which comes last in a string of three remarks, some more technical than others (\*\*). It reads:

"If we accept the formalism of  $Q_A$ -beams. ... it is easy to reduce the proof of 3.1, 3.2 to the case where  $X_0$  is a smooth curve and  $\{_0\}$  is smooth. This is clearly explained in [2] §5 (for 3.1; 3.2 is treated similarly)."

(my emphasis). In short, this unnamed quidam (except under the flattering sign [2] (\*)) has (not *done*, of course, but) *explained the trivial job* - so trivial even that it's hardly worth mentioning in this final remark, and still having the kindness to suggest that, trivial for trivial, it's at least explained there

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more than it is said that the main purpose is to provide the main ingredients of stale cohomology for "Weil's" conjecture. At the time of writing the double introduction to the volume, a purpose of appropriation to the dimensions of all scalar and  $A$ -adic cohomology must already have been present.

(\*\*) As I was writing these lines, I was struck by the striking sense of *identity* between the style I was exploring and the style I was writing.  
here, and the one that unfolded four years later, for the appropriation 'by contempt' of the 'theorem of the good God' (alias Mebkhout). I describe the twists and turns in question in the note 'Le Prestidigitateur' (it's worth the capital letter...), n° 75<sup>¶¶</sup>. The 'sensitive point' was hidden in an even messier note 4.1.9 (instead of 3.7). You can't stop Progress...

(22 March) It had escaped me that there is in fact a second reference in "SGA 4 1/2" to the same Bourbaki lecture of 1974, a reference served up with consummate art in "Fil d'Ariane", as we shall see in the sub-note "Les doublesens - ou l'art de l'arnaque" (n° 169).

(\*) Each to his own - in 1970 (at the International Congress in Nice), it was Serre (in the paper by Deligne "La théorie de Hodge I") which, instead of being named, was given the acronym [3], in the cryptic line where it is alluded to for the first and last time) to "sources" for the theory presented...

clearly. (We already know, from other comments by the brilliant author, that clarity is not the forte of the confused quidam in question...) To put it another way: the purpose of this chapter 'Report on the formula of traces' is to *do the real work*, leaving the trivial bits and pieces to those who are there for that.... .

While I'm on the subject, I might as well say straight away that on this same page is one of the four passages to which I alluded, containing historical comments on 'the' trace formula. It's section 3.8 (following on, appropriately enough, from the previous comment 3.7). It explains that there are "two methods" for proving 3.2 (i.e. the trace formula in the only explicit case where it is mentioned in this volume, namely the special case of the Frobenius correspondence). Needless to say, the name of the quidam does not appear in either of them. There is the 'Lefschetz-Verdier' method A, and the 'Nielsen-wecken' method B (that name sounds familiar too...). Let's see what he has to say about it:

B. Nielsen-wecken. A method inspired by the work of Nielsen-wecken makes it possible to reduce 3.2 [the trace formula for Frobenius] to a special case proved by Weil; this will be explained in the following paragraphs."

In fact, par. 5 (pp. 100-106) is appropriately entitled "*The Nielsen-Wecken Method*". We were told earlier that the method was *inspired* by the work of Nielsen-Wecken - so it's surely out of sheer modesty that the author of the volume calls the method "de Nielsen-Wecken". If the reader happens to look at the bibliography of a certain XII lecture to which he is never referred (and in a seminar which he is advised to forget), he will know that these are guys who published in the early forties. If he even reads their fine work (which I bet the brilliant author has never held in his hands), they'll know that their methods are triangulation techniques. It's apparently not the one in Xi's text. In the absence of any mention to the contrary, it is therefore the modest author of the volume who is also the author of the method. No date is given for it, no doubt out of modesty again, so as not to say that it was really he who first did the work to demonstrate this famous trace formula.

But let's take a look at the Lefschetz-Verdier A method and what they have to say about it. It's not exactly encouraging:

"If  $X_0$  is clean... the Lefschetz-Verdier formula for general traces can be used.

to express the second member of 3.2 as a sum of local terms, one for each point of  $X^p$  n . In the *original version* of SGA 5, this formula was only proved by solving singularities [we knew we were going to run into problems!] The reader will find an in-conditional proof in the *final version*, which is still too modest to remind us that it's thanks to him that the game has been saved - in any case, we'll be careful not to read the bloody SGA 5 J. In the case of curves, which can be reduced to (3.7), the ingredients [??? - we give up... ] were all available."

But then, if they were (a more alert reader, if there is one, might ask), why all this talk about a Lefschetz-Verdier formula that had only been proved and blah, blah, blah? Hadn't we just said that the *real* work was done in dimension *one*? Answer: it's the 'cuttlefish method': ejecting ink to fish in murky waters! At this stage, the reader is already fully convinced that this is surely not the right method. It is with a dull eye that he reads the next paragraph, which will give him the rest:

"To deduce 3.2 from the Lefschetz-Verdier formula, you need to be able to calculate the local terms [pity, what a mess. . . ]. for a curve and the Frobenius endomorphism [ah ! they're getting cold feet!], it had been done by Artin and Verdier [and they're still at it together!] (see J. L. Verdier, the Lefschetz fixed point theorem in étale cohomology, Proc. of a conf. on Local Fields, Driebergen, Springer Verlag 1967) and the *definitive version of SGA 5* [one wonders what the original version might have looked like, poor us!]'" (Here and above, my underlining is pure malice!).

It is obviously out of charity that the brilliant author refrains from referring to the pertinent lecture of the seminar doomed to oblivion, or from even hinting that 'the' formula is indeed to be found there! The indefatigable and curious reader, who would have dared to rummage around, would have found a lecture XII with the unusual name "Lefschetz and Nielsen-Wecken formulae in algebraic geometry, by A. Grothendieck [still the same quidam, my word!] written by I. Bucur [don't know]". Surely the quidam and his acolyte will have copied the presentation of their brilliant predecessor, overloading it with superfluous details. . .

In this famous 'report', there is nothing to make the reader suspect that it exists (apart from the Lefschetz-Verdier formula, or rather, should we say, the Lefschetz-Verdier-Deligne formula, which is in any case not very inspiring, as is clear from the author's disillusioned comments

itself) an explicit trace formula and everything and everything, for something *other* than the Frobenius endomorphism alone. Both in the passage quoted, referring to Artin-Verdier, and in another (quoted below) referring to SGA 5 (so as not to name the quidam), it is suggested that the work was done *only* in the case of the Frobenius endomorphism. We're buddies with Verdier (and we're proving it to him), but as far as the trace formula is concerned, it's a foregone conclusion: a thumbnail reference to Verdier all right (in a breath with Artin (\*)), and drowned in the middle of a technical and uninspiring text, as soon forgotten as read) - but it's well understood and there's no mistake: the trace formula is *his, Deligne's!*

It's true that the aforementioned Deligne has more than one string to his bow, and it's not for nothing that he has scattered these comments with a historical allure (sic) in four different places, in order to make up in one what he could be accused of having omitted (or overdone) in the other. In the meantime, he can fall back on the introduction to the same chapter, which has all been provided for 1 It's a seven-line introduction, which deserves to be quoted in extenso (\*).

(<sup>169</sup> 6) (18 March) I had to stop in mid-stream yesterday, as it was getting prohibitively late, and it had become clear that I wouldn't be finishing with "La Formule" that very night.

! Before going into some of the twists and turns of the formula, I would like to take the opportunity, in the case of the beautiful Lefschetz-Verdier formula, to put my foot down. This formula is a perfect illustration of something that seems essential to me, and which I returned to insistently more than once in the course of Re- coltes et semailles and in the Introduction (\*\*), but in terms that were perhaps a little too 'general'.

This formula is a striking example of a statement that is *profound*, and whose demonstration is "trivial" (<sup>169</sup> 6b i s ). When Verdier told me that he had derived and proved a Lefschetz formula for 'cohomological correspondences' (which had not even been defined until then) on any ('clean') algebraic varieties

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(\*) I had already come across Deligne's tried and tested technique of drowning a fish to get rid of so-and-so (in this case Verdier, who is a friend of mine and who will be given substantial compensation elsewhere), by naming him in a breath with another - so you can't reproach him for not being generous! This is the method of '*dilution* by assimilation'. The art of the method is to find the man who can do the job.

"I think it's always Serre that my friend uses. As far as I'm concerned, my friend always uses Serre... (\*) (20 March) I come back to this introduction in yesterday's reflection (Cf. 'Les double-sens - ou l'art de l'arnaque", sub-note n° 1697.)

and for any constructible "coefficients", I was incredulous at first. Perhaps the idea had occurred to me of a Lefschetz formula with more or less general "coefficients" - I must have written one at least, a long time ago - for "locally constant" coefficients, i.e. in a local system. But *I didn't believe in it* for general coefficients - it sounded too good to be true! It didn't take Verdier long to convince me. Writing down the formula straight away and demonstrating it to me must have taken a quarter of an hour - and even then, it's because I'm slow, especially when it comes to making sure of something so unexpected 1 is what you might call a '*trivial* demonstration', in terms of what is '*trivial*'. in terms of what is '*well known*', I mean. And following the wind that is blowing these days (the first whiffs of which have already been perceived by J. H. C Whitehead (\*\*\*)�), there is only one step (blithely taken by many) to classify the theorem itself as '*trivial*' - one formula among ten or a hundred, which '*fall*' all by themselves from the co-homological formalism - in this case, from the *complete* formalism that I had just developed in the spread-out framework the previous year (1963): the six operations, *and* the biduality theorem.

If I say that the theorem discovered by Verdier (following the path traced by Lefschetz) is '*profound*', it is in no way for the reason (however pertinent) that the formalism from which its demonstration derives is itself '*profound*'. Moreover, this same fashionable wind has long since (and with the unconditional support of Verdier himself, what's more!) classified formalism among the '*big Grothendieck-style sandwiches*', which we sweep aside with the back of one hand, while tacitly using the said '*sandwiches*' at every step (without naming them). The question of whether this theorem "*remained conjectural*" (as so-and-so points out with an air of commiseration), or was entirely established in every characteristic (as it is now, thanks precisely to the "*biduality theorem*" bearing the name of so-and-so himself) is for me just as incidental, when I say that it is a profound theorem, and one which substantially enriches our understanding of the "*cohomological theme*" of all kinds (discrete or continuous coefficients, and "*varieties*" or "*spaces*" of all kinds...). The same could be said of the ordinary Lefschetz formula, in the case, say, of a compact differentiable (or other) variety, and of an endomorphism of it with isolated fixed points: the "*formal*" demonstration, based on a formalism of duality in cohomology, takes up a page, if not a few lines. In both cases, however, there has been *creation*.

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(\*\*) See Introduction 4, "A journey in pursuit of the obvious".

(\*\*\*) On this subject, see the note "Youth snobbery - or the defenders of purity" n° 27).

something new and substantial, which had eluded everyone until then, which 'didn't exist' (yet), suddenly appeared...

Where exactly is 'creation' in this case? I think that more than one mathematician, and more than one of those who were my students, who once knew what creation is and who have long since forgotten, would do well to reflect on this case, or on any other similar one, closer to it. I am well aware that if I had proposed to myself, or to one of my students or other colleagues among those who were then well 'in the know' about cohomological formalism (\*), to explain a general Lefschetz formula, for any coefficients and any 'cohomological correspondences' (it's up to them to define them ad hoc I), also on any compact (sorry, clean) variety, everyone would have succeeded infallibly, by putting in a few hours or days, or if need be a few weeks (\*). Once the problem has been posed (albeit in a vague way, while the main terms are still waiting to be defined... . ) and *seen*, '*solving*' it (in this case, finding the right formulation, suggested by the existing cohomological formalism) becomes a matter of '*routine*' (what Weil calls, in the same sense I think, an '*exercise*'). This '*routine work*' requires flair, a modicum of intelligence and imagination, to be sure, but (as I have written on more than one occasion) it is then '*the things themselves that dictate*' how we should approach them, provided only that we know how to listen to them. (And if we don't know how to listen to mathematical things, we would have done better to choose another profession...) It is *not* in this work that *the spark of* which I speak takes place, which makes the new thing spring forth (\*\*).

The creative moment, the spark that triggers a process of discovery, was here when the *problem was seen*, and moreover, '*assumed*' - when the intention was born to really *look, to go all the way to the end* to get to the bottom of it, to 'see' *what exactly the 'real' do-* is.

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(\*) There weren't many of them then to 'be in the loop' (nor now either, given the way events have turned out...) - but there must have been three or four, apart from Verdier and myself. As for Deligne, he hadn't yet appeared in. 1-es parages...

(\*) Of course, I'm assuming here that the person in question has really "latched on" to the problem posed, so that the "It's not at all obvious that the 'feeling' I would have had (otherwise I wouldn't have proposed it 1) would have 'passed', and that the pupil or colleague would indeed 'trigger'. It's not at all self-evident that 'it'll pass' - far from it!

(\*\*) And even less does the "spark" spring from such a piece of supporting work, done perhaps ten years later., which would establish that the hypotheses that make such a demonstration 'work' are indeed verified where we expected them to be... .

Lefschetz's formula, which everyone claimed was 'understood'. What ignited the spark was *not* 'virtuosity' or 'power' (in the usual sense of brain power, to master difficult techniques or memorise complex situations...). It's an *innocence*: everyone thinks they've understood Lefschetz's formula, but I, poor me, don't feel I've understood it yet, and I'd really like to have a clear idea of what it's all about! In a case like this, once you've got going, you're *set*: things tell you what *to do*, and you do it. Going 'all the way' can mean, in one case, proving 'the' right theorem (in terms, in this case, of an already existing formalism - whether this formalism itself is 'established' or 'remains conjectural' is irrelevant here). In another case, it can mean: coming up with 'the' right conjecture (\*); and the fact that this conjecture is often itself provisional, that it may turn out to be false or insufficient, and that it will have to be adjusted or extended, is also incidental. This conjecture is one of the stages on the road to a deeper collective knowledge of things (in this case, mathematical things), a stage that could not be avoided (\*\*).

Depth and fruitfulness are closely linked qualities - the former seems to me to be the tangible sign of the latter. The very first sign of the fruitfulness of the formula discovered by Verdier came that same year (if not in the days or weeks that followed, I can no longer say): this formula was my main motivation, leading me to write a cohomological formula for functions  $L$  'with coefficients' in any  $\mathbf{A}$ -adic bundle. The fact that, *technically*, I didn't have to make any use of the Lefschetz-Verdier formula is irrelevant here. What is certain is that without this formula as a guideline, or rather

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(\*) The two cases, where the "spark" (followed "to the end") leads us to a theorem, or on the other hand to a conjecture, are not different in nature. "To the end" means to give full form to an intuition that is still vague, by probing it in all its aspects and using all the means at our disposal. A theorem is by nature no more 'finished' than a conjecture. There are theorems that are visibly provisional (or even lame and haphazard), just as there are conjectures (such as Weil's set of conjectures) that give the impression of an entirely finished, perfect whole. This does not prevent Weil's conjectures from being a point of departure for other developments (conjectural at first, like them), which are broader and encompass them. In this sense, it can be said that nothing in mathematics, as long as it is alive and well, is 'finished' or 'definitive'.

(\*\*) On the dynamics of discovery, and the crucial role of "error" in it, see (in the first part of R and S) the "Error and Discovery" section (n° 2).

Without this insistent voice, I wouldn't even have thought of coming up with the right notion, and *the* relevant formula that goes with it. I would probably have done so in the years that followed, but *first I would have had* to discover by my own means this other formula of more general scope, which was 'on the way', which *had to be* discovered.

Psychologically, the two situations are very similar. Just as Verdier first had to define the notion of 'cohomological correspondence', in order to clarify the 'problem of the Lefschetz formula' (beyond the 'ordinary' formula), so I had to define the notion of an L-function 'with coefficients', in order to clarify the 'problem of the formula of *L-functions*' (in other words: beyond the case of the 'ordinary' L-function, associated with a smooth  $X. \dots$ ). The 'creative moment', the moment when a spark went off, was when I *saw this problem*: defining such Generalised *L-functions* - and I *took it on*, going right to the end of that problem. Once I'd seen the problem, and assuming I'd managed to 'pass it on' to any of the people around me who were 'in the know', it was clear that they wouldn't have been able to resist solving it, in '*the only*' natural and reasonable way, by putting in a few days no doubt (as must have been the case for me), definitions, statement, demonstration and all (\*).

It's true, of course, that the 'unscrewings' that lead back to dimension one are 'easy', and even 'trivial' if you want to. It's not in this kind of unscrewing, which anyone can do as well as me (or won't deign to do), that *there's a discovery*. The discovery lies in a *concept* that nobody had thought of, even though it's *obvious*: that of an L function with coefficients. In this notion and in the formula that is inseparable from it, there is the possibility of (in the context of schemes of finite type over the prime field  $F_p$ , or more generally, over the absolute base ring  $Z$ ) to interpret the "six operations" in cohomology, starting with by the functor  $Rf_!$  (i.e. operations of a "*geometric*" *nature*) in terms of operations on "function fields  $L$ ", i.e. in "*arithmetical*" terms. This was a new step in the direction inaugurated by Weil's conjectures in 1949, towards the marriage between the geometry and arithmetic, through the cohomological theme.

What is to become of these two discoveries, in this text which presents itself as the standard reference book for standard and A-adic cohomology - this text for the most gifted and most

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(\*) I'm leaving aside here the last step of the demonstration, which I had left in abeyance (as not posing any real problem), and which was likely to be longer.

prestigious among those who were my students?

The Lefschetz-Verdier formula, which had inspired me without my ever having had to 'use' it, has become the *scarecrow* wielded aptly to make the reader (who only asks to believe!) understand the tenuous and uninvolving (and 'conjectural', what's more, not to mention the fact that the local terms 'were not calculated!') to what tenuous and uninviting thread (and 'conjectural', what's more, not to mention that the local terms 'were not calculated') was suspended a certain seminar to which ('in keeping with the spirit of this volume') one charitably refrains from ever referring (if not for the sole purpose of debunking it....); with a discreet reminder here and there that if the aforementioned ill-advised (and unusable, to put it bluntly) formula has nevertheless ceased to be 'conjectural', it is thanks to the modest author of this brilliant volume.

As for the notion of an L function with coefficients, which is the central notion of this Report and constitutes the very heart of the book, it appears without fanfare in par. 1.6 of the Report (loc. cit. p. 80), without the slightest comment indicating a motivation or provenance. A definition is, after all, a definition; you don't have to justify it. Readers who wonder about the origin of this notion, which is admittedly a bit abracadabra (especially when it is thrown at you like that on an empty stomach...), have a choice between Artin-Weil (but there were no A-adic bundles in their time, obviously introduced by the author in this same volume...), and (more probably) this same brilliant author, who is leading them in the direction of a certain formula known as 'traces'.

This is introduced in par. 3 (loc. cit., p. 86), which begins as follows:

"Grothendieck's *cohomological interpretation* of *L-functions* is the following theorem : .." (follows the formula in question 3.1 - NB my underlining).

Apart from the introduction to the chapter (to which we shall return), this is the only occasion in the entire chapter when a certain name is mentioned (\*). So it's this same quidam again, referred to two pages later by the acronym [2] (as one who was able to 'clearly explain' some 'easy reductions') who also gave this abracadabra 'interpretation' 3.1, thrown in there without warning. It had no merit whatsoever, as the reader will immediately (and unsurprisingly) realise, because the demonstration takes up barely half a page (on the same page 86) and was, moreover, 'classic': it is a simple corollary of the famous '*trace formula*' which gives the Report its name, and which is the subject of what is, obviously, the 'interpretation',

(\*) (9 April) There is one exception (which had initially escaped my attention), with a thumbnail reference (on p. 90) to "one of Grothendieck's essential uses of the theory of derived categories" (to define traces in "unorthodox" cases).

is the "true theorem" (3.2). No name is given to indicate its authorship - i. e. from '1 a' Formule - always this mania for modesty, among the most brilliant people 1 Two pages later (as we saw yesterday) the names of Lefschetz, Verdier, Artin, Nielsen and Wecken are mentioned, a veritable debauchery of modesty at that - all to avoid saying that it's him!

The point I would like to emphasise here, and which seems to me to go far beyond the case in point and these hints of fraud, is this. Whether it be the so-called (and rightly so) 'Lefschetz-Verdier formula', or the 'cohomological interpretation' of *L-functions* ('with coefficients'), it is precisely *this* which makes their discovery *acts of creation*, which is also, nowadays, the object of general disdain (if not casual derision), commonly expressed by epithets with pejorative connotations such as: "*trivial*", "*childish*", "*obvious*", "*easy*", "*conjectural*", or even '*flabby maths*', '*dream*', '*nonsense*' and other niceties, left to the improvisation of each individual. That's the part of the job, on the other hand, which I've always known (and above all, it seems to me, never *forgotten*) comes 'on top of' and by force of circumstance, like the '*housekeeping*' that is sure to follow (provided you stick at it), the *technical* part therefore, the part that is often reputed to be '*difficult*', It's the technical part of the job, the part that is often considered '*difficult*', that is done '*by the fistful*', and that I have also described as '*routine work*' (without attaching any pejorative meaning to it) - it's this part of the job that is valued by the current consensus, and highlighted to the exclusion of all others.

For me, the notion of '*difficulty*' is relative: something seems '*difficult*' as long as I don't understand it. My job then is not to '*overcome*' the difficulty by force of will, but to enter into my incomprehension sufficiently to come to understand something, and to make '*easy*' what had seemed '*difficult*' (\*). For example, the unscrewings that I did, for the '*formula of L functions*' as in other circumstances, unscrewings that today pass for '*trivial*', were no more '*easy*' for me than dealing with the so-called '*irreducible*' cases, supposedly '*difficult*'. These were stages

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(\*) Readers will note that this is a description of the '*yin*', '*feminine*' approach to a difficulty - that of the '*rising sea*'. I don't mean to say that this is the only possible creative approach - there is also the '*hammer and chisel*' approach, the '*manly*' approach - the only one that is honoured (not to say, today, the only one that is tolerated. . . ). On these two possible approaches, see the note "*La mer qui monte...*" (The rising sea...) (no.° 122), and on current attitudes to either approach, the notes "*Le muscle et la tripe (yang enterre yin (1))*" and "*La circonstance providentielle - ou l'apothéose*" (no.° s 106, 151), as well as "*Le désaveu (1)* - or recall" (n° 152) which follows on from the latter.

different parts of the job, that's all (\*). It's not because one stage comes *after* another, or because it's longer, that it's more 'difficult'. In both stages, *an idea* was needed: the idea of 'unscrewing' in one case (something we'd never thought of doing in this kind of situation, and for good reason when it comes to fixed point formulae for any correspondence other than Frobenius 1) ; in the other case, an idea that is undoubtedly more difficult to formulate, inspired by a fixed point formula (due to Nielsen-wecken (\*\*)) that is more sophisticated than Lefschetz's original formula, and implemented by introducing a careful division of the bundle of coefficients, expressed in terms of suitable derived categories (\*\*\*)�.

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(\*) The cases I am thinking of, where I have "unscrewed" to bring myself back to situations of dimension ( or relative dimension)  $n$ , apart from that of the general formula for *L-functions* "with coefficients", are above all the two base change theorems in stale cohomology (for a proper morphism, and by a smooth morphism), which constitute the two key statements that make the said cohomology "liveable" (as Deligne writes), and the "comparison theorem" for  $Rf_!$  between stale cohomology and transcendental cohomology (for finite type schemes over the field of complexes), between stale cohomology and transcendental cohomology (for schemes of finite type over the field of complexes). (There is also the (so-called "weak") Lefschetz theorem for affine morphisms). Psychologically speaking, it was only once that I managed to reduce myself to such "irreducible" situations that I had the impression that it was (more or less) "won", that the expected theorem would indeed "come out", and experience has confirmed on each of these occasions that this feeling had not deceived me. Technically speaking, however, it's the unscrewing that represents the 'easy' stage. As it happens, by a kind of 'providence' which struck me at the time, the ingredients needed to deal with the two 'irreducible' cases, in the two basic change theorems, had been developed by me (without suspecting anything), in SGA 1 for the first, in SGA 2 for the second, three and two years earlier...

(\*\*) (10 April) It was from me, at the same time as the other SGA 5 listeners, that Deligne learnt this 'Nielsen-wecken' formula and its transposition into étale cohomology, which dispensed him from ever having to look at the three fine articles (in German) by these authors (published between 1941 and 1943), and served him in the rather peculiar way that we know (see the sub-note "Les vraies maths.n° 169<sub>5</sub> ).

(\*\*\*) The language of derived categories is indispensable in this demonstration. After my departure, and until about the year of publication of the volume entitled "SGA 4 1/2", my cohomological students instituted a tacit and effective boycott against the derived categories, which had constituted the key conceptual tool for developing the duality formalism ("six operations" and biduality), in the context of "coherent" and then "discrete" coefficients. Despite its crucial role in proving the Lefschetz-Verdier formula, and also in proving the 'classical' duality formulae in the stale context, this formalism itself, as a mathematical structure and coherent conceptual whole, has been the object of the same boycott, which continues to this day (starting with the very name 'six operations', which is still anathema).

It is possible that it was the need to demonstrate the trace formula that prompted Deligne,

The second stage took longer, as it turned out: when it came to working it out in all its generality (\*) (given that there are endomorphisms of a curve other than the Frobenius endomorphism), there was a whole 'carpet' of non-commutative traces '*à la Stallings*' that ended up sticking to it and that I had to develop carefully. It was long and it was 'easy' - and it was also something that *had to* be done, that much was clear. But even coming up with the kind of ideas that make a job 'easy' (or, quite simply, possible. . . ), is part of 'routine work' for me. It contributes to the charm of the job, which makes it something other than a simple crank turn.

The *creative* part of the work, on the other hand, is the *child's* idea: the one that everyone should have seen years ago, if not centuries or millennia ago - and yet that nobody saw, even though it was staring us in the face all that time and we had to make a big diversions around it every time, so as not to bump into it!

When you come across an idea like this, whether you've 'stumbled across it' (to put it mildly...) on your own, or someone else explains it to you (like Verdier explained one to me one day), you feel like an idiot: there's no way you couldn't have seen it before, when it was precisely the most natural thing of all, the most obvious, the most 'stupid', to put it bluntly... We *should have* stumbled across it a long time ago, but we didn't...

It would seem that these days, and more and more, in such a situation (and when you're in a position of strength, above all...) you make up for it in flexibility, when it's someone else (an illustrious stranger perhaps, or some 'dead' person long since buried. . . ) who has the misfortune to stoop (or to have once stooped...) with an idea like that. But my poor fellow, what you're telling me is *trivial*! And to prove to the unfortunate fellow just how trivial it is (and the

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in 1977, to take a first step towards lifting the boycott on derived categories, by exhuming in the volume-pirate a skeletal 'État zéro' of Verdier's 'thesis' (a text in which my name is not mentioned). On this subject, see the note "Le partage" (n° 170) devoted to "l'opération III", and for more details on the funny business of the "thesis", the notes "Le compère" and "Thèse à crédit et assurance tous risques" (n° 63□□□, 81). (\*) (23 April) A generality rightly described as "superfluous" by Illusie in his Introduction to the murder-edition of SGA 5 (second paragraph), obsequiously echoing his prestigious friend Deligne, who refers (without further clarification) to the "useless details" that he would have "pruned". At the same time, this debunking absolves him once and for all from letting the reader suspect that there exists in dimension one a n explicit trace formula that is more general than the one he sets out for Frobenius, where he repeats step by step the stages of my demonstration while giving the impression that it is his own. See the following sub-note, "Les double-sens - ou l'art de l'arnaque", n° 169 .

put him in his place... ) we're going to spit it back at him in no time - you'll see what it's like to do maths! We've got something else up our sleeves than these first-timers (or this left-behind...)! All *you have to do* is pull on it a little, blow, pull again and abracadabra hopplà! And *here's at* least one statement that's got some guts that I'm pulling out of my hat, and here's a whole theory even, and it's no joke, it's work, yes i Young man get dressed, you'll be back when you know how to do the same!

Without even thinking about it, I made a shortcut to the misadventure of my 'posthumous pupil' Zoghman Mebkhout, a modest assistant in Lille or God knows where, at the hands of my 'oc- cult pupil' Pierre Deligne, the jewel of all of a selective institution (and I could go on...); a misadventure that occurred in the year of our Lord 1981, and which continues to this very day... This is 'Operation IV', known as the 'stranger on duty' (or 'the Perverse Colloquium', to p u t i t m i l d l y ) - the most incredible of the four operations. (On this subject, see the note "L'Apothéose", n° 171.)

But at the same time, as I was writing the previous paragraph, I had the impression that I was more or less rewriting something I'd already written on another occasion...

It didn't take me long to remember - it was in the first part of *Récoltes et Semailles*, written a year ago now, in the section '*La mathématique sportive*' (the name says it all), n° 40 (p. 105). The difference between the episode I mention in it and that of the Colloque Pervers is that this time the role of the 'token stranger' is played by 'this young white boy who was stepping on my toes', and that the haughty and 'sporty' big boss was not a naughty ex-student of mine, but none other than myself. It's true that I don't think I went so far as to appropriate (symbolically, in this case) someone else's idea. But I can't swear to it in good faith, and the person concerned (twenty years later, but better late than never) would have to let me know how *he* remembers the episode, which is a bit hazy in my memory. He had the misfortune to redo things I'd known for ages (among other things, constructing Picard's diagram of a non-reduced diagram by 'unscrewing' from the reduced case... . ), and it didn't go down well - that's what stuck with me.

but I wouldn't swear that his approach (in a less general framework than mine, of course) was really entirely covered by mine (\*).

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(\*) I never had the opportunity to write up and publish Picard's "relative" construction by "unscrewing" on nilideals, a construction planned for a later chapter of the EGA.

The fact remains that I have to admit once again that there is a *kinship* between an attitude that was mine at least at certain times in the 1960s and that which I encounter among some of my former students. They reflect back to me an undoubtedly disfigured image of the man I was - an image that for years I wanted to reject. But if Harvest and Sowing, which was above all a reflection on my past as a mathematician, had *a meaning*, it was also to make me understand, among other things, that even though some of those who were my students have disowned me, it is not up to me to disown any of them. What comes back to me through them is part of the harvest of what I helped to sow, just as they themselves contributed. And this observation that I have been making with an uncompromising pen for nearly three weeks now is not an indictment of anyone, but an *observation* that involves me as much as any of them.

(<sup>169 6 b i s</sup>) (10 April) (\*\*) As everyone knows, the meaning of the word 'trivial' in mathematics is very relative. Here, by 'trivial' I mean: in terms of what was supposed to be 'known', i.e. (in this case): the formalism of the six operations, and the biduality theorem (the latter remaining conjectural because  $p > 0$  in the discrete spread context, before Deligne found a proof...). In terms of this formalism, the principle of the demonstration can be explained entirely convincingly in a few minutes (at the same time as the statement). Admittedly, this does not dispense with the need for a formal demonstration, which meant checking a few tedious compatibilities.

The custom in such a case was for the author of a theorem (especially if it was an important one) to

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(which never saw the light of day).

In any case, when I speak of 'appropriation' of someone else's idea (big or small), I'm not necessarily talking about plagiarism in the usual sense, when this idea is presented (even in modified and perfected form) without indicating its origin - something that seems to me to be becoming increasingly common. But appropriation can be that of casual disdain, the breath of which wipes away the joy of a discovery, as if for the sole pleasure of frustrating it, to the tune of a disillusioned "oh 1 it's only that... . This air suggests, without having to say it, that what we've just been told we've known for as long as we can remember, and if perhaps we hadn't bothered to explain it any further, then it really wasn't worth the trouble... For these tunes (or for its ancestor), see (in the first part of R et S,) the section 'Le pouvoir de décourager' (n° 31) (taken up again in the already quoted note 'La mathématique sportive', n° 40); and (in the harsher atmosphere of the 70s and 80s) Burial I, 'Appropriation et mépris' (note n° 59).<sup>169</sup>

(\*\*) This sub-note is taken from a b. de p. note to the previous sub-note "... and 'nonsense'".  
(n° 169); see reference page 886.

takes the trouble to write a demonstration of it. In Verdier's case, there is no doubt in my mind that it is the most profound result, and the most important in its scope, of all those whose name he has the honour (and rightly so in this case) to bear (to use Weil's expression). However, he did for this theorem what he did for the theory of derived categories: as long as he had the credit for it in any case", he did not think it worthwhile to do the work, and to make it available to everyone with a complete demonstration.

This is an eloquent sign of a certain state of mind, which I have had occasion to mention here and there, most recently at the end (dated 28 February) of the note "Les manœuvres" (n° 169). I was able to see that it has set an example. While the so-called 'Lefschetz-Verdier formula' (with the above reservation) was indeed an act of creation by Verdier, at a time when he was still working with me and was passionate about his work, I see a direct relationship between the fact that he never had the respect to demonstrate 'his' theorem, and the fact that *his life as a mathematician never saw another similar act of creation*. Creative moments come to us only when 'we are worthy of them', in other words: in a state to welcome them. ...

This beautiful formula, left behind by a father on the run, has had some strange vicissitudes. It was first the theme of one of my first lectures (exp. III) at SGA 5, in 1965. Illusie was responsible for writing it, but for twelve years he didn't think it was worth the trouble. It then became, in perfect connivance between him and Deligne (and I imagine, with the at least tacit agreement of Verdier, to whom Deligne will grant substantial compensations) the head of the 'Trojan horse' (or 'scarecrow', as I write below), deftly manoeuvred to make credible the incredible imposture called 'SGA 4 1/2'. This was a fabrication designed to bury the master common to all three of us, in other words, the '*grandfather*' of the formula (which, without my modest self and the six operations buried with me, would probably not be written for another hundred years... . ). For a picture of manners, this is a picture of manners!

If my dear ex-students in cohomology, instead of wasting their time in such shenanigans playing the dwarf (which they are not) perched on the shoulders of a giant (which I am no more. . .), had during these fifteen years given free rein to the creativity that is in them just as it is in me, surely the theories of crystalline coefficients, De Rham-Mebkhout and Hodge-Mebkhout would have been born. ), had given free rein over the last fifteen years to the creativity that is in them just as it is in me, surely the theories of crystalline coefficients, of De Rham-Mebkhout and of Hodge-Deligne, with that of the 'mysterious functor' at the end of

it, would have long since reached the 'fully adult stage' of the formalism of the six operations. In fact

(I've suspected it for the last week or two...), the great bank of the man who was their master, this '*motif*' made to be a melody and which has become (in these same hands) a fiefdom, a fortune and a 'vague skeleton', would also have already been embodied in a vast symphony (by no means 'conjectural' but 'fully grown up' too), and would now be *everyone's heritage*.

(<sup>169</sup> 7) (19 March) But I must return to the 'twists and turns' of my friend Pierre Deligne, in his presentation of the famous 'Formula of Traces'. Remarkably, nowhere does he specify that for the application to Weil's conjectures proper (which were undoubtedly aimed primarily, if not exclusively, from a practical point of view), there is no need for a formula and a sophisticated demonstration - Lefschetz's 'ordinary' formula (*étale* version) suffices (\*). And it is of course no coincidence that it was precisely the lecture on the cohomology class associated with a cycle that he chose to "borrow" from SGA 5, and incorporate it into his digest without further ado - the very lecture that contains the key ingredient (apart from the "ordinary" Poincaré duality, spread version) for establishing the Lefschetz formula.

- 'ordinary' in four spoonfuls. One wonders, then, whether he could have dispensed with including this "Report", which is neither flesh nor fish, and which establishes a formula of traces for the Frobenius endomorphism alone (while obstinately concealing from the reader that he could find elsewhere (I) clearly more general formulae, and all equally "explicit"), if he has taken the trouble to write this "Report", it is undoubtedly for two related reasons. On the one hand, it was quite clear by the 1960s that Weil's conjectures, suitably reformulated in terms of "weights", still made sense for singular varieties and for non-constant "coefficients". It is true that they can now be formulated in entirely geometric terms, without explicit reference to the formalism of *L-functions*. This is indeed what is done, it seems to me, in Deligne's article "La Conjecture de Weil II" (in which there is of course no allusion to any role that I might have played in deriving the main statement that he proves). But nevertheless the arithmetical interpretation (in terms of *L-functions* 'with coefficients') of geometrico-cohomological operations was bound to have a role to play, in which the formula of *general L-functions*, in the form in which I had developed it, was to play a crucial role. With a view to the long term, it was therefore necessary to provide a reference in the

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(\*) (25 April) It is possible that I am making a mistake here, as I have not yet really read Deligne's proof of the last part of Weil's conjectures, concerning the absolute values of Frobenius eigenvalues. It would seem that the use of Lefschetz brushes leads him to introduce more general *L-functions* than the  $\zeta$ -function (i.e. the

"ordinary" *L-function*).

ume christened "SGA 4 1/2" - At the same time, while it had become clear that general trace formulae (Lefschetz-Verdier style) form an important ingredient of the cohomological panoply, this contributed to the illusion that this volume (as it advertises) does indeed present an essentially complete cohomological arsenal, for the needs of the "non-expert user" of A-adic cohomology.

It remains for me to go through the three remaining passages, among the four in "SGA 4 1/2" that pretend to give historical details about the trace formula. I will quote them in the order in which they appear in the volume. The first two are at the very beginning of the volume (page 1 of the Introduction, and page 2 of the "Breadcrumb trail"), and are obviously intended to "announce the colour". They are also probably the most widely read. The third is the short introduction to the chapter 'Report on the formula of traces'. (The fourth passage, mentioned the day before yesterday, is part of the body of this mimeograph report, and is surely the least read of all).

In the bibliography after the "Breadcrumb trail for SGA 4, SGA 4 1/2, SGA 5", the acronym SGA is explained as "Séminaire de géométrie algébrique du Bois-Marie", with no reference (needless to say) to me personally. Nevertheless, I am one of the directors of SGA 4 and SGA 5. This function of director must, moreover, have been quite platonic: in reviewing the main papers of SGA 4 and SGA 5 (and let there be no more talk about it. . . ), there is mention of papers by Artin, Jouanolou, Houzel and Bucur, but none by me. In the reference to SGA 4 and SGA 5, there is no indication of date - and I have found no allusion in the whole volume that might make the reader who is not already informed doubt that SGA 5 ('to appear in Lecture Notes') is, as its name indicates, well and truly *subsequent to* the volume called 'SGA 4 1/2' (\*). When an allusion is made to a presentation in SGA 5 (generally unspecified), it is clearly stated that it is a 'zero state' or the 'original version' (in other words: thick and unbearable, as you might expect...). These references to SGA 5 (intended for an uninformed reader, who is advised not to consult SGA 4 or especially SGA 5) are therefore (in the mind of this same reader) references to a text *subsequent to* the one he is reading. I suspect that these uninformed readers are by far the vast majority, and (as I have written elsewhere) the others are getting old and will die their own deaths...

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(\*) Nor the slightest hint that might lead the reader to guess what this seminar, which is not to be read, was about, and even the title "*A-adic cohomology and L-functions*" remains unknown!

I quote from the first page of the Introduction, paragraph 3:

"The "Report on the Trace Formula" contains a complete proof o f the trace formula for the Frobenius endomorphism. The proof is that given by Grothendieck in SGA S, pruned of all unnecessary detail. This report should enable the user to forget SGA 5f, which can be regarded as a series of digressions, some of them very interesting. *Its existence will make it possible to publish SGA 5 unchanged in the near future.* (Emphasis added.)

This text has two *opposing* meanings, served up *simultaneously* with consummate art. The reader who is informed about the history of the formula in question for Frobenius may be surprised by the casualness of the presentation (all the more so if he is well informed about the ins and outs of the SGA 5 seminar and the role it played in the training of the brilliant and casual author); For the uninformed reader, he learns that the demonstration i n the volume he is holding in his hands is also to be found in a certain later text, SGA 5, a text written by Grothendieck and cluttered with useless details that this person must have added to the original demonstration for the sake of it. The passage quoted is vague about the demonstration. As we saw the day before yesterday, reading the demonstration itself, in the 'Report' in question, leaves little doubt that it is indeed the brilliant author of the volume 'SGA 4 1/2' who is its father. Of course, nowhere does it deign to specify whose idea it was *to write* the trace formula; after all, it costs nothing to write something, as long as you don't bother to demonstrate it! Nor is there any mention of Verdier (who was the first to demonstrate the 'crucial case' that I had left in abeyance). It's no coincidence, surely, that it's at the very moment when the trace formula is being discussed, at the heart of '*the*' Conjecture, that the author makes an assault of 'niceties' like 'useless details', 'digressions' (very interesting indeed, you're either a good sport or you're not!) that we recommend forgetting (\*), and finally this reminder that is both discreet and peremptory "its existence will allow SGA 5 to be published in the near future as it stands", as if SGA 5 only 'stands' and is only publishable thanks to the 'existence' of the text called 'SGA 4 1/2' - which surely provided the quidam in question with what he was looking for.

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(\*) More precisely, it clearly implies that this single 34-page 'Report' contains (for the better) everything that could be useful in SGA 5 (which, even in the massacre edition, is still nearly 500 pages long). That's a lot of 'digressions' for nothing!

he needed to present in a complicated way what is simply done in the original text here.

In the Ariadne's thread, I have already pointed out (in the sub-note 'The Trojan Horse' (n° 169<sub>3</sub>) to the note 'Manoeuvres') the seventeen lines of the two consecutive paragraphs 2 and 3 on page 2, as 'models in the art of "fishing in troubled waters"'. The second concerns the famous "traces" formula. Both paragraphs deserve to be reproduced here in full:

"There exists in stale cohomology a duality formalism analogous to that of coherent duality. To establish it, Grothendieck used the resolution of singularities and the purity conjecture (for the statement, see [Cycle] 2-1.4), established in a relative framework in SGA 4 XVI, and - modulo the resolution - in equal characteristics in SGA 4 XIX. The key-points are established by another method in [Th. finitude], for schemes of finite type over a regular scheme of dimension 0 or 1. Various developments are given in SGA 5 I. In SGA 5 III, we show how this formalism implies the very general Lefschetz-Verdier formula.

We can see that in the original version of SGA 5, the Lefschetz-Verdier formula was established only conjecturally. Moreover, the local terms were not calculated. For the application to *L-functions*, this seminar contains *another complete proof*, in the particular case of the Frobenius morphism. It is the one given in Rap- port! Other references: for the statement and the unscrewing scheme: Grothendieck's Bourbaki exposition [5]"; for a brief description of the reduction (due to Grothendieck) of the crucial case to a case already treated by Weil, [2] par. 10; for an A-adic treatment of this last case, [Cycle] par. 3."

I have already commented on the first paragraph in the note cited above (see also the note by b. de p. (\*\*)) page 872 to this one, on the priceless "various developments are given in SGA I"). It remains for me to follow the twists and turns of my friend (or at least some of them - there are too many

) in the second paragraph. The first two sentences, rehashing the age-old Lefschetz-Verdier formula, as if the whole of SGA 5 (and a certain demonstration, never clearly named, which appears in it, for a certain formula of traces... .) depended on it for life and death, is clearly a case of the 'cuttlefish method': confusing what is clear,

to fish in troubled waters (\*).

The key phrase with a double meaning, however, is the one that immediately follows the drowning of the fish:

"... this seminar contains *another* demonstration, a complete one, in the particular case of the Frobenius morphism".

The informed but hurried reader (and what reader is not in a hurry...) is taken aback for a second by the ambiguity of the expression 'this seminar' - is it SGA 5, is it 'SGA 4 1/2'? - and since he knows that there was a complete demonstration in SGA 5, it's settled once again: the author has indeed referred (in a somewhat vague way, admittedly...) to where we expected him to refer. I almost did the same thing on the first reading, in April last year (see the note 'La table rase', n° 67), but it didn't fit. I was well aware that the proof I had given of an explicit trace formula was by no means limited to the 'special case of the Frobenius morphism'. Moreover, what struck me was that someone had just insisted heavily (with rubbish 'arguments') on the very fact that a certain SGA 5 presentation (in its 'original version', my goodness!) was *not* 'complete': conjectural here, terms not calculated there.... . With this 'it completes' neatly framed by two commas, this categorical opposition irresistibly suggests to the uninformed reader, without him even having to question it, that 'this seminar' is obviously the volume 'SGA 4 1/2' that he is holding in his hands - and he is immediately told, in the next sentence, where to find it: 'It is the one that appears...'.

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(\*) It is incorrect to say that the Lefschetz-Verdier formula was 'conjectural' - it was established on the assumption that we have a duality formalism ('six operations' and 'biduality theorem'), and it was indeed proved in this form in 1964 by Verdier. This demonstration had of course been given in the oral seminar, and it is complete. It was the validity of the biduality theorem for  $p > 0$  that remained "conjectural", and it is established (as we said) in the "Finitude" chapter of "SGA 4 1/2".

As for the local terms in the Lefschetz-Verdier formula, they were 'calculated' no more and no less than in the ordinary Lefschetz formula (with isolated fixed points that are not necessarily 'transverse'), and generalised the classical 'intersection multiplicities' that appear in the latter. To say that these terms 'were not computed' makes no more or less sense than saying that the dimension of an *unspecified* vector space, or the raciness of a polynomial with undetermined coefficients, are 'not computed'. To "compute", in these cases as elsewhere, means: to establish in a specified "*case in point*" (e.g. in dimension 1, for the Lefschetz-Verdier formula) an *equality* between two terms, neither of which is more "computed" or known than the other (e.g. between the local terms defined by Verdier, and certain local invariants linked to the Artin conductor...).

in [Report]". - And it is certainly *not* the reading of the aforementioned demonstration in the chapter cited, which could afterwards arouse in this same reader the slightest doubt (\*)!

It's the only underlined word in the two introductory texts, and unless I'm mistaken, the only underlined word in the whole volume (apart from the titles, statements and new terms introduced). If he's so keen to highlight this word, it must be for a good reason. (It's only now that the thing has caught my attention.) The effect of this term '*other*', and even more so when it's highlighted in this way, is to underline that there were *two* demonstrations of '*the*' Formula: one *incomplete*, and we've just said a few words about the unpleasant situation, with this formula by 'Lefschetz-Verdier' that's definitely not out of the ordinary ! (And in the more technical text of the famous Report, seen the day before yesterday, we duly come back to this sorry subject... . ). As for guessing whether or not, thanks to the brilliant author's finitude results, this flawed method actually ended up working, well, who will ever know. But after this push-back effect (the same, in the end, as the one examined the day before yesterday), the psychological reflex in the docile reader is all the more peremptory: instead of the *incomplete* method in a certain muddy SGA 5 seminar (so incomplete that there is no question of even giving a precise reference (\*\*)), a method that we will certainly never bother with, we will be entitled, in *this* good, solid *seminar*, to the good, *complete* demonstration that is already reaching out to us. If you look for it in the presentation specially designed for the purpose, the "Rapport sur la formule des traces", you'll have no trouble finding it... (\*\*\*) .

However, both in the paragraph quoted and in the more technical context of the 'Rapport' on the (now forgotten) 'Lefschetz-Verdier' method (p. 88), he has once again (\*) gone so far as to say 'clearly' (or at least, in chiaroscuro) *the wrong thing*.

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(\*) See the sub-note from the day before yesterday "Real maths... ". (n° 169).<sup>5</sup>

(\*\*) Nowhere in the volume entitled "SGA 4 1/2" do I find a reference to one of the *lectures* in SGA 5 which contains either the proof of a fixed point formula or the famous "cohomological theory of *L-functions*". In fact, it was clearly stated (see below) that "in accordance with the spirit of this volume, no reference will be made to SGA 5 ... . " !

(\*\*\*) The best thing is that, in reality, Deligne's demonstration is a faithful reproduction of his own. had learned, along with the other auditors, at the APG 5 seminar in 1966.

In both passages, he stresses that there is a method (which we can guess is the one unfortunately followed in SGA 5, 'Dieu sait dans lequel de ses exposés "touffus"...) for *proving* the trace formula for Frobenius, which would consist in *using the Lefschetz-Verdier formula*. However, before Alibert's thesis in 1982, which gave the calculation of local terms in dimension 1 for any cohomological correspondence with isolated fixed points, there were only *two* demonstrations of the "crucial" case, Verdier's and mine, neither of which (and neither does Alibert's) makes use of the Lefschetz-Verdier formula! It was a tricky question, moreover, and one that remained unresolved for a long time (and which seemed a little incidental), to prove that the local terms that appear in the explicit formula set out in SGA 5 (for correspondences that are much more general than the Frobenius formula) are indeed those of the Lefschetz-Verdier formula. Illusie finally verified this, according to what he announced in the introduction to the massacre edition of SGA 5 (p. VI), and also in the introduction to his lecture *II<sub>IB</sub>* "Calculations of local terms" (p. 139) (\*\*).

If Deligne nevertheless goes to such lengths to create this false impression, it is not without reason. In fact, he creates the impression that SGA 5 (the seminar of 'technical digressions' to which no reference will be made, in the spirit of this volume', intended to make it 'forgotten') depended on this 'conjectural' formula, moreover unusable as it stands (local terms not calculated sic.), which was only finally established thanks to Deligne in the eloquently named volume "SGA 4 1/2" which the reader has in his hands, and on which (if only for this reason) the later and "confused" seminar SGA 5 depends...

As for the last sentence of the passage quoted, beginning with "Other references" (sic), it too is a model of its kind, to avoid saying that the vague quidam Grothendieck had given a complete demonstration eleven years earlier (in the "later" seminar doomed to oblivion. . . ), and that this is faithfully reproduced in "Rapport". The impression that had to be created was that the quidam had made some vague preliminary reductions, whereas the difficult case is due to Weil, and brilliantly taken up again (by a "treatment A-adic") by the author. The reference to a prestigious book by Weil of which the reader will have heard, in addition to a

(\*) 'Again', since he had already set out (even more clearly) to 'say the wrong thing' in the previous paragraph, as we saw in the sub-note 'The Trojan Horse' (n° 169).<sup>3</sup>

(\*\*) For the motivation behind Illusie's sudden efforts, see the sub-note "Congratulations - or the new style" (n° 1699), in particular pages 916-918.

1 As luck would have it, there is no indication of date in the reference to Weil's book, nor of chapter or page - it does not seem that the brilliant author wants to encourage the reader to go and look elsewhere than in the brilliant volume itself, where the reference suddenly becomes very precise (chapter, paragraph).

The famous "result already treated by Weil" is in fact nothing other than the *ordinary* Lefschetz formula in the case of an algebraic *curve* (projective smooth connected over a closed algebraic field), which Weil managed to formulate and prove by the means of the edge in the 1940s, without yet having the cohomological tool (but using the Jacobian to define the missing A-adic H). Proving this formula in the case of "abstract" algebraic geometry was an important new idea at the time, and must have put Weil on the way to his famous conjectures. Once we have the cohomological formalism, Lefschetz's formula in question becomes essentially trivial. But if we had clearly said that the quidam's reduction was a reduction to the ordinary Lefschetz formula (for which we proudly refer, without naming it, to the 'Cycle' chapter of the brilliant volume

- the pirated chapter in SGA 5...) - it could have given the impression that the said "reduction" was even a *demonstration* of the sacrosanct Formula. You wouldn't want ! (\*)

I can't wait to get it over with! What remains is this introduction to the chapter 'Rapport sur la formule des traces', loc. cit. p. 76, which is as follows (amputated of these last two lines, referring to an expository article by the author of the volume):

"In this text, I have tried to set out as directly as possible Grothendieck's cohomological theory of *L-functions*. I follow very closely some of the talks given by Grothendieck at the IHES in the spring of 1966. In the spirit of this volume, no reference will be made to SGA 5 - except for two references to passages in Lecture XV, which is independent of the rest of this seminar."

At first glance, it seems as if the author is not being secretive about his sources.

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(\*) (11 May) Thus, the whole art-"thumb!" here has been to refer in two places far from each other (p. 2 and p. 88) to *two* "reductions" (!) (easy, it is understood) made by this quidam (named once, and not the second....), without a candid reader ever suspecting that this same quidam had *found* and *proved* a formula for the traces; and that his demonstration (doomed to oblivion) is faithfully reproduced in the brilliant "Report"...

lant'théorie cohomologique *de Grothendieck* des fonctions  $L'$ , and even adding that he 'follows very closely' some of my lectures. In a *normal* volume, there would be nothing to say. But it is also true that *context* is part of the meaning of any text. The context of the unusual volume called "SGA 4 1/2" profoundly alters the meaning of this passage, for a naïve reader who has already been warned by what he has read before, and who will be further edified by reading the "Report" itself. Afterwards, he will have the impression that it is really a kindness of the generous author towards the confused quidam named Grothendieck, to credit him with a "cohomological theory of  $L$ -functions", which finally seems to be reduced to a cohomological "interpretation" a little abracadabra, but after all *trivial*. It is demonstrated in barely half a page, as an immediate *corollary* of a "trace formula", which is not prone to worms, and is of course due to none other than the too modest author of the volume.

It is true that in his 'report' the author 'follows very closely' some of the lectures given by this quidam at the IHES in the spring of 1966. Nothing more is said about these undoubtedly lengthy lectures, which must have been lost in the shuffle, except what the author of the volume was willing to retain for his report. Is it sorites about Frobenius (for which we will generously refer to SGA 5 "directed" by the same quidam), or generalities about A-adic bundles, or certain "easy reductions" which will be discussed elsewhere?

- we're completely in the dark. Be that as it may, these must have been mostly "useless details", which the Report will spare us. Thank God - that's all we need. So let's put a veil of secrecy over the quidam, and get down to *business*!

While my friend likes to remain vague about references to a certain person (when he doesn't pass them over in silence), this time you get the impression that he can't be blamed for not being precise: lectures given at the IHES, spring 1966. If he had been just a hair more precise, he would have added: lectures *at the SGA 5 seminar*.

SGA 5? Isn't this precisely the seminar that appears (*without a date*) in the bibliography in 'Fil d'Ariane', with the mention 'to be published in Lecture Notes'? The seminar that consisted (as we understand it) in adding 'digressions' (some of them very interesting, all right) and 'useless details' to the SGA 4 1/2 seminar (which was really impec) that preceded it? Don't kid yourself, SGA 5 wasn't held in the spring of 1966, are you kidding J And the best proof is right there in front of your eyes, in black and white in the just-quoted introduction to the 'Rapport sur la formule des traces' (by Pierre Deligne):

"In the spirit of this volume, APG 5 *will not* be used.

So it's clear, isn't it? !

(<sup>169</sup> 8) (20 March) I'm starting to feel a bit tired, not to say exhausted, by the work I've been doing for the last three weeks and especially (in detail) over the last few days, patiently 'dismantling', in the 'little things' that make *everything*, the brilliant scam set up by my most brilliant pupil, throwing into the public arena those who only want to be thrown in (and there are legions of them, are there not? ). I can't wait to get it over with, yes, and yet I don't regret the time I've spent on it, even though I'm about to turn fifty-seven and there's no shortage of more interesting (or more 'enjoyable', at least) things to do. It's a bit like the work in maths that I called (three days ago) 'routine work' - you eat your heart out doing it, you know it's all o.1 Not because of some austere 'obligation' or self-imposed duty, but because you can't (or at least, I can't) do without it, if I want to establish an intimate contact with the thing being probed, to 'penetrate' it. It's through this work, by 'rubbing shoulders' with the things we want to know, over a period of days, weeks or even years, that we actually 'know' them - and it's from this knowledge alone, the fruit of often arduous *work* that doesn't pay for itself, that sometimes *something else* springs up, this 'spark' I was talking about the day before yesterday, which suddenly renews our apprehension of things and the very work that leads us into them.

It is through this fatigue (which is not yet weariness), a sign of the energy that has been expended, that I can also fully measure the prodigious energy that my friend Pierre has had to expend in this delicate montage-staging that is the 'SGA 4 1/2' or 'SGA 4 1/2 - SGA 5' operation. I can't say to what extent this work of an artist, so much more subtle than that of a mathematician and bringing into play faculties of a completely different order, is conscious, or the work of entirely unconscious forces. And that's an incidental point, of his own making. In any case, the diversion of energy, and the intensity of investment in a task that is the antithesis of the drive for discovery - the task of gravedigger-prestidigitator - must have been staggering, and (I have no doubt) still is today (\*).

(\*) This obsession with appropriating "the formula" is truly insane, in simple terms.

(in the course of the long 'escalation' that was the Burial of the deceased Master) by acquiring such an empire over his being that they became like a second nature, which invaded and re-imposed itself on him.

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rational terms. On the one hand, this appropriation, by necessity, must remain to a large extent, if not totally, symbolic: a satisfaction that one grants oneself, by playing as if one *were* indeed 'the father', or as if one *had been able* to make the whole world believe it. The fictitious, symbolic nature of this is already apparent, if we remember that Deligne himself, in the article "La Conjecture de Weil I", published four years before the "SGA 4 1/2- SGA 5" montage, writes (p. 278) "Grothendieck has demonstrated Lefschetz's formula" (for Frobenius's correspondence). It is true that just a few months later, in the Bourbaki lecture (no.° 446) of February 1974, in which Serre presented this article by Deligne, the author was astonished (and rightly so) at the absence of any published demonstration of the Lefschetz formula ("we have been waiting since 1966 for the definitive version of SGA 5, which should be more convincing than the existing mimeographed lectures"), and he takes this opportunity to ironise about the 1583 pages of SGA 4 which set out ("with all the necessary details, as well as many others") the formalism of stale cohomology, surely Serre had no idea that these sarcasms directed at an absent person would not fall on deaf ears. I am convinced that they must have played their part in germinating the ingenious idea of 'making us forget' this 'gangue of nonsense' etc. SGA 4 and SGA 5, as the public voice seemed to demand through Serre's own mouth... But apart from Weil I, in terms of published texts (including the massacre-edition of SGA 5, which remains a convincing, albeit mutilated, testimony...) the authorship fraud simply does not hold water, in terms of the most elementary mathematical common sense.

Added to this, as I've already pointed out, is the fact that perfecting the famous formula *is purely routine*, once you know what you want to achieve. It took me a few days to work out the essential features

- This led me to precise questions of divisibility linked to the Artin conductor, for which Serre had ready answers, elegantly expressed in terms of the Serre-Swan module. The slightly time-consuming (but also routine) work was the careful finalisation of the formalism of non-commutative traces inspired by Stallings' work (which, as luck would have it, had just reached me). All this is the sort of thing that someone with the felling of a Deligne (or only the more modest felling that is mine) deals with by the dozen in the course of a single year!

It is true that in Deligne's writing, "trace formula" means trace formula *in any dimension* for the *Frobenius* correspondence, a formula that he takes care (in "SGA 4") to distinguish from what he calls the "cohomological interpretation" ("of Grothendieck", thank you!) of the *L* functions. He presents the latter as a simple *corollary* of the trace formula. (In fact, in the spirit of my talk at the 1964 Bourbaki seminar, the two formulae were for me *synonymous*, as equivalent expressions, one additive and the other multiplicative, of the same relationship between "arithmetic" and "geometry").

So the real motivation (still superficial, admittedly) behind this obsession with 'the formula' is by no means in the cohomological arsenal, but rather that of minimising as far as possible, if not entirely erasing, the fact that I played a role in the demonstration of '*1a*' Conjecture. In the end, it was she who appeared to me (until the Pervers Colloquium in June 1981) as *the* main point of fixation in the conflict that had developed in my ex-

student around the disowned master...

covered in its original nature, that of the 'child' in it, setting out to discover the world... More than once I've been able to see at close quarters, in seemingly innocuous situations (no match for the scale of an 'operation' like the 'Spread Cohomology' operation that I've just looked at a little more closely), the silent effectiveness of these reflexes, working with perfect ease beneath their air of affable candour. Before you've even realised what's happened (if you ever really do. . . ), he's already appropriated what you joyfully created, first by withering it with the breath of a discreet and insidious disdain. (It's also true that he's not the only one, far from it, in whom I've perceived that breath, which today seems to be part of the zeitgeist...)

But this breath that wipes out the beauty of what someone else has created and wipes out his joy, also wipes out the beauty of *everything* and the very creative power that is in him, as in each of us, to commune with the thing and to know it deeply. Of course, this does not prevent him from doing 'difficult' things and being admired, envied and feared. But the work he carried within him, of which I saw the first signs a short while ago, is still waiting to be born. It will be born on the day (if ever) when something will have collapsed, and the master-slave will have become, as his disowned master was, a *servant*.

That's about sixty well-packed pages now (not to mention a proud bunch of footnotes!), and nearly three weeks' work, which I've just devoted to the one operation alone, 'Spreading Cohomology'. It's the most voluminous of all, if not the 'biggest' (this one will be reviewed at the end of last year, in the note with the well-deserved name 'The Apotheosis').. )-I realise that with all this, I haven't even quite finished going through it all. One thing led to another, and this planned 'tidying up' of the 'facts uncovered' in a certain 'investigation' got the investigation going again, by making me look a little more closely at the rather ordinary volume called 'SGA 4 1/2', which I had previously only looked at on the run.

It was also an opportunity to look again, and with a more informed eye, at the Illusie edition of SGA 5, of sad memory. I now realise that there was a meticulous agreement between the two thieves, with Illusie placing himself entirely at Deligne's disposal to present an edition of SGA 5 entirely in keeping with the wishes of his prestigious protector and friend. This presentation of SGA 5 echoes, in a muted way, the spirit of debasement and contempt that runs through the coup-de-scie text, and provides discreet and effective support for the imposture set up in it.

The introduction to the mass-murder edition is written from beginning to end in such a way as to create a sense of security for the reader.

uninformed reader the impression of a volume of "technical digressions", on the "SGA 4 1/2" text which presents itself as central and prior (M. This impression is further reinforced, in the presentations written by Illusie, by the abundance of references to the pirate text, to which he generously refers each time he uses a result that his friend had seen fit to include in his digest, even when there are "tailor-made" references in the same SGA 5 volume, or even already in SGA 4 (\*).

I discovered the reality of a massacre in the course of reflection in the note of the same name (n° 87), dated 12 May last year, and in the sub-notes to it. In this set of notes, I finally give a detailed (if not yet exhaustive) description of the dismantling that had gradually appeared to me over the past two weeks. Having failed to dismantle in detail, as I have been doing for nearly three weeks now, the meticulous scam set up in the so-called 'SGA 4 1/2' around 'the Formula', I still failed to grasp last year this aspect of meticulous concertation, in the overall presentation of the Allusie edition of SGA 5. To finish with the 'Cohomologie étale' operation, alias 'SGA 1/2 - SGA 5', it remains for me to give a few details of how this concerted effort manifested itself in the presentation of 'the formula' (the fixed points) in the Illusie edition.

I have already noted (in the sub-note "The Good Samaritans", n° 169<sub>2</sub>) how Illusie, in his introduction, agrees with his friend to give the impression that the publication of SGA 5 was conditional on the demonstration of the eternal Lefschetz-Verdier formula. (This demonstration had been available since 1964, and I had of course developed it in the oral seminar, without Illusie, who had taken on the task of writing it in 1965, seeing fit to keep his promise for twelve years....).

I would also like to remind you that last year (in the cited note "Le massacre", n° 87) I had already discovered certain vicissitudes of Lecture XI of the original seminar. This paper, inseparable from the following paper XII which developed my version (the best known until 1981) of Lefschetz's formula in dimension 1, had completely disappeared from the Illusie edition. A en

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(\*) Thus, Künneth's formula with proper supports (over any basic scheme) is an immediate corollary of the change of basis theorem for a proper morphism (derived categories version), which was the first great "break through" in stale cohomology, in February 1963. As such, it appears in the "gangue of nonsense" of SGA 4 - we wouldn't want Illusie to refer to it, when he has the central text (intended to obviate, precisely, these confused predecessors) stretching out his arms. ...

According to Illusie's introduction, this talk would have consisted of "Grothendieck's theory of commutative traces" (a providential slip of the tongue for "n o n commutative"!) "generalising Stallings' theory" (of non-commutative traces), and would have disappeared (just as providentially) in a move (!1). In reality, this talk developed the algebraic preliminaries that are indispensable for the description of local terms in the following talk, in which I developed a general method for calculating (or better, *defining*) local terms (via a formula of the "Nielsen-wecken" type (\*)) and its explicit application in dimension one (using Serre-Swan modules, if I remember correctly). In any case, Illusie "replaces" the original paper XI, which has "disappeared", with a "new" paper  $II_{IB}$ , called for the occasion "Calculations of local terms" (which, unless I am mistaken and as if by chance, was also the title of the aborted paper!), *of which he presents himself as the author*. So he kills two birds with one stone. On the one hand, it is an act of *mutilation*, which may seem gratuitous at first sight, sowing havoc (\*\*) by this brutal *cut*, snatching a presentation from its natural context, leaving a gaping hole in its place, for the pleasure of stuffing it somewhere else. Of all the mutilations that the delicate and meticulous Illusie has inflicted on what was once a splendid seminar (of which he suddenly saw himself as absolute master...), this is perhaps the one that in retrospect seems the most violent, the most brutally ostentatious: I can slaughter for free, and I slaughter - with all the delicacy that befits my good upbringing. Congratulations, Illusie, on this kind of work, which you didn't learn from me, but from someone else, whom you've taken as your model and teacher...

And one. And as a second blow by the same stone, struck with mastery, Illusie succeeded in *concealing the authorship* of this formula of fixed points that I had worked out in 1965, at the same time (and above all) as he succeeded in *concealing this formula itself*. Since 1965/66, this had been '*the*' correct formula for fixed points in dimension one, much more general than the one I had developed.

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(\*) This formula was appropriated by Deligne (without mentioning myself), with the method of passing from the Nielsen-wecken formula with constant coefficients (therefore "ordinary"), to a formula of fixed points with any constructible coefficients. On this subject, see the sub-note "Real maths...". (n° 169<sub>5</sub>, page 883- 884). As a result (noblesse oblige. . . ) this same Deligne carefully avoids any mention of Lecture XII of the "later" SGA 5 seminar, where the name "Nielsen-wecken" appears in the title of the lecture ("Nielsen-wecken and Lefschetz formulae in algebraic geometry").

(\*\*) This mutilation and this mess, among many others sown by the care of my former pupil Illusie in the orders from my ex-pupil Deligne, allows the latter to express himself condescendingly on the 'confused state' ('albeit rigorous', because we're good players...) of SGA 5, which 'SGA 4 1/2' (however earlier it may be) is

supposed to 'remedy'... All this under the watchful eye of the Congregation of the Faithful. Congratulations!

developed by Verdier at woodshole the previous year (otherwise there was no point in tiring myself out) and a fortiori, that of Deligne's famous "Rapport" (which is confined to the Frobenius correspondence alone, while following step by step the demonstration that I had worked out in the general case). It was improved only a few years ago (nearly twenty years later) in Alibert's thesis (\*), dealing for the first time with the case of any cohomological correspondence. Illusie has managed to present the text in such a way that *the formula in question is practically impossible to find*: in the technical magma of the lectures (torn from each other)  $I\!I_{IB}$  (sic) and XII, there is nothing (in the introductions to either of them, or elsewhere) to draw the reader's attention to this central result of the two lectures as a whole, and one of the most important of the whole seminar (\*\*)! I confess that I have been unable to ascertain with absolute certainty whether this formula is to be found in SGA 5. Given the deliberate confusion of the text, and my distance from the subject, it would take me hours or even days of work to find my way around. My problem is the absence of any reference to the Serre-Swan modules, which (if I remember correctly) gave the formula I had worked out its elegance and conceptual simplicity (\*\*\*)�. It was precisely for the purposes of this formula that Serre had given some fine talks on the Galoisian modules associated with the Artin conductor, talks which were of course to feature in the published seminar, but which ended up being written off (along with five or six other packages of talks from the original seminar - never mind the Illusie, Deligne and consorts...). It is possible that the fixed-point formula in question is the formula (6.3.1) in Lecture XII (p. 431). At a glance, there is nothing to distinguish it from the dozens of other copiously numbered formulae, among which this one is drowned. Clearly the

(\*) This thesis was prepared under the supervision of Verdier (no mistake, always the same Verdier), who wrote it in Montpellier in 1981 or 1982 (I don't have the reference to hand). It represents the culmination of ten years' work, which was obviously gloomy...

(\*\*) Technically, it is the crucial formula ("irreducible case") which makes it possible to prove the famous "*L-function* formula", equivalent to the trace formula (in any dimension) for the Frobenius correspondence. The crucial role of this formula is already attested to by the very name of the SGA 5 seminar (a name that is never mentioned in the "earlier" text "SGA 4 1/2"): "A-adic cohomology and *L-functions*".

(\*\*\*) It is possible that here, and in the following sentence, I am confusing the structure of the formula Euler-Poincaré formula (in lecture x) and the Lefschetz formula (in lecture XII). In the Euler-Poincaré formula, in the form in which it appears in  $1^{\oplus}$ . Bucur's presentation (which reproduces my oral presentation), the Serre-Swan modules do indeed come into play explicitly.

The editor (Bucur) was overwhelmed by the task - and it was not the brilliant editor-sic Illusie, experienced for fifteen years in the tasks of limpid and impeccable editing, who would have lifted a finger to repair the blunders of his friend Bucur (\*) which suited him perfectly. On the contrary, he manages to increase the confusion, by making the key formula, already untraceable, *indistinguishable from that of Lefschetz-Verdier*, or from his particular case in "Rapport". The introduction to the famous exposé  $II_{IB}$  - sic, by the improvised 'father' Illusie reads:

"The second part of this talk  $II_{IB}$ , which is much more technical in nature [so don't go and read it!], is inspired by the method [!] used by Grothendieck to establish the Lefschetz formula for certain cohomological correspondences on curves [] so don't go looking for which ones.

[...] (see XII [but who knows where to find 'the' formula!] and (SGA 4 1/2 Rapport) [where the reader will have no trouble finding the formula, and being informed about the identity of its *real father*. [...] . (Emphasis added.)

Further on in the same introduction, it is said that we (i.e. Illusie, it goes without saying) apply the techniques of n° 5 (\*\*)

"to define, at n° 6, local Lefschetz-Verdier terms for cohomological correspondences between complexes of modules over rings that are not necessarily commutative".

The name surreptitiously given to these "local terms" that I introduced in 1965 in order to write the explicit formula  $0^{\sharp}$  de Lefschetz-Grothendieck"), without having to refer to the local terms of the general Lefschetz-Verdier formula - this name is obviously chosen to maintain the confusion intended and maintained by Deligne - as to what

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(\*) The last lines of the introduction (by Illusie) to the edition-massacre of SGA 5, pretend to "pay tribute to the memory of I. Bucur, who died of cancer in 1976" - a year before the murder-edition. I don't know whether there's a causal relationship - I have no doubt about Bucur's fundamental honesty and loyalty, and he wouldn't have let an enormity like this go through without at least letting me know. The fact remains that the spirit of the operation in which the posthumous homage is inserted gives it a suspicious flavour. This was just paying lip service, when there was a way, more in keeping with Ionel Bucur's goodwill and uprightness, of honouring his memory by mitigating his blunders instead of shamelessly exploiting them.

(\*\*) On the tracks, this time, non-commutative - lapsus-persifflages are strictly reserved for the deceased, at least as long as he's not there to take over...

the explicit formula in question *would* technically *depend on* the Lefschetz-Verdier formula. A few lines further on, to add to the joy, we learn that "the local terms defined by Grothendieck in the Lefschetz formula of (XII 4.5)" (\*) (of which it is not said that they are the very ones that have just been generously baptised "local Lefschetz-Verdier terms") "are indeed the local Lefschetz-Verdier terms" (but this time in *another sense*, of course: those of the *general*, "non-explicit", so-called Lefschetz-Verdier formula).

For the art of fishing in muddy waters, in a style that I recognise only too well, this is it! The same confusionist technique is used in the introduction to the volume, which reads (page VI, line 5):

"Applications to Lefschetz formulae are given in lectures XII and  $I\ I_{IB}$ ."  
(emphasis added),

especially so that the reader is hopelessly lost and has no chance of finding, or even trying to find, the only explicit Lefschetz formula known in dimension 1 (until 1981 at least), due (not to Illusie, nor even to his boss Deligne, but) to the late ex-'director' (sic), not named as it should be (\*\*), of the seminar gaily massacred by his 'publisher'-fossile Illusie.

In the original seminar, Lecture XI, which was retracted and renamed  $I\ I_{IB}$  (with a brand new father), was part of a *series of six lectures* VIII to XIII, centred around the two closely related themes of the explicit formulae of Euler-Poincaré and Lefschetz, dealt with in the same seminar.

We worked together in the same spirit, following common methods that I had identified during the seminar. In this part of the seminar, as in the others, there was a unity of purpose and vision

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(\*) (12 May) Puzzled by this unusual precision (XII 4.5) concerning "my" formula, I have just looked at the cited reference. I find a "*Conjecture 4.5*" (p. 415), which seems to concern the possibility of defining local terms. We had a feeling that this impayable quidam was going to come up with another one of his conjectures, instead of a real definition...

(\*\*) Whereas all the essential results of the SGA 5 seminar, with the exception of the Lefschetz- formula, have been used in the SGA 5 seminar.

Verdier and Serre-Swan's theory of modules (which does not appear in the murder edition), are due to me, Illusie presents the texts in such a way that for *none of* these results (not only the so-called 'Lefschetz formula' lost somewhere in an exposé XII...) does it appear that my modest person had anything to do with it. As a result, he played a leading role in the operation *to oust* me from the SGA, an operation that had been prepared for a long time by his friend Deligne, an ousting that found its epilogue in the note 'Les Pommes Funèbres - "im Dienst der wissenschaft"' (n° 175). (See also the sub-note "L'éviction (2)", n° 169.)

obvious. It was meticulously massacred by my ex-student, taking advantage of his role as 'editor'-sic-of a seminar wrecked by him and my other cohomology students (as posthumous thanks to their teacher). With a regularity worthy of the meticulous Illusie, one lecture out of two of the six, namely ex- poses IX, XI and XIII, disappeared from the massacre edition. Lecture IX was by Serre and presented Serre-Swan's theory of modules - seeing the turn events were taking, Serre preferred to withdraw his marbles and see to it himself that his fine lecture was made available to everyone. Lecture XIII was, as the 'editor' explains in the introduction to the volume, oversubscribed - apparently the unnamed 'director' couldn't count to thirteen - so it went down the trapdoor 1 Lecture XI, as we have seen, by a brilliant sleight of hand, ends up as Lecture III, as an appendix to Lecture  $II_{IB}$  (well, well - as luck would have it...), which is called Lecture  $I_{IB}$ ....), which was initially called the 'Lefschetz-Verdier Formula' and which has been renamed, for the sake of confusion, the 'Lefschetz Formula' for short. In any case, this 'move' did not happen by chance - it always goes in the same direction, that of the confusion tirelessly maintained by the perfect Deligne-Illusie tandem between the Lefschetz-Verdier formula (the one that is 'conjectural', 'local terms not calculated', but finally proved all the same by the combined efforts of Deligne and Illusie. ...) and the Lefschetz-Verdier formula (the one that is 'conjectural', 'local terms not calculated', but finally proved all the same by the combined efforts of Deligne and Illusie. ...). . ), and another formula, an explicit one, which must remain rigorously hidden, carefully drowned in a magma of formulae numbered with four decimal places, of insinuations that have never said anything, of carefully calculated ambiguities. Congratulations again, dear ex-student I As a result, lecture X, entitled 'Euler-Poincaré formula in staggered cohomology' (\*), deprived of the one that preceded it and the one that followed it, hangs pitifully in the void. Well done, you haven't wasted your time...

(<sup>169</sup> 9 ) (22 March and 29 April) I would like to come back to the confusion between the Lefschetz-Verdier formula and the *occult* formula, *the untraceable*. I've just come across a rather copious 'terminology index' in SGA 5 - either you're careful or you're not! Out of curiosity, I looked under 'Lefschetz', in case 'my' formula was there.... . The only reference is to a 'Lefschetz-Verdier formula (exposé III)' - which exposé has now been renamed (as we have seen) 'Lefschetz formula'. So the reader is well warned

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(\*) Unless otherwise stated, the reader will guess that this famous "Euler-Poincaré" formula is due to the two illustrious geometers whose name it bears. Compare with the previous b. de p. note.

that there is no other "Lefschetz" formula (at least not in this volume) than the so-called "Lefschetz-Verdier" formula (the same one that he has learned is conjectural, etc.), that SGA 5 depended on it to death and for life, and that "SGA 4 1/2", as its name indicates, saves the day... A fine piece of work, yes!

I continue to review the prowess of my former pupil Illusie, under the tutelage of my other former pupil Deligne. I take up the rest of the quotation from the introduction to the massacre-volume (\*), where 'the' Lefschetz-Verdier formula, always the same, had suddenly been multiplied (by virtue of the art of mathematical prestidigitation) into 'Lefschetz formulae', but no one had ever been able to say which ones. He continues (page VI, line 6):

*"The formula for the traces in Lecture XII [which we hope no reader will ever have the idea of unearthing...] is demonstrated independently of the general formula in Lecture III, but it is shown in (III B 6) that the local terms which appear there are indeed those of the general formula, and that the latter implies it. ] is demonstrated independently of the general formula of exposition III, but it is shown in (III B 6) that the local terms that appear there are indeed those of the general formula, and that the latter implies it."* (Emphasis added.)

Nothing in the hands, nothing in the pockets - untraceable Illusie, just as untraceable as its brilliant prestidigitator-in-chief! After having tracked down one after the other a whole cloud of ambiguities in trompe-oeuil, all pointing in the same direction, I have just noticed that here, in an innocuous turn of phrase that had escaped me until now (as it will have escaped any other reader of this introduction of more than four pages (\*\*)), it is said in chiaroscuro that a certain formula in the traces of exposé XII (that the reader will

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(\*) See the beginning of the quotation in the previous sub-note "Les prestidigitateurs - ou la formule envolée" (n° 169<sub>8</sub>), page.

(\*\*) Zoghman Mebkhout, who is an attentive reader but who arrived a little late, tells me that he has been I was even fooled, convinced that the explicit fixed-point formula (for Frobenius in any dimension, or for general correspondences in dimension one) did indeed depend on the general (non-explicit) Lefschetz-Verdier formula. So Illusie's thumb assertion had escaped his attention as well as mine - which was the desired effect...

The confusion is reinforced by the fact that my 1974 Bourbaki lecture, presenting the formula for *L-functions* "with coefficients" in a constructible bundle (or what amounts to the same thing, the explicit formula for fixed points for the Frobenius correspondence in such a bundle) had been written before an *explicit* formula in dimension one had been made explicit. At the time I assumed that the proof of the explicit formula for Frobenius, in dimension one, would appear as a corollary of the general Lefschetz-Verdier formula - that

"all that was left to do was to make the local terms explicit". So, anticipating the work still to be done by Verdier in

he manages as best he can to find out which M is demonstrated independently of the "general form of exposition III" (which, for the time being, is also not entitled to a name, in accordance with the method known as "deliberate vagueness"). . ) - only to follow in the same breath and in the same sentence (as if to '*make up for*', as it were, an assertion - an inch in line with the rules of prudence...) with a 'but we show...'. This 'but' refers to the 'platonic' complement that no one, starting with Illusie and Verdier, had bothered with for twelve years, namely that 'my' local terms - sorry, I meant 'those that appear there' (in this formula of the traces of exposé XII, the author of which will never be clearly named (\*)) - that these terms are those of the eternal 'general formula' - and the vagueness about the names given to the formulas and the places where they can be found suddenly gives way to an exemplary precision, worthy of the meticulous Illusie : this demonstration of a "rabitot" can be found in III B 6 - if a reader wants to be sure that it is indeed there,

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In this Bourbaki paper, I have called this explicit formula the "Lefschetz-Verdier theorem". In what follows, both Verdier's 'woodshole' demonstration and my own, which covers a much more general case, do not make use of the general Lefschetz-Verdier formula. The situation was perfectly clear to anyone listening to SGA 5, at least. But for those who were only familiar with my Bourbaki presentation, to the exclusion of SGA 5 (which remained sequestered until 1977), there was a misunderstanding, which was exploited to the full by Deligne and Illusie, by mutual agreement, to pull off the deception (stitched together from thick white thread) "SGA 4 1/2".

- SGA 5".

From the point of view of the imposture of the "logical dependence" of SGA 5 on the pirate-text with the misleading name, this does not hold up in any case, even if the explicit formula did indeed depend on the "conjectural" formula of Lefschetz-Verdier. Indeed, as Deligne himself notes in passing in the famous 'Méthode A' (for a reader who asks for mercy - see 'Les vraies maths...' n° 169<sub>5</sub> page 884), the 'easy reductions' of the unnamed quidam led back to the case of dimension one, where 'the ingredients of the demonstration were moreover all available'.

All these deceptions work, as long as they are served to a reader who is either asleep, in a hurry, or who wants nothing more than to be bamboozled. To an attentive and critical reader, the whole clever set-up appears for what it is: a shameless swindle. But it seems that I am the first attentive and critical reader, in the eight years since this scam appeared on the mathematical market... ...

(\*\*) For readers of SGA 5, it is Illusie, author of the brilliant paper *II<sub>IB</sub>* on "local terms", who must appear as the modest father of the never-named formula. For a reader of the volume called 'SGA 4 1/2', who has not heard of any other formula than 'Rapport', the father is clearly the brilliant author of the volume. For a reader of both (if there are any), all he or she has to do is flip a coin, or let the cat out of the bag... .

he'll have no trouble finding it!

And why this sudden interest in this identity, when the fate of the entire SGA 5 seminar had left Illusie (like my other cohomology students) completely indifferent for eleven years? It's to be able to follow up brilliantly, in the same sentence again (it's from the envoy or I don't know 1) that 'the general formula' (by Lefschetz-Verdier, not to name it) *implies* 'that of exposé XII' (by an equally unnamed deceased).

It's a truly brilliant trick! My brilliant ex-student has sweated blood and water, including mathematical piecework, but yes, to arrive at the brilliant result of this seemingly insignificant end of sentence - and yet, in the eyes of a Deligne and those of his servant, it is crucial: the Lefschetz-Verdier formula 'implies' that of 'exposé XII' (which we have just said was demonstrated independently, but never mind for the sake of the all-symbolic satisfactions of the unconscious!)

This '*implication*' is of a very particular nature, mathematically speaking - and I bet I'm the only mathematician in the world, apart from the brilliant inventor of the gag (and perhaps his master Deligne), who has been able to appreciate its flavour, to understand it, you don't even have to be a specialist, or even a mathematician. The two formulae, the 'general' one (alias Lefschetz-Verdier) and 'that of exposé XII' (alias the unnamed deceased) are expressed respectively in the form of

$$T = L, \quad T = L^{\sharp},$$

where the term  $T$  (alternating sum of traces) is the same in both formulae, while the terms  $L$ ,  $L^{\sharp}$  (sums of local terms) have been defined ad-hoc (one by Verdier in the spirit of Lefschetz, the other by the deceased in the spirit of Nielsen-wecken-Grothendieck). Eleven years later, Illusie (whose editorial zeal was suddenly aroused by a sign from the chief) makes a sudden effort, worthy of a better cause, to prove *directly* (?)

$$L = L^{\sharp} \text{ (and the same applies to local terms one by one),}$$

in order to be able to say that the formula  $T = L$  "implies"  $T = L^{\sharp}$  (and thus, implicitly, that the formula  $T = L^{\sharp}$  from the seminar to be massacred, which is crucial for the theory of  $L$  functions, "depends" on the formula  $T = L$ , which remained "conjectural" before the appearance of Deligne and his providential "SGA 4 1/2" - sic. . ). The situation becomes even more grotesque for someone with a bit of experience, who realises that nobody in the world would have had the idea

of the abracadabrious definition of the local terms which enter into  $L^\square$  (those of the unnamed deceased), if this definition was not directly "blown" by the very approach of the demonstration of the formula  $T = L^\square$ . To tell the truth, I can say that I found a "demonstration" of the formula  $T = L^\square$  even before having defined the second member  $L^\square$  and its local terms: the latter "came out" of the demonstration, no more and no less (\*).

Congratulations for the third time, Illusie, and to you just as much, Deligne, who served as her model. Together, you have pioneered a *new style* in mathematics. A style that has already set an example. It has already become known as the '1980 style', and is clearly destined for the brightest future (\*\*). It is a style of prestidigitation, aka 'the gravedigger's style', where the art lies in constantly *deceiving the reader*; deceiving him, not only about the *authorship* of the main ideas, but also (in the process) about their filiations and mutual relationships, about the significance of each, about what is essential and what is accessory - and all this for the laudable purpose of magnifying that which should be magnified, of debunking or burying with a nonchalant gesture and the bend of an anodyne sentence. And *above all*, to have the titillating sensation of *power*: to lead the reader as one pleases and by the nose, to make and unmake the history of one's science *as one pleases*, and to decide what the mathematical things one claims to explain 'are', and what they are not. This is the art of always '*reigning*'.

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(\*) I should point out, and this is self-evident, that in all conceivable applications (not just to the formula for  $L$  functions, concerning the Frobenius correspondence alone), it is the *explicit formula*  $T = L^\square$  that is the relevant formula. From a practical point of view, and as far as phenomena in dimension one are concerned, the Lefschetz-Verdier formula  $T = L$  is only of historical (or heuristic) interest, and the same applies a fortiori (at least until further notice) to Illusie's result  $L = L^\square$  (or, more precisely, that the two types of local terms, those appearing in  $L$  and those appearing in  $L'$ , are the same).

These are all very obvious things, but the two men are doing their utmost (and succeeding, these days) to blur them. It makes you wonder about the meaning of the unbridled scientific production we are witnessing, when such crude departures from simple mathematical common sense - on questions that closely concern the crucial progress made over the last twenty-five years in our knowledge of the relationship between geometry and arithmetic - go unnoticed by one and all. . .

(\*\*) For eloquent examples in this regard, see the few samples of the "1980" style that appear in the note "La maffia" (n° 171<sub>2</sub>), under the pen of our great authors Brylinski, Kashiwara, Beilinson, Bernstein. obviously, all hopes are allowed!

(12 May) As other occasional followers of the 'new style', who have distinguished themselves in the wake of the work of an obscure posthumous pupil never named, I can now add Malgrange, Laumon and Katz. (See the note 'Carte blanche pour le pillage', n° 171<sub>4</sub>)

r' by delicately pulling invisible (?) threads, without ever, ever stooping to serve. And all this in such a way as to be always and totally '*thumb* 1': so that if, by some extraordinary chance, a reader who is cleverer than anyone else should go and look at it for himself, should he have the unusual idea of making use (you never know... . ) of their own enlightenment and faculties (it's rare, but after all it could happen. . . ), that they could never catch you in the act of saying something which, *taken literally* and with no room for ambiguity or double entendre, is well and truly and irremediably *false*.

The art of art lies in this style clause, which may seem like a challenge, and yet... With the perverse Colloque d'étrange mémoire, barely four years after the virtuoso displays of prestidigitation of the lavish "SGA 4 1/2 - SGA 5" operation, we have seen just how far this new and innocent technique can go, in the concealment of an innovative work, and in the shameless plundering of the person who had long supported this work and matured it in solitude.... .

Hats off to the master and the pupil, to Deligne and Illusie! An artist's work! Both of you have well deserved the unanimous recognition of the entire Congregation.

(<sup>170(i)</sup> ) (28 February) I've come to the third of the 'four operations' around my mathematical work (pending the fourth in the following note, omitting the work of Zoghman Mebkhout).

### III The "Duality - Crystals" operation (or: "Les Beaux Restes...").

As I see it at present, it's roughly a question of *sharing* the part of my work concerning cohomology that had not yet been appropriated (de facto, or symbolically) by P. *Deligne* (\*). He has obviously reserved the lion's share for himself, with the motifs and staggered cohomology, and more specifically, the A-adic cohomological tool. The rest (\*) is shared between two other cohomology students of mine, J. L. *Verdier* and P. *Berthelot* (\*). The consensus that has emerged, I can't say when or how, seems to be

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(\*) (1 May) it is nevertheless appropriate to set aside the formalism of duality in the *coherent* context, which (contrary to an impression which has turned out to be hasty) has apparently not yet been appropriated by any of my cohomology students, nor by anyone else to my knowledge, it being true that the only reference text, setting out the major part of my ideas and results on this theme, is R. Hartshorne's "Residues and Duality", which makes it possible to refer to it without at any time having to pronounce an undesirable name. Hartshorne's 'Residues and Duality', which means that I can refer to it without ever having to say an undesirable name. . .

(\*) (1 May) It has since emerged that a 'fourth thief' needs to be added in the person of Neantro.

Saavedra Rivano, who appropriates the philosophy of the Galois motivic group through the categories he calls,

be as follows: all crystalline cohomology to Berthelot, and the rest to Verdier, who essentially annexes everything that revolves around the yoga of duality (\*\*), and the yoga of derived and triangulated categories that constitutes its algebraic prerequisite.

With regard to Berthelot's participation in the sharing of my remains, I have only one fact, albeit a small one. I came across it by chance last year, in the course of my reflections in the note "Co-heirs... . "(n° 91), and I devoted a small sub-note to it (n° 91<sub>1</sub>). This is Berthelot's Survey article, which I quote (\*\*\*)<sup>170(i) bis</sup>, presenting the main ideas for a "synthesis" (he says) of Dwork-Monsky-Washnitzer cohomology and crystalline cohomology, at the Luminy Colloquium in September 1982 entitled "Analyse p-adique et ses applications". In the introduction, part b), he gives a short history of crystalline cohomology, in a narrow-minded way that in no way corresponds to the much broader vision I had of crystalline yoga (\*\*\*\*).

My name is omitted from both the text of the article and the bibliography. I refer you to the sub-note quoted for a few comments and clarifications, which need not be repeated here. I would only add that once I am out of the picture, it is none other than Berthelot who is considered to be the father of crystalline cohomology, without him even bothering to say so in plain English - a certain style of appropriation has obviously become the norm... . In fact, it is his thesis, which he prepared with me based on my initial ideas, that constitutes the first published work on the subject of crystalline cohomology (apart from the very brief sketch I made of some of the initial ideas (\*)). His thesis presents a large-scale work of foundations for a first part ( <sup>170(i) bis</sup> at least to the programme that I had proposed to him.

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for the occasion, "tannakiennes". But he simply acted as a "straw father" for Deligne, who "recovered" the paternity ten years later. For a detailed history, see the series of notes entitled "Le sixième cO. au au cercueil", n° s 1761 to 1767.

(\*\*) See footnote on previous page.

(\*\*\*) Rigid geometry and cohomology of algebraic varieties of characteristic p, Pierre Berthelot, in Colloque de Luminy 6-10 septembre (CIRM) "Analyse padique et ses applications".

(\*\*\*\*) On this subject, see the sub-note "Deaf ears" (n° 170 (i) bis) which follows this note.

(\*) The only published sketch of these ideas, based on five lectures I gave at the IHES in November and December 1966, written by I. Coates and O. Jussila, is "Crystals and the De Rham Cohomology of Schemes", in Dix exposés sur la Cohomologie des Schémas (North Rolland, Amsterdam 1968) pp. 306-358. All the essential starting ideas are outlined, including the need to introduce local thickenings à la Monsky-washnitzer (pp. 355-356).

This memorable 'survey' took place in 1982, a year after the 'Colloque Pervers' (Luminy, June 1982), which will be discussed with 'Operation IV'. I haven't bothered to go back through the Berthelot prints in my possession to find out whether his participation in my Burial represented a late turning-point in his relationship with me and my work, or whether it was a continuation of an earlier attitude. In the first case, it would be a safe bet that this turning point comes in response, as it were, to the sudden and unbridled self-escalation in the general degradation of scientific ethics, achieved the previous year with the Colloquium. In this connection, I would remind you that 1982 also saw the publication of the 'memorable volume' LN 900 exhuming the motives (\*\*), in which the person who bore the brunt of the operation was no longer a vague 'service unknown' (as at the time of the brilliant Colloquium), but a 'deceased' whose name, in spite of everything, is still remembered (albeit reluctantly...). The previous year's operation had shown clearly enough that no restraint was to be expected - and 'operation Motifs' did indeed pass, just like 'operation Cristaux' and all those that had preceded it, without the slightest wrinkle... .

(<sup>170(i)bi s</sup>) (28 February and 30 April) (\*\*\*\*) By the "first part" of crystal theory (in p 0) I mean here that which concerns the crystal cohomology, with constant coefficients (or "twisted constants"), of *clean* and *smooth* patterns on a basic pattern of  $p$ . It is then sufficient to work with the "ordinary" or "infinitesimal" crystal site, which I had introduced (on a provisional basis) towards the end of the 1960s (\*\*\*\*). In fact, contrary to the restricted meaning that Berthelot likes to give to the term 'crystalline cohomology', it had a much broader meaning for me from the start, which I did not hide from him or from anyone else, and which my students apparently forgot - only to 'reinvent' a small part of it ten or fifteen years later. ...

On the one hand, from the outset, my crystalline ideas were by no means limited to the case of diagrams with a given characteristic  $p > 0$ . My first crystalline reflections, before I had the new idea of introducing "divided-power thickenings", were based on diagrams with *zero characteristic*, where the divided powers are automatically present (and therefore tend to go unnoticed...). The natural outcome of this research direction, renewed thanks to the ideas of Zoghman Mebkhout, will be the formalism

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(\*\*) See "Silence" (n° 168), in particular "... and exhumation" (n° 168 (iii)).

(\*\*\*) This sub-note is taken from a footnote to the previous note "La part du dernier". (\*\*\*\*) (12 May) In fact, this was already in 1966, see the footnote (\*) above.

of the six operations for the "crystalline coefficients of De Rham-Mebkhout" on schemes of zero characteristic (to begin with), a formalism to which I had already alluded in the note "La mélodie au tombeau - ou la suffisance" (n° 167). Back in the sixties, I had glimpsed a crystalline cohomology without characteristic distinctions, in the form of a crystalline formalism of the "six operations" in the context (for example) of finite-type schemes on the absolute base  $\mathbb{Z}$ . It was to encompass "ordinary" crystalline theory (which was still in its infancy), and which is still "being sought" for schemes of finite type over the  $p$ -element field  $\mathbb{Z}_p$ . I am I'm convinced that it's the fact that we've forgotten and buried this vision of the late master (which was nonetheless simple and inspiring) that is responsible for the sorry stagnation of crystalline theory, almost twenty years after its vigorous beginnings.

On the other hand, and to come back to Monsky-Washnitzer's approach, which had helped to 'trigger' my interest in crystalline cohomology, from the outset I had in mind the need to introduce (for the purposes of a theory that would not apply only to clean and smooth schemes) a crystalline site larger than the 'infinitesimal' site, where the "thickenings" envisaged would be spectra of con- venable *topological* algebras (with power-divided ideal), perhaps those used by Monsky-Washnitzer (stripped of useless hypotheses such as smoothness) (\*). Identifying "the right site" and "the right coefficients" is part of the programme.

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(\*) As I pointed out in a previous b. de p. note (see page 922), such Monsky-Washnitzer thickenings were mentioned in my first and only published talk on crystalline yoga, at the end of 1966. At that time, it was clear to me that crystalline cohomology of characteristic  $p \neq 0$  was going to be played out for the most part on rigid-analytic spaces of zero characteristic. Of course, I didn't fail to point this out to anyone who might be interested, and certainly first and foremost to my pupil Berthelot, once he had chosen to take up the crystalline theme. In the article quoted, in a style that I recognise well and that Berthelot did not invent, it seems as if he had just discovered (fifteen years later) the unsuspected link with rigid-analytic geometry. Here he poses as the brilliant inventor of a 'common generalisation' (of Monsky-Washnitzer theory and crystalline theory), which he pompously calls 'rigid cohomology' (and which will soon be called, appropriately enough, 'Berthelot cohomology'). I would also like to point out that Berthelot's work is "the continuation of a reflection carried out with Ogus" - the same Ogus who distinguished himself the same year (1982) by his participation in the "Motifs" swindle, as co-author of the LN 900 volume.

The systematic burial continues in a later article by Berthelot (of which I have a preprint) "Rigid cohomology and Dwork theory: the case of exponential sums" (undated). There is no reference to the deceased for the crucial notion of  $F$ -crystal, or that of cohomology with proper support (which I have the honour of introducing into algebraic geometry in February 1963, twenty years earlier... ). These notions are so natural that there is really no need to bother... The notion of the generic fibre of a formal diagram (in the

that I had bequeathed (to no avail, it now appears) to my cohomology students, starting with Berthelot. Having thought about the matter recently 'in passing' (while writing *Récoltes et Semailles*), and remembering the imperative of a crystalline theory encompassing all characteristics at once, I have come to wonder whether these topological algebras (à la Monsky-washnitzer, or any other reasonable variant) are not also too "coarse" (in the same way as restricted formal series), because they are too "far from the algebraic", and whether they should not be replaced by "thickenings" which are (in a proper sense) "étale neighbourhoods". I intend to come back to these questions in the part of the Reflections that follows on from Harvest and Sowing (volume 3, I presume), with the exposition of the yoga of the six operations and the 'problem of coefficients', and in particular crystalline coefficients of the 'De Rham-Mebkhout' type.

Mebkhout had, moreover, sensed that his philosophy of  $\square$ -modules was to provide a new point of view for crystalline theory. But his suggestions along these lines, at Berthelot in particular in 1978, coming from a vague unknown and unrepentant Grothendieckian, fell on deaf ears (\*). . .

(<sup>170(ii)</sup>) (28 February) (\*) To put the 'operation Dualité' in context, to the dubious benefit of J. L.

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The notion of a rigid-analytic space (i.e. a space above a discrete valuation ring) is generously attributed to my ex-student Raynaud. This notion was known to me before Berthelot, Raynaud or anyone else had even heard the word "rigid-analytic space", since it was the need to be able to define such a generic fibre that was one of my two motivations for predicting the existence of a "rigid-analytic geometry", and it was also he who was subsequently one of the two guiding threads for Tate, setting up a construction in the form of such a geometry: his definition had to be such that the notion of "generic fibre" became tautological...

(\*) The fact that Berthelot's ears are deaf does not prevent him, in the article I quoted in the previous paragraph, from saying

note de b. de p., to refer nonchalantly (at the end of par. 3 A) to "an analogue of the theory of  $\square_X$ -modules on a complex variety", which "for the moment" is not yet available in the rigidanalytic framework. There was of course no question of mentioning here the name of a certain vague stranger who had come to him with outlandish suggestions four or five years earlier, and all the less so since a certain Colloquium the previous year (which will be discussed in the following note "The Apotheosis", n° 171) had clearly set the tone with regard to the vague stranger in question. Surely, in a few years' time, and with the blessing of the *true* father of the well-known philosophy known as the 'Riemann-Hilbert-Deligne' philosophy, Berthelot will emerge as the brilliant inventor of the philosophy of the

$\square$ -modules in the context of 'rigid-analytic cohomology', also known as (although he refrains from calling it that) 'Berthelot cohomology'. Which just goes to show that, these days, you don't need to have a very keen ear to get very far. . .

(\*) The text of this note was republished, with some corrections, on 1 May (Lily of the Valley Day).

Verdier, I should first say a few words about the yoga of duality (known as the 'yoga of the six operations' - but the name has sunk without trace) that I developed from the second half of the 1950s onwards, and the yoga of derived categories, which is in fact inseparable from it. I expressed myself in some detail on this subject in the note 'Mes orphelins' (n° 46, in particular pages 177-178) and in the sub-note n° 46 to this one (pages 186-187), and finally (in an initial reflection on the role of Verdier in the burial of my point of view in homological algebra) in the note 'L'instinct et la mode - ou la loi du plus fort' (n° 48). I don't think it's necessary to return to it, and I suggest that the reader refer to it if necessary, before continuing with the account of the 'Duality' operation (\*\*).

Verdier's attitude to the sharing operation appears more ambiguous than that of his two friends, in that he *played*, at times simultaneously, *two* roles that might seem contradictory. At first, I found it hard to identify with the situation, because it seemed so confusing. On the one hand, after he defended his thesis in 1967 and especially after I left in 1970, he tried (for reasons that escape me) *to bury and discredit* the yoga of cohomological algebra and duality that he had inherited from me, even though he had devoted most of his energy, throughout the 1960s and right up to the submission of his thesis, to developing these ideas and enriching them with his own contributions. On the other hand, from at least 1976 onwards (nine years after his thesis was defended), and with Deligne's encouragement and effective support, he pretended to appropriate both the original ideas (insofar as they were not boycotted), and of all the methods and results that I had developed around the theme of étale duality, methods that apply mutatis mutandis to all sorts of other contexts (\*), such as topological spaces or complex analytic spaces.

With regard to Verdier's attitude towards derived categories alone, I tried to put my finger on the meaning of this ambiguity in the note "Thèse à crédit et assurance tous risques".

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(\*\*) (12 May) See also the note "The ancestor" (n° 171(i)) and "A tour of the workshops - or tools and vision" (n° 178), in particular the "Six operations" and "Coefficients" workshops (n° s 3, 4).

(n° 81) (\*\*). It also contains a number of material facts, notably about the strange circumstances surrounding his thesis (still unpublished to this day) and its defence. With the benefit of a year's hindsight, the vision of things that emerges in the course of this reflection seems to me to be probably correct (with a few alterations perhaps), but superficial nonetheless; it is quite clear to me that Verdier's *true* motivations are not to be found at the level of some derisory 'calculation of returns', but that they are of an entirely different nature, and involve in an essential way his ambivalent relationship with me. Even to a superficial observer, it seems to me, it is particularly obvious in his case that in believing he was burying the man who was his master, it was none other than *himself* and the creative force within him that he was burying, day after day and right up to the present day.

In order to complete the overview of the 'Dualité' operation, I will now give a brief retrospective of the various stages of this operation that I know of, and more generally, of Verdier's participation in l'Enterrement.

*Stage 1* (1966-1976). It was after I left in 1970, I can no longer say when exactly, that Verdier informed me that he no longer intended to publish his thesis. The thesis was supposed to present the new foundations of homological algebra, from the point of view of derived categories. In my view, the purpose of his thesis was to be made available to everyone, to provide a reference text of comparable scope to the Cartan-Eilenberg book, directly adapted to the new needs that arose in the fifties and sixties in the wake of my work and that of my students. With hindsight, I realise that this new cohomological language was still only fully assimilated (and still, I would even say today...) by my cohomology students, and that Verdier's decision was therefore tantamount to drawing a big line under this new vision of homological algebra. As a result, his twenty-five page 'thesis', which was limited to

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(\*) Of course, in the "other contexts" in question, the initial difficulty of the stale context, i.e. the need for a "breakthrough" that gives a minimum grip on stale cohomology (in the absence of the well-known transcendental constructions using singular simplexes, retraction methods, etc.), does not arise. My students have all found situations where the major preliminary 'breakthrough' work had already been done by someone else.

- all they had to do was bring in their furniture, which 'the other' often provided on top of everything else. As soon as the opportunity arose, they hurried to bury it, to take advantage of what they saw fit to appropriate, and to make fun of the rest...

(\*\*) When I wrote this note, I was not yet aware of the way in which Verdier had distinguished himself, with the 'good reference' he provided in 1976 - see 'step 2' below.

In other words, my thesis, if it were to present a convincing outline of ideas that he himself said were not his own, would lose its meaning and become, strictly speaking, a 'thesis-bidon'. But in the early 1970s, when I learned (with surprise) of Verdier's decision, I was so intensely absorbed in tasks that were the antithesis of my former mathematical interests, that these questions were infinitely remote for me. It never occurred to me to write about the subject, which I had learnt in a draught (I can imagine) between a public discussion on the scandal of the cracked drums of atomic waste at Saclay and a work session for the Survivre et Vivre newsletter! And even less would I have thought of reacting at the time. The first time I finally 'posed' on the meaning of Verdier's act, and where its nature of deliberate sabotage timidly began to appear, was in the aforementioned note "Instinct and fashion - or the law of the strongest" (n° 48), taken up again a few weeks later, after the discovery of L'Enterrement 'in all its splendour', in the much more detailed and in-depth note "Thèse à crédit et assurances tous risques" (n° 81).

In retrospect, it becomes clear that Verdier's division in the work he had assigned himself, and which was part of the 'contract of good faith' he had made with his thesis jury (see the note cited n° 81), must date back at least to 1968 or 1969; otherwise the writing and publication of his 'thesis' would have been a done deal long before I left in 1970. I would remind you that I had submitted the programme of work on his thesis to him as early as 1960, and that for a gifted and motivated researcher such as he was at the time, this programme, with a vast drafting of new foundations, could hardly have represented more than three or four years' work at the most, bringing him up to date and all. It's also true that a certain mentality, which consists of arranging to withdraw credit in advance for a planned 'job', which you then have no reason to bother doing - such a mentality is now becoming apparent to me as early as 1964, with the vicissitudes of the so-called "Lefschetz-Verdier" formula, and later, with the duality (known, as a matter of course, as "Verdier") of locally compact spaces, in the spirit of the six operations (which still remain unnamed) (\*). But throughout the sixties, locked up as I was in my tasks and in the - vision that I tirelessly pursued through them, like Ahab's elusive and omnipresent white whale, I was miles away from suspecting that something was 'wrong' with what was for me like

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(\*) On the subject of this rather special spirit, see the sub-note "Le patrimoine - ou magouilles et création" (n° 1696 bis), and also last year's sub-notes (n° s 812, 813) to the above-mentioned note "Thèse à crédit et assurance tous risques".

a close companion in tasks that I thought were 'common' - no more than I would have suspected for any of my other cohomology students. And with twenty years' hindsight, I'm now struck by the extent to which, for ten years of my life (if not fifteen or twenty), I lived completely *out of step with* the reality around me, and this\* not only in my family life (which I came to realise a long time ago), but also in my professional life, in which I invested myself with passion...

But I return to 'stage 1'. In any case, Verdier's ambiguous relationship with me and my work became apparent as soon as the SGA 5 seminar was completed in 1966: he, like none of my other cohomology students, felt no involvement in the writing of this seminar (\*\*), which remained in the hands of 'volunteers' - sic - who were overwhelmed by the task, or who had little interest in keeping to their commitments. Clearly, even then, the situation among my cohomology students was rotten, although I didn't realise it, preferring to live in a world where everything was order and beauty... Eighteen years later I'm beginning to take a first, tentative look at what really happened in those days which (just a year ago) had seemed idyllic (\*\*\*)�.

After I left in 1970, and even before he announced his 'official' decision to scuttle his work on the foundations, Verdier's ambiguity in the 1960s was confirmed by his connivance with various mini-scams perpetrated by his friend Deligne, of which he could not fail to be aware: the concealment of my person in the Hodge I, II, III (\*) articles, then in the published version of the SGA 7 II monodromy seminar (presented under the names of Deligne and Katz, the latter unexpectedly taking the still warm place of a deceased...). In the same year (1973), he also had the opportunity to read

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(\*\*) In retrospect, I wonder what Verdier was doing with his time between 1964 (when, thanks to my contact with him, he had finally got to grips with the new cohomological techniques) and 1970, when he did not deign to take on and complete any editorial task, not even the theories of which he was to present himself as the author. For a list of his contributions, which were valid but none of which was completed, see sub-note no.° 81- to the note quoted at length.

(\*\*\*) See in particular, in "Fatuity and Renewal", the section "A world without conflict?" (n° 20), where Only the question mark in the name of the section might suggest some doubt about the 'idyll'.

(\*) In the joke about "weight complexes" (see the note of the same name, n° 83), I thought I had discerned an allusion, in the tone of a challenge, to the oldest patent fraud of which I am aware among one of my cohomology students, namely that of Deligne in his 1968 article on the degeneracy of spectral sequences. Although I was completely taken aback at the time, the example set by my most brilliant pupil was not lost on everyone 1

Mac Pherson's paper, which solved a "Deligne-Grothendieck conjecture" for which he knew perfectly well that Deligne had nothing to do with it.

Until 1976, Verdier's role in l'Enterrement seemed to be mainly passive, at least as far as the operations of tacit annexation were concerned; on the other hand, by refraining from publishing what was supposed to constitute his thesis (which had been granted to him 'on credit' (\*\*)), even before I left, he played a crucial role in burying my point of view on commutative holographic algebra (which he had made his own for a while), and its use as an 'everyday' technique in algebraic geometry, topology and algebra. Like his friends Illusie and Deligne, by scuttling the work of his own hands in this way, for the pleasure of burying the man who had inspired him, he well deserved the unreserved recognition of the unanimous congregation...

This deliberate intention to bury was also clearly expressed in his de-courageous attitude towards Zoghman Mebkhout, after 1975, when the latter pretended to be inspired by my yoga of duality, and that of derived categories. On this subject again, I refer the reader to the more detailed notes already quoted, 'My orphans', 'Instinct and fashion - or the law of the strongest', 'Thesis on credit and comprehensive insurance' (no.° 46, 48, 81), as well as to the note 'The service unknown and the good God theorem' (no.° 48<sup>¶</sup>) (\*\*\*)�.

*Stage 2 (1976).* 1976 saw the publication of Verdier's 'memorable article' in *Astérisque* (\*), which had already been referred to as 'episode 3 of an escalation' with the operation 'Cohomologie étale' (see the note 'Les manœuvres', n° 169). I would remind you that this fifty-page article consists (apart from a few pages of its own) of repeating verbatim a certain number of concepts and techniques that I had developed ten years earlier in SGA 5, without any reference to myself or to a seminar dealing with these matters. This publication, which I discovered a year ago in the wake of the Colloque Pervers (in the note 'La bonne référence', n° 82), shed a whole new light on why he and my other cohomology students were so reluctant to make the SGA 5 seminar available to the mathematical public (under this name, and with his authorship).

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(\*\*) See note° 81.

(\*\*\*) (1 May) See also the sub-note "The blossoming of a vision - or the intruder" (n° 171<sub>1</sub>) to the note "The Apotheosis".

(\*) J. L. Verdier, "Classe d'homologie associée à un cycle", *Astérisque* n° 36 (SMP) p. 101-151 (1976).

There is no need to repeat here the comments I made about this article in yesterday's note (n° 169). As an amusing detail, I will only add that it was the manuscript of this 'work' (sic) by Verdier, which the latter had been kind enough to send to Zoghman Mebkhout the previous year (1975), that was for the latter the *se s âme-Ouvre-Toi* of the cohomology of varieties, and the basis of an unreserved admiration for the man who, from then on, was seen as a 'benefactor'. This admiration was, moreover, long-lasting, and only disintegrated completely, I believe, following Zoghman's misadventures at the Colloque Pervers.

Deligne tells me (\*\*) that he only became aware of Verdier's article *after* the publication of "SGA 4 1/2" (sic) and SGA 5, the following year (1977) - which would run counter to my conviction that the publication of Verdier's 'good reference' marked an essential last step in the 'escalation' of scams, which eventually led to the quite different operation 'SGA 4 1/2 - SGA 5' the following year. On reflection, I find it hard to believe Deligne's version. As one of the best-informed mathematicians I know, and having remained in close contact with Verdier throughout his life, it is hardly possible that he was not already aware of Verdier's project, that he did not receive a preprint of it (even before Mebkhout), and that he was one of the very first to be served for the separate printings, in 1976. This article (as Deligne himself confirmed to me) filled a gaping hole in the literature (in the absence of publication of the SGA 5 seminar after 1966), and it is hardly possible that Deligne did not at least take the trouble to read it - a matter of no more than fifteen minutes for someone 'in the know' like him (\*). Be that as it may, the fact that this blatant plagiarism elicited no reaction from any of the other six or seven ex-editors of SGA 5 who were well 'in the loop', was a sure sign that all concerned were in complete agreement. The time was ripe for a full-scale massacre of the SGA 5 mother seminar, and for shattering the work of no less than two people. ...

*Stage 3* (1977). In this "SGA 4 1/2 - SGA 5" operation, which took place in 1977, on

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(\*\*) See "Dotting the I's" (no 164), part IV 1.

(\*) I can imagine, moreover, that far more important than the mathematical interest (although this article had nothing to teach Deligne that he didn't already know as a listener of SGA 5), must have been that of being able to see at first hand, in black and white, the deceased master's straightforward concealment, following the tradition that he himself had inaugurated eight years earlier 1

On Deligne's initiative and with Illusie's eager participation, Verdier this time plays a supporting role, contributing to the meagre fascicle with the misleading name 'SGA 4 1/2', a certain 'Etat 0' of his thesis-sic (which has now disappeared, body and all...), exhumed especially for the occasion after a fourteen-year slumber! Nowhere in the volume, either in the introduction where this text-rabiot ("now untraceable" - and for good reason 1) is duly highlighted, or in the text itself, is there any allusion to a role I might have played in the ideas developed therein; nor, moreover, to the fact that this text was one day destined to become a thesis, nor did Verdier, like Deligne, see fit to inform me of this publication (and for good reason), nor to send me a copy of the trompe-oeil volume. I refer you, for details, to the note "Le compère" (n° 63□□□, written under the emotion of the discovery of this exhumation on the sly), and to the more detailed reflection in the note already quoted many times, "Thèse à crédit et - . assurance tous risques" (n° 81).

Thus, ten years after his unusual thesis defence, Verdier seized the opportunity offered by Deligne to take, in short, an "*option*" on the undisputed and undivided authorship of the "derived categories" point of view in homological algebra, with the full backing of his prestigious friend; and this at a time when both were still maintaining a de facto *boycott* on the use of this same point of view (\*\*). This boycott, which weighed heavily on Zoghman Mebkhout's work, condemning him to complete solitude, remained in force until the "Colloque Pervers" in 1981.

Thus, in 1977 Verdier appeared as the father-in-reserve of a yoga of cohomology which, for the moment, remained the object of a tacit disdain in good taste - but one never knew. ... Moreover, since the previous year, with the publication of 'la bonne référence', he had been the father of part of the duality formalism developed by me (on the 'discrete' homology and cohomology classes associated with cycles, the biduality formalism, constructibility version finiteness theorems, etc.) - not to mention the duality of locally compact spaces, which also remained in an ambiguous status, a status of expectation - just like the yoga of derived categories which gives it its meaning.

*Stage 4 Pervers conference, June 1981).* This is, by far, the culmination of the participa-

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(\*\*) As I explained in a previous b. de p. note (page note), in the collection-text called "SGA 4 1/2" Deligne was unable to avoid using derived categories in the demonstration of "the" formula. This is undoubtedly what suggested to him the idea of expanding his volume with the 'state 0' of a shipwrecked thesis. In fact, this did not alter the boycott on derived categories until 1981.

tion de Verdier à l'Enterrement. This Colloquium consecrates the shameless spoliation of Zoghman Mebkhout, pioneer of the unifying and fertile point of view of  $\mathbb{Q}$ -modules in the cohomology of algebraic varieties. As the official organiser of the Colloquium, together with B. Teissier, Verdier played a leading role. I will come back to this in the following note, with "operation IV" (known as "the Perverse Colloquium" or "the unknown on duty"). Here, I shall confine myself to the re-fallings directly for Verdier, in the context of the 'sharing' of an inheritance (where the deceased bequeather remains carefully ignored...).

This Colloquium marked the triumphant 're-entry' of derived and triangulated categories into the mathematical arena. As the 'father' of these categories (which he had done everything in his power to bury for fifteen years), it is Verdier, after Deligne, who emerges as the main hero of the happening. That, at least, is the impression one gets from the Colloquium's main article, written by Deligne, which alone constitutes Volume I and the centrepiece of the Colloquium Proceedings (\*). As luck would have it, it is the skeletal and providential 'État 0' of a thesis (which I would never have dreamed of accepting as a doctoral thesis, and which had come at just the right moment to bolster the pirate text 'SGA 4 1/2' which was a little thin around the edges) - here it has become the brilliant piece of evidence, allowing the father-to-the-sauvette Verdier, in a cloud of references to "SGA 4 1/2", to boast modestly as the far-sighted precursor of the great rush known as the "perverse bundles" (which had nothing to do with it, though) and of a new and belated re-start of the cohomology of algebraic varieties (on the heels of a vague unknown whose name nobody dares to mention...)

This same article (by Beilinson-Bernstein-Deligne) also marks the return in force of the formalism of the six operations (never named, admittedly) in the étale context, with the now established notations that I introduced in the 1950s. As I have written elsewhere (\*i "there is not a page in the article cited. . . which is not deeply rooted in my work and bears its mark, even in the notations I introduced, and in the names used for the notions that come into play at every step - which are the names I gave them when I first became acquainted with them before they were named".

The flat duality formalism that I had developed eighteen years earlier, when my

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(\*) Proceedings published in Astérisque n° 100 (1982) - under the title "Analyse et topologie sur les espaces singuliers". In fact, the proceedings in question, dated 1982, were only completed in December 1983, and Mebkhout read them in January 1984.

Pupil Verdier was still learning the B. A. BA of cohomological language, was renamed "Verdier duality" to general euphoria (\*\*). His prestigious patron was not going to skimp on such jubilant days! The name of the deceased does not appear in the article (\*\*\*) nor in the introduction to the volume, written by Teissier-Verdier. Nor that of the vague unknown (Zoghman Mebkhout, not to name him), without whom the article, and the whole brilliant Colloquium, would never have seen the light of day.... .

For the slaughter, it was slaughter! Apart from the motives, which were to follow shortly (from the following year), and perhaps the crystalline yoga, the uneventful sharing of the cohomological legacy of an unnamed deceased was now a done deal, and this with unanimous agreement and *general satisfaction*.

(<sup>170(iii)</sup>) (1 March) The three 'operations' that I reviewed in the previous notes concern the 'sharing' of the 'legacy' that I left, in the form of my written and unwritten work on the cohomology of diagrams. The direct 'beneficiaries' of this sharing were three of my five cohomology students, namely Pierre Deligne, Jean-Louis Verdier, and Pierre Berthelot (\*). But each of these three operations (like the one that follows) could only have been carried out with the connivance (and sometimes the active support) of a large number of colleagues more or less 'connected' to the cohomology of diagrams, among whom figure in first place my five student cohomologists, including, in addition to those I have just named, Luc Illusie and Jean-Pierre Jouanolou (\*).

These three operations, and the fourth to be discussed, seem to me to be indissolubly linked, both in their deepest motivations and in their most tangible events. The first discreet signs date back to 1966 to 1968, but its

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(\*) See the note "L'Iniquité" (n° 75), p. 288.

(\*\*) In the index of notations, the dualising functor (which I introduced into the étale context in 1963, and which is the subject of Lecture I of the Illusie edition of SGA 5, where it managed to survive) is called "Verdier duality". This name reappears throughout the text (e.g. on pages 62, 103 - looking at happiness...). I swear I'm not making this up!

(\*\*\*) My name still appears in the bibliography, along with the acronym EGA (which you'll have to manage to remember to be placed in an ad hoc text one of these days...). Mebkhout's name is absent from both the text and the bibliography. There is no trace of it in the entire volume.

(\*) (2 May) In fact, a fourth 'beneficiary' should be added to this list, which I discovered recently only, namely Neantro Saavedra, mentioned in a previous b. de p. note (note (\*) on page 921).

The most obvious manifestations came after my 'departure' in 1970. This departure and a certain general state of morals in the mathematical 'great world' (\*\*), created the external conditions conducive to such a large-scale operation, undoubtedly unique of its kind in the annals of our science.

This operation was aimed first of all at *discrediting* most of the major *ideas* that I had introduced into mathematics (\*\*\*)<sup>1</sup>, and burying the unifying *vision* into which they were inserted; then, at discrediting or concealing the *role of the worker* in the creation of those, among the tools that I had fashioned under the dictation of these ideas and inspired by the overall vision, which served as basic tools in the work of Deligne and my other cohomology students; and finally, in a final stage, to appropriate the authorship of the ideas and tools that my students were fortunate enough to adopt, or to end up adopting despite the boycott they had imposed on them (\*).

This operation came to an end in 1982 with the publication of Lecture Notes 900, which marked the reappearance of motifs in the mathematical public arena, albeit in a narrower form (compared with the vision that had emerged for me in the 1960s) and under the (implicit and obvious) authorship of Deligne. It finally found its epilogue the following year, in the three-part 'Funeral Eulogy' in the IHES jubilee booklet, published to mark the twenty-fifth anniversary of its existence.

The 'mine' that these texts constitute was discovered on 12 May last year (\*\*), in the note 'L'Éloge Funèbre (1) - ou les compliments' (n° 104). It continues near

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(\*\*) (2 May) There must have been a two-way street: a certain state of degradation of mentalities (in which I myself had participated before my departure) encouraged the escalation of the plundering and debunking of my work by a group of my former students, whose growing cynicism surely contributed in turn to creating the more or less widespread state of corruption that I see today.

(\*\*\*) (2 May) for more details on this subject, see the note "My orphans" (n° 45) and above all "The orphans' tour" (n 45).

construction sites - or tools and vision" (n° 178).

(\*) (2 May) Among the ideas and tools that I had introduced, which were buried and which ended up imposing themselves despite the boycott instituted by Deligne and my other cohomology students, I would like to mention the following: derived categories, motives (a narrow version, admittedly) and the yoga of Galois-PoincaréGrothendieck categories (renamed "Tannakian" for the purposes of the Burial), the formalism of non-commutative cohomology around the notions of fields, sheaves and links (developed by Giraud after the initial ideas introduced by me from 1955 onwards).

(\*\*) It was on the same day that the shameless massacre of the original SGA 5 seminar had already been revealed to me, at the hands of Illusie and with the active support or eager connivance of all my cohomology students, under

five months later in the note (n° 105) that followed it, "L'Éloge Funèbre (2) - ou la force et l'auréole (\*\*\*)". I shall confine myself here to recalling in a few words the spirit and all the salt of this unusual 'Eloge'.

The brochure presents (among other things) a 'portrait gallery'\* made up of short topoi on the various present and past professors of the institution celebrating its jubilee. In the text (written by Deligne) devoted to me, which is supposed to evoke a work, the word 'cohomology' or 'motif' is not used. Nor is the word 'schema', or any other that might suggest a theory I've developed or a theorem I've proved that could perhaps have been useful. On the other hand, I am generously showered with phoney superlatives and other\* flattering niceties: "gigantic work...", "twenty volumes...", "greatest natural generality... . "\*\*\*\*)" "great attention to terminology...", "problems... along the lines he had set himself... . . . that had become too difficult... . . . the'. It's a funeral with great fanfare and in the limelight, with a well-sent 'compliment', enormous and plethoric like the deceased whose memory is being 'honoured', and at the same time with a finesse in the comical insinuation that was decidedly lacking in the clumsy ancestor...

In the article on Deligne (and reviewed by him), there is nothing to suggest that I had anything to do with the 'demonstration' of Weil's conjectures ('of proverbial difficulty')<sup>i</sup>, which is duly highlighted. On the contrary, it is emphasised that "this result seemed all the more surprising" because it had to be demonstrated, so to speak, against a "series of conjectures" of my own (Grothendieck is definitely no different!)<sup>j</sup> which, moreover (he adds, to leave no doubt as to what is to be thought of them) 'are as unapproachable today as they were then' (read: when I had the unfortunate idea of stating them...).

These two minute portraits, and a third section which completes them remarkably well (in a single pithy three-line sentence(\*)) are real gems, and probably unique too.

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the tender eye of the "entire congregation". . .

(\*\*\*) For an unexpected extension of the discussion on L'Éloge Funèbre, see also the following note "Le muscle et la tripe (yang enterre yin (1))" (n° 106), which also opens the long discussion on "La clef du yin et du yang".

(\*\*\*\*) This French-petit-nègre is a truly hilarious way of evoking (in a comical way and . . .) the plethoric and gratuitous bombast of a gigantic chatterbox...

(\*) I discovered this third part in the course of my reflections in the aforementioned note "L'Éloge Funèbre (2) - ou la force et l'auréole" - and it immediately struck me as more significant than the other two taken together I

in their genre, among the Funeral Eulogies deftly served in honour of a 'deceased' (still not deceased in this case!). They are explored with all the care they deserve in the three consecutive notes already cited (n° s 104-106), and, in the more penetrating light of the dynamics of the 'reversal of yin and yang', in the note (a few weeks later) 'The funeral of yin (yang buries yin (4))' (n° 124).

(9 May 1986) *Warning to the reader.* The long series of twenty-eight notes and sub-notes which I have called "The Apotheosis", devoted to the operation of appropriating the work of Zogh- man Mebkhout, was written in several consecutive movements, during the months of March, April and May last year. Apart from occasional reminiscences and reflections on my own work, my main source of information for the following account was the main person concerned, Zoghman Mebkhout himself. Over the weeks and months since April 1984, he has sent me some fairly impressive documentation (at least for someone like me), which I am far from having read all, or even assimilated even the essentials. In addition to these incontrovertible written documents, most of which have been published, I have made free use of the explanations provided by Mebkhout, whether in letters or in person. Thus, the history that I have been led to trace of the development of the theory of  $\square$ -Modules since 1975, as a new theory of cohomological coefficients (in the spirit of my ideas of the sixties, and in particular of my crystalline ideas), can be considered as being essentially the "Mebkhout version" of the history of  $\square$ -Modules. This is all the more the case, as I had taken care to share my notes on the Apotheosis with Mebkhout as I went along, to give him the opportunity to rectify any misunderstanding that might have crept in. I have taken into account (usually in the form of footnotes) any observations he may have made to this effect.

After the provisional edition of *Récoltes et Semailles* was published in October last year, Pierre Schapira and then Christian Houzel contacted me to point out some glaring inaccuracies in the version of events presented in *Récoltes et Semailles*. The situation was considerably clarified during correspondence with both of them between January and March of this year. It now appears to me that in the 'Mebkhout version' (which was not lacking in internal coherence) the

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It was he who inspired the name 'La force et l'auréole' given to this note.

The true, the tendentious and the downright false are inextricably intertwined(\*)).

These distortions are most obvious in [?] Mebkhou's relationship with the Japanese school, and especially with Kashiwara, to whom [?] There has been an 'exchange of ill will' between him and Kashiwara, apparently since 1976, the origin of which escapes me. In my article of last year I referred only to Kashiwara's 'bad dealings', while ignoring almost entirely the influence of Kashiwara's ideas on Mebkhou's work. Mebkhou goes so far as to attribute to himself ("with the best faith in the world", that's one thing, of course) the paternity of important ideas due to Kashiwara. It would seem that Kashiwara (perhaps in retaliation) made no mistake in returning the favour, by attributing to himself (without mentioning it) crucial results due to Mebkhou without any possibility of doubt).

I have tried to rectify the most flagrant errors in footnotes(\*) dated 6, 7 and 8 May 1986. This is clearly not enough to rectify an overall 'view' which now appears to me to be unrealistic: the one which presents the new theory of coefficients as being, more or less, the solitary work of Zoghman Mebkhou alone. This is why I felt it necessary to add a few pages of critical retrospective at the end of the Apotheosis. These will also supplement the comments I make along the same lines in the 'Postscript Epilogue' (ReS 0, Lettre, section 16 'Amende honorable - ou l'esprit du temps (2)'), and the public apology I offer to Kashiwara for a tendentious presentation of the facts, for which I had unreservedly vouched.

It is quite clear to me that this violent hatred of a distant Kashiwara by my friend Zoghman Mebkhou was a welcome diversion for him, to avoid confronting a reality that was much closer and much more painful. For the burial of Mebkhou, Grothendieck's unrepentant follower, was not the work of some distant Japanese school (if only incidentally). This burial, culminating in the 'hap-

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(\*) All the more inextricably, of course, because my friend Zoghman won't budge on anything, just as sincerely convinced of his own distortions as any of my students... (\*) Exceptionally, I have also made a few minor corrections to the text here and there (compared with the provisional edition of last October), whenever I found that it was simpler than adding corrective footnotes, and that it did not drastically alter the meaning and spirit of the original text. Finally, I have deleted a one-and-a-half page passage in the sub-note "Premiers ennuis - ou les caïds d'outre-pacifique" (in "La maffia" n° 171<sub>2</sub>, (b)), replacing it with a short retrospective commentary.

The incredible "pening" of a "Perverse Colloquium" took place *right here*. It was orchestrated by the students of that 'ancestor' from whom Mebkhout publicly drew inspiration - by the very people he considered to be 'his own'. Mebkhout was betrayed by the very people he unreservedly admired and trusted.

It is fortunate that I did not follow Mebkhout in giving his dispute with Kashi-wara a place that did not belong to him, in my account of the unprecedented collective mystification that took place around his work. So I think that the following pages, despite the incorrect or tendentious passages (pointed out in their place) concerning Mebkhout's role and merits, are nevertheless a detailed and faithful reflection of a certain 'spirit of the times' such as now reigns (among others, surely) in certain mathematical circles, including among the most eminent. And these very distortions, which I echoed and vouched for, also seem to me to be an eloquent sign of this spirit, of which my friend Zoghman Mebkhout (I have come to realise) is also, in some of his reflexes and behaviour, a product.

(<sup>171(i)</sup>) (1 March and 2-8 May (\*\*)) In each of these 'four partial operations' that I have distinguished in my anticipated burial, it is Deligne who is visibly playing the role of conductor (or rather, of Grand Officiant at the Funeral), with the more or less active participation of my other four cohomology students, and with the connivance of a considerably larger group of mathematicians, all well aware of the situation (which is obviously not to their displeasure...). This 'group of connivance' takes on impressive and almost unbelievable proportions in the fourth of partial operations, which I shall now review.

#### IV Operation "L'inconnu de service" (or "du Colloque Pervers").

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(\*\*) (13 May) This note and the following four originally formed a single note, "L'Apothéose" (n° 171), dated 1 March. It also included the previous note "Les joyaux" (n° 170(iii)). It was taken up again and considerably expanded between 2 and 8 May, especially as regards the mathematical part, and split into the four separate notes "The ancestor", "The work...", "and the windfall", "The day of glory" (n° s 171 (i) to (iv)), in addition to the note "The jewels" already mentioned. In addition, there are the eight sub-notes (n° 171 (v) to (xii)) relating to the four notes in question, and the four sub-notes (n° 171<sub>1</sub> to 171<sub>4</sub>) from the month of April, recounting the strange misadventures of my friend Zoghman in his struggle with the 'law of the middle', as he himself told me. It is all these sixteen notes (n° s 171 (i) to (xii) and 171<sub>1</sub> to 171<sub>4</sub>) that now make up the 'Apotheosis' part of 'The Four Operations' (of which the said Apotheosis is the fourth and - until further notice - last...).

It's the operation of *appropriating the work of Zoghman Mebkhout* - the only mathematician (to my knowledge) who took the risk, after I left the mathematical scene, of being seen as 'Grothendieck's successor'.

This operation has continued over the last ten years, from 1975 to the present day. At the risk of repeating myself, I'll start by recalling the historical context.

In the second half of the 1950s, I had developed a "coherent duality" formalism in the context of diagrams. These reflections, motivated by the desire to understand the meaning and exact scope of Serre's duality theorem in analytic geometry and especially in algebraic geometry (\*), had been pursued in almost complete solitude, and did not seem to interest anyone other than myself (\*\*). It was these reflections that led me to gradually develop the notion of derived category, the objects of which were presented as natural "coefficients" in the homological and cohomological formalism of spaces and varieties of all kinds, forming part of the first embryo of a formalism of "six operations" on ringed spaces (while waiting for ringed topos). Many of these operations were already more or less familiar to me from my 1955 work "Sur

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(\*) My first thoughts on duality were in the context of analytic spaces, and predate those of Serre. Using "etevetesque" duality techniques and the Poincaré-Grothendieck lemma on the  $\square$ -operation (which I had just proved), I proved that if  $X$  is a Stein variety, the  $H^i(X, \underline{\mathcal{O}}_X)$  (resp.  $H^{n-i}(X, \underline{\mathcal{O}}_X)$ ) are nuclear Fréchet spaces, in perfect duality with the  $H^{n-i}(X, \omega_X)$  (resp.

<sup>1</sup>  
the  $H^i(X, \underline{\mathcal{O}}_X)$ ). I did not then think of applying the same method to the case of vector fibres (not having realised this very simple algebraic fact, that the operator  $\square$ , being  $\underline{\mathcal{O}_X}$ -linear, extends to differentiable differential forms with values in a holomorphic vector fibre), nor to complex varieties other than Stein's (the only ones I was familiar with at the time). Serre's proof of his theorem of analytic duality in the general case is practically the same as the one I had found in a particular case.

(\*\*) Of course, the mathematician of all people whom I would have expected to be interested in my thoughts of coherent duality, was Serre. He was interested, I seem to recall, in the generalisation of his duality result to a coherent bundle  $F$  (not necessarily locally free) on  $X$  projective and smooth over a  $k$ -field, identifying the dual of  $H^i(X, F)$  with  $\text{Ext}^{n-i}(X; F, \underline{\omega_X})$ . This gave an intrinsic geometrical meaning to a "computational" result of FAC (which had of course intrigued and inspired me), in the case where  $X$  is the projective space. But apart from this result, one of the first in my journey to discover duality, and still close to what he was familiar with. Serre always refused to listen when I felt like talking to him about duality. I don't think I tried to talk to anyone else about it, apart (much later) from Hartshorne, who gave a very fine seminar on my ideas at Harvard, published in 1966 ("Residues and duality" by R. Hartshorne, Lecture Notes in Mathematics, n° 20, Springer Verlag).

some points of homological algebras" (\*), in the language of derived categories : with the notations that emerged in the following years (at the same time as the point of view of derived categories), these are the "internal" operations  $\times^L$  and RHom ("total derived functor" version of the  $T_{\text{ori}}$  and Ext bundle formalism<sup>i</sup> introduced in "Tohoku"), and "external"  $L f^*$  and  $Rf^*$  (inverse images, and direct "à la Leray"), forming two pairs of adjoint functors (or bifunctors). In the case where  $f$  is an "immersion" morphism  $i : X \rightarrow X$ , there is also the pair of adjoint functors  $Ri_!, Ri^!$ , embodying respectively the "extension by zero" and "local cohomology with supports in  $X$ " operations. The thread running through my reflections is to arrive at a *duality theorem* (global, at a time when there was no question of a local version. . . ), generalising the one proved by Serre for a locally free coherent bundle on a smooth projective variety over a field. The idea was to give a formulation that could be applied to any coherent bundle (or complex of such bundles), or even a quasi-coherent bundle, without any smoothness or projectivity hypothesis on  $X$  (keeping only the cleanliness, which seemed essential at the time (\*\*)). Moreover, in analogy with my reflections on the Riemann-Roch theorem, I felt that the correct statement should concern, not a variety over a field, but a proper morphism  $f : X \rightarrow Y$  of otherwise arbitrary diagrams. It was by successive approximations, over the course of several years' work (\*), that the global duality theorem was gradually freed of its superfluous hypotheses, at the same time as the notion of derived category also emerged from the limbo of the prescient to take concrete form, and give the formalism and the statements an *intrinsic meaning*, without which I would have felt incapable of working! It was first of all in order to arrive at a statement of global duality that fully satisfied me that I introduced the formalism of *dualising complexes* and derived the *biduality theorem*, and that I discovered (under suitable Noetherian hypotheses) the existence of a dual-valued complex.

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(\*) In Tohoku Mathematical Journal, 9 (1957), pp. 119-

221. (\*\*\*) On this subject, see b. de p. (\*) on page 940,  
below.

(\*) It goes without saying that during these "several years of work", I had many more irons in the fire than just questions of coherent duality! I became familiar with the then known foundations of algebraic geometry (with FAC de Serre's point of view as my main reference), with the problem of Weil's conjectures, and with the formalism of intersection multiplicities learnt in one of Serre's lectures, where he developed his idea of "alternating sums of tor"). This was to set me off in 1957 on the formalism of *K-theory* and the Riemann-Roch-Grothendieck theorem, very close (in spirit) to my thoughts on duality.

isant, essentially canonical, which I call the "*residual complex*", and a theory of variance for it. An early formulation of the global duality theorem, which at one time seemed to me to be 'the right one', was that the functor  $Rf_*$  commutated to dualising functors on  $X$  and  $Y$  (for two dualising complexes that 'correspond' to each other). It was only later that I discovered that the theory of variance for dualising complexes alone (via residual complexes) was generalised by a functor of an entirely new nature, the functor  $Rf^!$  or "unusual inverse image", of a local nature on  $X$ . This also gives us the definitive formulation of the duality theorem for the proper morphism  $f$ : this new functor is *adjoint to the right* of  $Rf_*$ , and thus forms part of a sequence of three adjoint functors

$$L f^*, Rf_*, Rf^!.$$

In order to have a fully completed formalism, all that was missing was the description of a functor  $Rf_!$  for a (separate) morphism of any finite type, generalising the functor already known when  $f$  is an immersion, reducing to  $Rf_*$  for  $f$  proper, and forming with  $Rf^!$  a pair of adjoint functors  $Rf_!, Rf^!$ . I don't remember, back in the fifties, being distressed by this imperfection in a formalism whose general scope, beyond schematic or analytic coherent duality, still escaped me (\*).

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(\*) Of course, I had already realised that in the case of an open immersion  $f: X' \rightarrow Y$ , where the functor  $Rf^!$  coincides with the "restriction to  $X'$ " functor  $L f^*$ , the latter does *not* (in the context of quasi-coherent bundles) admit a left adjoint. The usual left adjoint  $Rf_!$  ("extension by zero outside  $X'$ ") does not preserve quasi-coherence. On the other hand, I had also checked that apart from quasi-coherence hypotheses and even for a proper morphism with base one point, there is no "duality theorem". Thus, the impossibility of defining an  $Rf_!$  under general assumptions seemed to me to be a given and in the nature of things.

It was Deligne who realised in 1965 or 1966 (as soon as he had arrived!) that we could make sense of  $Rf_!$  and recover the coherent duality theorem for a separate morphism of finite non-eigen type, provided that we worked with coefficients which are (complexes of) quasicoherent *pro-beams*. This beautiful idea, however, did not have the fortune that one might have expected - nor did the initial formalism of coherent duality, which it made it possible to perfect.

Deligne successfully took up this idea in his attempt at a construction of "De Rham coefficients" on algebraic schemes of zero characteristic, a promising attempt which he nevertheless discarded as a write-off as soon as I left in 1970. Six years later, it was left to Mebkhout to come up with "the" right category of (crystalline) "De Rham coefficients" that I had been anticipating for ten years.

This shortcoming only became fully apparent to me in 1963, when I discovered that in the context of the just-arrived scalar cohomology (with "discrete" coefficients), there existed a formalism which was in every respect analogous to the coherent formalism, with the addition, precisely, of a function  $Rf_!$  (of direct image with proper supports) defined for *any* separate morphism of finite type. It was, moreover, by guiding myself step by step on the work I had done in the coherent case years before (without any interest other than my own), that I then managed (in the space of a week or two, at the very most), starting from the two key theorems of basis change, to establish the complete formalism known as the "six operations". This is a duality formalism that is incomparably more sophisticated and powerful than the one previously available in the transcendental context, for topological varieties alone (and local systems on them), and even more satisfactory than the formalism I had arrived at in co-herent duality.

My work on coherent duality is set out in R. Hartshorne's well-known seminar "Residues and Duality" (published only in 1966) (\*\*), that on staggered duality in one or two chapters of SGA 4, and above all in the SGA 5 seminar, which was entirely devoted to it. And it is only at the moment of writing these lines that I suddenly realise that, apart from a few sporadic precursor texts (in the Cartan and Bourbaki seminars of the fifties), there is no systematic text *published*, from my pen, expounding the formalism and yoga of duality, either in the coherent context, or in the

(\*\*) The seminar in question (published in Lecture Notes in Mathematics, n° 20, Springer Verlag) sets out the main thrust of my ideas on the coherent duality formalism, centred on the six-operation formalism, biduality, and a theory of "residual complexes" (which are canonical injective representatives of dualising complexes). These ideas were taken up in the analytical framework by Verdier and above all by Ramis and Ruguet. The Hartshorne seminar does not, however, contain a number of more detailed developments, closely linked to this formalism: a theory of residues (for schemes of finite type and flat on any basis), and a cohomological theory of difference, which have never been published (as far as I know). In the 1950s I had also developed the formalism of the "determinant module" of perfect complexes, which was eventually to be included in SGA 7 and whose editor (following the example already well established by certain "editors" of SGA 5) withdrew after two years.

Finally, I would like to point out that in the wake of my reflections on coherent duality in the 1950s, I was led to introduce and develop to some extent the purely algebraic version of *Hodge's cohomology* and *De Rham's cohomology*, and in particular the formalism of cohomology classes associated with an algebraic cycle (assumed to be smooth in the first instance), and a theory of Chern classes, modelled on the one I had developed in Chow theory.

spread context. The lectures of SGA 4 devoted to this theme, centred around the only "global duality theorem" for a separate morphism of finite type (establishing that  $Rf_!, Rf^!$  are adjoint), were written by Deligne two or three years after the seminar, according to my handwritten notes (\*). As for the SGA 5 seminar, it was practically sequestered for eleven years by my cohomology students, before finally being published (*after* Deligne's 1977 saw-cut text), copiously plundered and unrecognisable, ransacked by the 'editor' - sic Illusie, in the complete devotion of his prestigious friend (\*\*). It is here, in this ruin of what was one of the most beautiful seminars I developed and, along with SGA 4, the most crucial of all in my work as a geometer - it is the only trace written by my hand, or at least according to notes by my hand, that evokes in any way the formalism and yoga of spread duality, and, beyond this still partial yoga, and irresistibly suggested by it, that of the six operations. My students have taken care to erase all traces of this last yoga (\*), which has a suggestive force of its own.

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(\*) Deligne's paper was written *after* the SGA 5 seminar. Moreover, Deligne did not follow my notes to the letter, but a variant of my method, which Verdier had introduced in the context of locally compact spaces in 1965 (essentially using the étale model). At that time, there was no ambiguity in anyone's mind about the authorship of all the main ideas in duality, and a fortiori, about the authorship of stale duality; it would not have occurred to anyone (surely not even to Deligne!) that the fact of following a variance of my initial method could, over the next two decades, be used to fish in troubled waters and attribute spread duality to Verdier (while Deligne pockets the rest of the spread cohomology 'package'... ).

(\*\*) On this subject, see the note "The four manoeuvres" (n° 169 (ii)), and the sub-notes that follow it.

(\*) (8 May) I have just gone through my handwritten notes for the first three lectures at SGA 5, which Illusie kindly returned to me last year at my request. (He is the only one of the former editors who took the trouble to return the notes I had given them.) The first talk consisted of a vast 'tour d'horizon' of what had been achieved in the previous SGA 4 seminar, as far as the stale cohomological formalism and its relations to various other contexts were concerned. The second talk develops at length the 'abstract' formalism of the six variances. There is an essentially complete formalism, but no effort yet to identify compatibilities between canonical isomorphisms. (This was a more technical task, unnecessary at a time when my main concern was to 'get across' this yoga of duality, the strength of which I could feel). Needless to say, there is no trace of either presentation in the Illusie edition. I had come to believe that (preoccupied by the more technical aspects of the seminar) I had probably omitted to set out the unifying vision. In retrospect, and almost a year to the day after the discovery of the 'massacre' of the SGA 5 seminar, it seems to me that I have now put my finger on what was at the very *heart* of this operation-massacre. It's not the disappearance of one presentation or another, annexed by a Deligne, plundered by a Verdier, saved from disaster by Serre or torn from a harmonious 'whole', for the sheer pleasure of it, as one might say, by an Illusie. But it is the very soul and sinew of this seminar, the constant and omnipresent thread running through this vast work.

which had inspired my work on cohomology throughout the sixties. This was really the 'nerve' in the key idea of 'types of coefficients' (\*\*), of which the yoga of patterns is the soul...

Such an aberrant situation, where an important advance in a science, embodied in a new vision, is eradicated by the very people who had been its first beneficiaries and repositories, could not have arisen without this other situation, also highly exceptional, created by my sudden departure and the conditions surrounding it. Moreover, the turn events were to take had been prepared from before my departure and throughout the sixties by the divided situation in which I found myself, monopolised on the one hand by interminable fundamental tasks that only I was able or willing to take on (\*), and on the other hand constantly solicited by questions on themes often far removed from the primary bases that were absorbing me at the time, and therefore often more intensely and directly fascinating (\*\*). Rarely, among the very themes that I had allowed myself the leisure to deepen and develop (such as that of the

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work done by a single person - that's who Illusie set about eradicating from SGA 5 without leaving (almost) a trace. The very name 'six operations' is absent from this seminar, just as it is absent from the work of my students, who have had to make a tacit pact not to utter these words except on the very rare occasions when one or other is still confronted with the worker declared dead, to whom (however dead he may be) it is nevertheless appropriate to give the change...

(\*\*) This key idea was also eradicated, and then forgotten, by my cohomology students. It is one of the one of the first things that came back to me, when I first looked back 'fifteen years later' on my work and its vicissitudes, in the note 'My orphans' (n° 45). This note, whose name is more apt and more profound than I would have dreamed at the time, was written even before the discovery of 'L'Enterrement' (in the literal and strong sense of the term).

The same key idea of the six operations and the 'cohomological coefficients' comes up again and again, almost as a Leitmotiv, when the reflection in *Récoltes et semailles* brings me back into contact with the fate meted out to my work by those who were my students. See in particular the notes "La mélodie au tombeau - ou la suffisance" (developing to some extent the "melody" \* or the theme with variations, types of coefficients), and "Le tour des chantiers - ou outils et vision" (notes n° s 167, 178).

(\*) I would remind you that this work on foundations of vast dimensions ended abruptly and until a few years ago.

even today, on the very day I left. This is an eloquent sign of the 'misunderstanding' I mentioned in the note 'The hoard' (n° 169 (v)). Everyone was ready to bring their furniture and take up permanent residence in the houses I had built - but there was no one left to move around and wield trowel and plumb bob to build and fit out, even if only under the peremptory pressure of need..,

(\*\*) If I had listened to myself, how many times would I have planted there the interminable foundation

stains that I was trying to find?

duality), I have also found the leisure to write up the results of my work in a form suitable for publication (in accordance with my own demanding criteria). This is how I have often been led to leave it to others (in whom I had complete confidence, of course) to write (as was the case for the theme of 'duality', in both the coherent and the discrete frameworks), or to develop certain initial ideas that I knew would be fruitful.

(such as the derived category, or crystalline cohomology, to name but a few of many). In a 'normal' situation, that of good faith responding to the trust I had placed in me by addressing motivated students, learning from me their trade and the broad bases for their future work, everything was for the best, and for the greatest good of all concerned, including the scientific community. But it's true that this unusual situation put considerable *power* in their hands (without the idea ever having occurred to me before last year...), and especially after my departure. As soon as I had left (or even before, to put it mildly...) some of them were quick to use this power to conceal the work and the vision, to undermine the worker, and to avail themselves of the tools he had fashioned, which they thought they could use.

My coherent duality work has never been very popular, it seems to me (\*). On the other hand, my work on spread duality attracts immediate attention. But it would be more accurate to say, I think, that what attracts attention is that someone has "managed", however, to prove in the stale context the analogue of Poincaré's duality, which had been well known to everyone for nearly a hundred years I imagine, in the familiar context of oriented topological varieties. This was therefore a 'good point' for scalar cohomology (there was now little doubt that it was 'the right one' for Weil's conjectures ('of proverbial difficulty')). In other words, the mathematical public on the lookout for the famous

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service to all, to embark on the unknown adventure that was constantly calling me, the real one.

- instead of leaving to others the pleasure of surveying the new lands I had discovered. Today I see that these lands are still virgin, or very nearly so, and that those in whom I thought I saw pioneers had already chosen to be comfortable renters before I left.... .

(\*) As I pointed out in a previous b. de p. note, this work inspired those of Verdier and Ramis, Ruguet in the coherent theory of analytic spaces. It has always been clear (to me at least) that the same formalism can only be found in the rigid-analytic context (which is also still in its infancy, according to the echoes that come back to me). On the other hand, Mebkhout tells me that the Japanese school of analysis drew quite a lot of inspiration from 'Residues and Duality', though it never named the worker. These days, the opposite would have been surprising.... .

conjectures, reacted like a 'consumer', reluctant to recognise and assimilate a new and profound vision of things, and retaining only a familiar-looking 'result'. More than twenty years later, I note that this powerful vision of the six operations and the types of coefficients, expressed in a disconcertingly simple formalism, remains ignored by everyone (with the sole exception of the solitary worker), when it is not the subject (when someone dares to make some allusion to it) of poking fun or ironic comments (\*\*). Some of the scattered ingredients of my panoply are used here and there without any allusion to me (and with ready-made spare fathers), and especially the biduality formalism, since the great rush on intersection cohomology, after the memorable Colloquium (in 1981) that we are going to talk about. But the *vision*, with its childlike simplicity and perfect elegance, which has nevertheless given eloquent proofs of its power (\*), remains ignored, the object of the disdain of those who prefer to scorn (and plunder. . . ), rather than understand.

If what I have done with my hands and with my heart has been twenty or perhaps fifty years ahead of its time, it is not because of the immaturity of the *mathematics* that I found when I put my hand to the dough thirty years ago. It's because of the immaturity of men (\*\*). And it was this same immaturity that confronted my posthumous pupil and only conti

- nator, Zoghman Mebkhout. Before I left in 1970, I had had the great good fortune to be confronted only with incomprehension, which never departed from a friendly disposition. Zoghman Mebkhout, who arrived on the mathematical scene at a different time from the one whose work he was recklessly continuing, After being misunderstood and scorned, and when the value of *one of* his results as a tool was finally recognised, he was subjected to the malice of his elders and to the full weight of the iniquity of an era. But I anticipate...

One of the most important discoveries I made in mathematics, and one that remains virtually unknown to everyone, was that of the *ubiquity* of the duality formalism that I had begun to develop in the 1950s: the "formalism of the six variances and biduality" applies both to the "continuous" coefficients initially envisaged (theo-

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(\*\*) for details and comments, see the sub-note "Useless details", n° 171 (v): in particular part (a), "Packages of a thousand pages...".

(\*) For more details about these "eloquent proofs", see the sub-note "Unnecessary details" (n° 171). (v), part (b) "Machines for doing nothing....".

(\*\*\*) For some initial thoughts on this subject, see the sub-note "Freedom...".

coherent'), and with 'discrete' coefficients. This ubiquity appeared, as a barely believable surprise, in the spring of 1963 - it was thanks to it, and to nothing else, that I was able to develop a formalism of stale duality and achieve what I call the 'mastery' of stale cohomology. And from that time on, I was intrigued, though I didn't dwell on it too much, by the question of a theory that would be 'common', whether in the schematic framework, or in the complex analytic framework, or even in the topological framework - a theory that would 'cap' both types of coefficients. De Rham's cohomology (an old friend of mine...) gave a first indication in this direction, suggesting that we look for a 'common principle' in the direction of 'modules with integrable connections' (or 'stratified modules', perhaps...). These give rise to a "De Rham cohomology" (with discrete coefficients, morally speaking), which is thus related to coherent cohomology. This approach later suggested to me the idea of a "crystal" and a "crystalline cohomology", without yet (it seemed) being sufficient to provide the key to the description of a complete formalism of the six variances for types of "coefficients" which, in a suitable sense, would encompass both discrete ("constructible") coefficients, and continuous coefficients (\*).

None of my students seems to have been able to sense this problem (\*\*), with the sole exception of

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(\*) At the time of writing, my memory on this subject was still hazy. It came back later, and I come back to it in more detail in the sub-note "The crazy questions" (n° 171 (vi)),

(\*\*) I spoke to Verdier about this problem, after he had developed (as I had suggested) the theory of duality of topological spaces (or at least an embryo of a theory), on the model of the one I had developed in the étale context (see sub-notes n° s 81<sub>1</sub>, 81<sub>2</sub>). This must have been around the mid-sixties. Obviously it didn't 'click' then - the very meaning of the question (a little vague perhaps, it's true) seems to have escaped him. However, I must surely have mentioned De Rham's cohomology, both differentiable and complex analytic, which relates Serre's duality and Poincaré's duality, concerning both types of coefficients.

(14 May) Moreover, as early as the 1950s I knew that Serre's duality theorem could be generalised to the case of a complex of differential operators between locally free bundles on a clean and smooth relative scheme, so as also to encompass De Rham cohomology (so, morally, a cohomology with discrete coefficients), so this is a duality result very close to that of Mebkhout in the analytic framework, which will be discussed in the following note. I did not pursue this line of thought at the time, mainly, I think, because I could not see how to make a suitable "derived category" with complexes of differential operators, in the absence of a good notion of "quasi-isomorphism". It's also true that the isolation in which I was working, on questions (coherent cohomology) that obviously interested nobody else in the world but me, was hardly stimulating to pile an additional generalisation (with differential operators replacing linear morphisms) on top of those I had already worked out in my corner,

of Deligne. He devoted a whole year's seminar (at the IHES, in 1969/70 I seem to remember) to developing a formalism which enabled him, at least for a scheme  $X$  of finite type over a field of zero characteristic  $k$ , to describe cohomology spaces (known as "de Rham" spaces) which, in the case where  $k = \mathbb{C}$ , give back the ordinary complex "Betti cohomology" (defined by transcendental means). The coefficients he worked with were "stratified promodules" and complexes of such promodules. However, it was not clear whether these coefficients would fit into a formalism of the six operations (\*), and Deligne gave up pursuing this path. If I remember correctly, what was lacking above all (\*) to give confidence was a description in purely algebraic terms (using coherent or procoherent Modules and stratifications), valid therefore over any base field of zero characteristic, of the category of "algebraically constructible" ( $\mathbb{C}$ -vector) bundles over  $X$  (\*\*), which is defined by transcendental means when the base field is

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in previous years. However, I was very close to Mebkhout's point of view, where the switch to

□-Corresponding moduli (to the components of a complex of differential operators) provides a perfectly simple key to constructing the appropriate derived category. From 1966 onwards (but without realising it clearly at the time) I had in my hands a dual point of view, which would have allowed me to make a derived category using "stratified pro-modules" (an idea later developed by Deligne, in his outline of a theory of De Rham coefficients, which will be discussed later). Indeed, by associating with any coherent Module the pro-Module of its *principal parts of infinite order*, which is provided with a canonical stratification, or associated with a complex of differential operators a complex of such stratified promodules, whose crystalline hypercohomology is identified with the Zariskian hypercohomology of the complex of differential operators under consideration. (See my lectures "Crystals and the De Rham Cohomology of schemes" (notes by I. Coates and O. Jussila, in *Dix exposés sur la cohomologie des schémas* (p. 306- 358), North Holland - in particular par. 6). We can then define the notion of "quasi-isomorphism" for a (differential) morphism between complexes of differential operators, in the usual way, in terms of the associated complexes of stratified promodules.

(\*) Here again, my memory was hazy, and there is a mistake - it was clear a priori here, for heuristic reasons.

that there *must* be a formalism of the six operations. (For further details, see the sub-note "... and hindrance", n° 171(viii).) My error is obviously due to a deliberate intention (a *fleur de con-science*) to rationalise, to render intelligible something that might have seemed inexplicable, namely Deligne's abandonment of a 'safe' research direction rich in promise. Reason is by no means mathematical!

(\*\*) I would remind you that this notion of constructability was introduced by me, among many variantes (algebraic, real analytic, etc.) as early as the 1950s, at a time when I was strictly the only one interested in these questions. (See my comments last year, in sub-note no. 46<sub>3</sub> ).

(6 May 1986) On the other hand, the derived categories were used systematically by the Japanese school from 1973 at least, and it was no doubt in this way that Mebkhout was led to use them himself.

the body C of complexes.

(<sup>171(ii)</sup>) Mebkhout's work, which began in 1972, took place in the transcendental (and technically more difficult) context of analytic spaces. It was in almost complete isolation that, over the next few years, he became familiar with my work on cohomology and with the formalism of derived categories (\*\*\*)<sup>1</sup>, which had been ignored by my former students.

One common thread, which gradually came to occupy a prominent place in his reflections, was the striking parallelism between continuous duality and discrete duality. In the meantime, the latter had taken on the name of 'Poincaré-Verdier duality', without anyone in the wider world (and especially not the new 'father' Verdier) even pretending to question the deeper reason for this parallelism. This is the reign of the short-sighted, 'utilitarian' point of view, content to use the ready-made tools I had created, without asking any questions - and especially not such a vague, not to say preposterous, question! The question is not mentioned in any published text, not even (and I realise that I'm to blame here...) in those written by me (\*).

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in spite of the fashionable winds blowing in Paris.

(\*\*\*) (14 May) Mebkhout has since told me that his first readings of mathematical literature, around 1972, were works by Japanese authors of the Sato school. He told me that he had a lot of trouble finding his way around them, because they seemed terribly complicated. That's when he came across a reference to Hartshorne's book Residues and Duality, which was a real delight for him to read. It's true that this book is superbly written. The few introductory words that I had written for this book, evoking the ubiquity of the formalism that is developed in it, inspired him a great deal. It was from there that he began to familiarise himself with my work, which subsequently became his main source of inspiration. In all his works and presentations, he is careful to indicate this source clearly.

(6 May 1986) According to the information and documents kindly communicated to me by Pierre Schapira (letter of 16.01.1986), the kick-off of the theory of  $\mathbb{D}$ -modules, together with the reintroduction of derived categories, is made in the article by M. Sato, T. Kawai and M. Kashiwara of 1973 (Microfunctions and pseudodifferential operators, Lecture Notes in Math. n° 287, pp. 265-529), already cited in ReS II (b. de p. note (\*) p. 322). I admit that I had the vaguest ideas about the beginnings of the theory of  $\mathbb{D}$ -modules, which I would as well have placed in the early sixties, and I was entirely unaware of the leading role that Kashiwara had played in it.

(\*) (14 May) I remember, however, that during the SGA, 5 seminar, I had the following constantly in mind the ubiquity of the formalism I was developing, and I never missed an opportunity to point out the variants that were possible in such and such other contexts, for the ideas and techniques I was developing within the framework of cohomology

The very formulation of common formalism makes essential use of derived categories. Mebkhout makes them his constant working tool, against the winds of fashion and the disdain of his elders, starting with the one who (we don't know whether willingly or reluctantly...) was the 'father' of the said categories, namely Verdier. Compared to the arsenal I had introduced, Mebkhout's essential new ingredient is the semi-crolocal analysis of Sato and his school. More precisely, Mebkhout borrows from them the notion of  $\square$ -module on a smooth complex analytic variety (equivalent to the notion of "crystal of modules" that I had introduced around 1965-66, which keeps a meaning in broader contexts, and in particular on singular varieties), and especially the notion of  $\square$ -coherence and the delicate condition of holonomy on a coherent  $\square$ -module. In addition, he makes essential use of a 1975 theorem of Kashiwara, according to which cohomology bundles of the complex of differential operators associated with a holonomic  $\square$ -module are analytically constructible. This was a point of view and results that I was completely unaware of until Mebkhout told me about them two years ago, and Deligne must have been just as unaware of them in 1969/70, at the time of his reflections, which remained unresolved at the time, towards a formalism of De Rham co-efficients. It was *by putting the two currents of ideas together* that Mebkhout arrived at a common apprehension of the two types of coefficients on a smooth complex analytic variety  $X$ , in terms of complexes of differential operators, or (better and more precisely, in the more flexible language of  $\square$ -modules) in terms of complexes of  $\square$ -modules with coherent cohomology (\*). This is his great contribution to contemporary mathematics.

More precisely, if  $X$  is a smooth complex analytic space, let us denote by  $\text{Cris}_{\text{coh}}^*(X)$  the full subcategory of the derived category  $D^*(X, \square_X)$  formed by the complexes of  $\square_X$ -Modules with  $\square_X$ -coherent cohomology, by  $\text{Cons}^*(X, C)$  the full subcategory of the derived category  $D^*(X, C_X)$  formed by the complexes of  $C$ -vector bundles on  $X$  with co

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discrete spread. I find it hard to believe that I did not mention the problem of a synthesis of the two types of coefficients during the oral seminar, if only in the final presentation on open problems, which also disappeared from the massacre edition. Needless to say, there is no hint of such a problem in this edition, which has been carefully purged of anything that would not fit the label of 'volume of technical digressions'...

(19 May) See also the sub-note "Dead pages" (n° 171(xii)).

(\*) For details about the language of  $\square$ -Modules, its relation to that of complexes of differential operators and that of crystals, see the subnote "Five pictures ( $\square$ -Modules and crystals)", n° 171 (ix), part (a).

analytically constructible homology, and finally by  $\underline{\text{Coh}}^*(X) = D^*_{\text{coh}}(X, \underline{\mathcal{O}}_X)$  the sub full category of the derived category  $D^*(X, \underline{\mathcal{O}}_X)$ , formed by the complexes of  $\underline{\mathcal{O}}_X$ -Modules with coherent cohomology. Mebkhout highlights fundamental functions

$$\begin{array}{ccc}
 \underline{\text{Cons}}^*(X, C) & & \underline{\text{Coh}}^*(X) \\
 \text{(Meb)} & \searrow M & \swarrow N \\
 & \underline{\text{Cris}}^*_{\text{coh}}(X) &
 \end{array}$$

where the right functor  $N$  is the "tautological" functor, totally derived from the extension functor of scalars by the obvious inclusion  $\underline{\mathcal{O}}_X \rightarrow \square_X$ . The left functor  $M$ , or "*Mebkhout functor*", is of a much deeper nature (\*\*). It is *fully faithful*, and its image essential is the full sub-category of  $\underline{\text{Cris}}^*_{\text{coh}}(X)$  formed by the complexes of  $\square_X$ -Modules with bundles of cohomology that are not only coherent, but also "holonomic" and "regular". These are subtle local conditions, the first introduced by the Sato school, the second defined ad-hoc by Mebkhout (\*), inspired above all (he tells me) by my comparison theorem between algebraic De Rham cohomology and De Rham cohomology.

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(\*\*) For an "explicit" description of a closely related functor  $M$ , in the context of  $(\mathbb{D}^\infty$  - modules, see the already quoted subnote nc 171 (ix), part (b); "The good God's formula".

(\*) The name "regular" is taken, of course, from the classic terminology for "critical points". regular" differential equations of functions of one complex variable. If  $i : U \rightarrow X$  is the inclusion of the complementary  $U = X - Y$  of a divisor  $Y$  in  $X$ , regularity in the sense of Mebkhout (for a complex of  $\square$ -modules  $C$  over  $X$ ), "along  $Y$ ", is written by saying that the canonical morphism

$$Ri^{\text{mer}}(CU) \rightarrow_{\text{ri}*}(CU)$$

from the "meromorphic direct image" of the  $_{CU}$  restriction of  $C$  to  $U$ , to the ordinary direct image, induces a quasi-isomorphism for the associated De Rham complexes.

In the case where  $_{FU}$  is reduced to a "local system", i.e. to an integrable a-coherent bundle, this notion is equivalent to Deligne's notion. This too is obviously inspired by my theorem of comparison (with the difference that Deligne is careful not to point this out, whereas Mebkhout is constantly careful to clearly indicate his sources). Mebkhout became aware of Deligne's notion only after he had introduced his own definition, which is transcendental in nature. He had not previously sought a purely algebraic description of his condition. Deligne's work showed that in the particular case under consideration, Deligne's algebraic condition implies Mebkhout's, and Mebkhout verifies that the converse is also true. This therefore provides the key to a purely algebraic description of Mebkhout's regularity condition, for any complex of  $\square$ -Modules with coherent and holonomic cohomology.

complex analytic (i.e. complex Betti cohomology). These conditions are in fact "purely algebraic" (and this is what I consider to be their main interest), making sense in particular in the case where  $X$  is replaced by a scheme of finite type (smooth if you like, but it's not necessary) over any field of zero characteristic.

The Mebkhout functor  $M$  (or "God's functor" (\*\*)) is described as a quasi-inverse functor of the functor

$$m : \underline{\text{Cris}}^*(X)_{\text{hol. rég}} \rightarrow \underline{\text{Cons}}^*(X, C)$$

$$m : F \mapsto \text{DR}(F) = \underset{\square}{\text{RHom}}(\underline{0}_X, F),$$

restriction of the functor (defined on  $\underline{\text{Cris}}^*(X)$ ) associating to each complex of  $\square_X$ -modules (with coherent cohomology) the associated complex of differential operators (or "De Rham com-plex") (\*). Kashiwara's constructibility theorem implies that when  $F$  is holonomic (and a fortiori, when it is regular holonomic),  $\text{DR}(F)$  is indeed in  $\underline{\text{Cons}}^*(X, C)$ , which makes it possible to define the functor  $m$  - an obvious definition, admittedly childish, and yet one that nobody apart from Mebkhout (and still until the "big rush", five years later...) had thought of (\*\*)! (To do so, we would have had to remember

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Mebkhout told me that the Japanese had a notion of 'micro-differential system with regular singularities', which they used in a completely different spirit (for analysis purposes, not geometry). After the rush on the 'God's theorem', this was a ready-made way (among many others) to muddy the waters and obscure Mebkhout's pioneering work. It would seem that the two notions are equivalent - and the chances are, given the deliberate messiness of the subject, that nobody has ever bothered to check. Mebkhout only ever worked with the notion of regularity as he introduced it in 1976 (and as it appears in his thesis, submitted two years later).

(\*\*) For the origin and meaning of the name "theorem (or functor) of the good Lord", see the note "L'inconnu de service et le théorème du bon Dieu" (n° 68<sup>□</sup>), written before I knew about the mystification of the Colloque Pervers or even 'L'Enterrement dans toute sa splendeur'.

(\*) See on this subject the note already quoted "The five photos (crystals and  $\square$ -modules)" n° 171 (ix), part (a), "The album  
"De Rham coefficients".

(\*\*) (7 May) The two functors  $m, M$ , which establish the equivalence of crucial categories in both directions, must be called *Mebkhout functors*, and the same applies to the functors  ${}_{M\infty}, {}_{M\infty}$  re-

<sup>o</sup>( For more on these, see the note on "The five photos" (n° 171 (ix), part (b)).

By composing these functors with the natural dualising functors, we find two other pairs of functors quasi-inverses of each other,  $(\delta, \Delta)$  and  $({}_{\delta\infty}, {}_{\Delta\infty})$ , contravariant themselves, and more convenient in some respects (cf. note cited). These are the four "*Meckhut contrafunctions*".

of a certain kind of yoga, that of the... dri-, ved categories, which everyone by common consent had decided to bury, alongside the deceased who had introduced it among other bombast of the same style... . (\*\*\*)).

Moreover, the *regularity* condition, over and above that of holonomy, was established by Mebkhout "to measure", precisely in such a way that it becomes reasonable to hope that the functor  $m$ , thus restricted, is fully faithful and even an *equivalence of categories*. He arrived at this conviction in 1976. He finally proved it, in a very similar form at least (\*), in his thesis at the beginning of 1978.

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(\*\*\*) (7 May) More than once Mebkhout has been treated like a joker, who thinks that writing arrows between derived categories (we're asking you a bit!) and RHom is doing maths... He didn't let that shake him, any more than I did when I introduced (in 1955) the global and local Ext of bundles of Modules (while waiting for the RHom with or without underlining), which made everyone seasick and justified the most express reservations about me (at least until 1957, the year of Riemann-Roch-Grothendieck...).

None of this stopped Mebkhout from trusting his own flair and following it wherever it led him. He set to work with his bare hands, with no experience, with no help from anyone. He was *sure* that the theorem he sensed must be true - all the indications he had were consistent. With a little experience, it would even have been obvious that he already had everything he needed to prove it, with the now standard means that the first of my students would apply in a jiffy. But reduced to his own resources, the theorem seemed vertiginously remote and inaccessible - he hardly dared to hope that he would ever prove it 1

If he struggled to prove it, for nearly two years, it was because he had not had the advantage, as my students had, of being supported by a benevolent elder, and of learning from me a certain standard technique for unscrewing constructible beams, combined with the resolution of singularites à la Hironaka. The statement he came up with is a profound certest statement and the proof is also profound, but now of a standard nature. In retrospect, it seems that the difficulty he had to overcome was above all psychological, rather than technical: working against the current, and entirely reduced to his lights alone...

(\*) (5 May) In his thesis, Mebkhout states and proves the corresponding equivalence theorem for  $\infty$ -Modules  $\square$ , and gives a remarkable explicit expression for the quasi-inverse functor  $M$ . See on this subject subnote 171(ix) (part (b)), and also the subnote "Hatching of a vision - or the intruder" (n° 171<sub>1</sub>). Mebkhout had by 1976 arrived at the conviction that the two functors  $m$ ,  $m$  (hence also the scalar extension function  $i$ , discussed in the last quoted sub-note) are equivalences, and at the explicit form of the quasi-inverse functor of  $m_{\infty}$ . The result that appears in his thesis, concerning  $m_{\infty}$ , is from 1978. By this time, he had all the ingredients for the demonstration (analogous, but with additional technical difficulties) in the case of  $m$ .

Given the general indifference that greeted his thesis, passed in February 1979, he made no effort at the time to

Above all, this is *the* great new theorem contributed by Mebkhout, representing the crowning achievement of eight years of obstinate work, pursued in complete solitude. It contains, in a single lapidary statement, a whole range of profound results, of increasing generality, patiently worked out and proved one by one, between 1972 and 1980. For some of the major milestones in this solitary journey to discover a new 'philosophy' in the cohomology of varieties, I refer you to the sub-note "The three milestones - or innocence" (n° 171 (x)). In this note, my main aim will be to describe in a few words the new panorama that presents itself at the end of this first long stage in the labours of the solitary worker, Zoghman Mebkhout.

The crucial fact (clearly recognized by Mebkhout as early as 1976) is that the Cons category\*  $(X, \mathcal{C})$  (of "topological" nature) can be interpreted, thanks to Mebkhout's functor  $M$ , as a full subcategory of the category  $\underline{\mathbf{Cris}}^*$   $_{\text{coh}(X)}$  which retains a meaning in the framework of "abstract" algebraic geometry; it can also be interpreted, "morally", as a kind of "derived category" formed with complexes of differential operators in the ordinary sense (\*). The full sub-category in question, defined by conditions of holonomy (à la Sato) and regularity (à la Mebkhout), is clearly *1a* good category.

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write a formal proof for the case of  $m$  as well. The ingredients are the same as for  $m$ , and are inspired by the proof of my comparison theorem for the De Rham cohomology of complex algebraic varieties (which he had learned in 1975), and the unscrewing techniques of SGA 5 (which he learned in Verdier's "good reference", while the SGA 5 seminar continued to be carefully sequestered by my dear cohomology students). It was only at the end of 1980, in view of the importance of his ideas for the proof of the Kazhdan-Lusztig conjecture, that he took the trouble to write a circumstantial proof in the case of  $m$  (where a quasi-inverse functor was not available in advance). This proof was published in "Une autre équivalence de catégories" Compositio Mathematica 51 (1984), pp. 63-88 (manuscript received 10.6.81).

I would point out that between 1975 and 1980 (apart from an allusion in a few lines by Kashiwara in 1980, which will be discussed in the sub-note "The mafia" n° 171<sub>2</sub>), nowhere in the literature apart from the work of Zoghman Mebkhout, there is any mention of the functor  $m$  or  $m$  or of a duality "philosophy", relating precise analytically constructible discrete coefficients, and complexes of regular holonomic  $\mathbb{D}$ -modules, or complexes of holonomic  $\mathbb{D}^\infty$ -modules. As we shall see, when the importance of this relation was finally recognised, with "Kazhdan-Lusztig" and the rush on intersection cohomology (under the leadership of Deligne), Zoghman Mebkhout's name was eliminated without fanfare, by a hushed, smiling and discreet agreement, which was implacably effective...

(\*) For the precise relationship between the two points of view, I refer you to the abundantly quoted sub-note "Les five photos" (n° 171 (ix)), part (a).

of "De Rham coefficients" that I had been planning since the sixties, and which was still missing from my panoply, in zero characteristic, to complete and to link together, as in a single large fan, the "*A*-adic coefficients" that I had identified in 1963; it is also the category that Deligne had tried to grasp at the end of the sixties, without succeeding (it seemed) in a way that satisfied him. This category will obviously have an essential role to play in algebraic geometry (and in particular in the description of the category of patterns on a basic scheme  $X\dots$ ). The obvious name for this category, for me at least, is the "category of *De Rham - Mebkhout coefficients*" (\*\*), denoted  $\text{DRM}^*(X)$  (or  $\text{Meb}^*(X)$ ), or  $\text{DRM}^*(X/k)$  (or  $\text{Meb}^*(X/k)$ ) in the schematic framework, when  $X$  is a scheme of finite type over a  $k$ -field of zero characteristic (\*).

It is via the functor diagram (Meb) above, which summarises Mebkhout's philosophy (dating back to 1976, and established by him over the following years), that the *co coherent crystalline efficients* (i.e. objects of  $\underline{\text{Cris}}^*(X)_{\text{coh}}$ ) can be regarded as a "common generalisation" of "discrete" (constructible) and "continuous" (co-herent) coefficients. The category formed by the former is in any case identified, by the Mebkhout functor  $M$  (a functor of deep nature), with the *full subcategory* of the category

(\*\*) The general lack of understanding of the crucial role and significance of this category can already be seen in the fact that it has still not been given a name or a concise notation. Instead (in the texts I've looked at) the authors confine themselves to vague references to "regular holonomic differential systems" (which is a fine line to walk!), of "construction" or "correspondence" or "relation" (supposedly well known) between these and (C-constructible) bundles - and always, need I say it, in passing, lies under silence the one who was the solitary artisan, setting in motion all this great hype around the new cream pie of the beau monde: "the  $\mathbb{E}$ -modules" .

(\*) In the algebraic case, in addition to the condition of local "regularity", a condition of regularity "at infinity" (in the case of a non-clean variety) to find the "right" De Rham coefficients - Mebkhout, which will correspond, in the case where the base field is the complex field, to C-vector complexes on  $X_{\text{an}}$  with algebraically (and not only analytically) constructible cohomology bundles; It is for these coefficients too that we have a "comparison theorem", generalising my result on De Rham cohomology, namely that the "total crystalline cohomology"  $R\Gamma_{\text{cris}}$ , taken algebraically (Zariskian) or in the transcendental sense, is ". the same". This statement in turn must be seen as a special case of a more complete statement, namely that the "six operations" from the algebraic point of view are "compatible" with the six operations from the transcendental point of view.

If my students hadn't been so busy burying the master's work, it would have been at the very beginning of the seventies (if not as early as the sixties...) that they would have come up with the theory of coefficients that was needed, in all its simplicity and power...

crystalline coefficients of De Rham-Mebkhout. The situation is not so good for the tautological functor  $N$ , which is by no means fully faithful. But to console us and to complete the picture, we can add that in each of the categories in question, we have a natural *dualising functor*, giving rise to a biduality theorem ("trivial" for  $\underline{\mathcal{O}}_X$ -Modules and  $\square_X$ -Modules, and using the full force of Hironaka's resolution of singularities in the case of constructible C-vector bundles), based on the model I had first developed in the coherent (commutative) framework, and then in the discrete spread framework (in 1963) (\*\*). That said, the two functors  $M$  and  $N$  are compatible with the C-vector functors.

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(\*\*) (5 May) The extension, from the stale context to the analytic context, of my biduality results, and of the stableness of constructibility by the RHom operation, is moreover automatic and was known to me as early as 1963. Verdier had then been working with me for three years, getting into the yoga of derived categories (whose systematic theory he had taken on) and of coherent duality. It was from me that he learned the techniques for extending the formalism of coherent duality to the case of discrete coefficients. As we have seen, he appropriated the yoga of duality and biduality, in the complex analytic context, in "the right reference" thirteen years later (in 1976), with the connivance of Deligne and my other cohomology students, all well aware of the situation.

In the massacre edition of SGA 5 the following year (1977), Illusie retained (in exposition I) the biduality theorem, so that for a reader of both texts, Verdier's deception is obvious - but apparently it was considered normal by everyone (given the times we live in...). On the other hand, Illusie has refrained from including the stability result of constructability by RHom, which I had of course given even *before* stating and proving the biduality theorem, on which my proof (copied by Verdier) in no way depends. So (it has to be done anyway 1) Illusie confines himself to establishing the stability in question when the second argument is the dualising complex!!! this was a way of covering up for his friend Verdier, by making it a little less apparent that from beginning to end (and give or take three pages which were mentioned in his place) Verdier's article is copied from my lectures in SGA 5. The best part is that the stability in question is already an immediate corollary of the biduality formalism (which does not prevent it from being mathematically crazy to pretend to establish the stability of constructability by RHom( $F$ ,  $G$ ) only when  $G$  is the dualising complex). But the complacent Illusie is careful not to mention this corollary in his presentation, so as to keep up the appearance that the stability result that appears in his friend's "The Good Reference" is indeed his own.

One wonders why, under these conditions, Illusie still kept the biduality theorem - massacre for massacre's sake, he wasn't that far off! But if he had emptied it, he would also have been obliged to empty Lefschetz-Verdier's eternal formula (which makes essential use of it) - that is to say, precisely the 'head of the Trojan horse': the formula whose supposedly crucial role in SGA 5 was to justify his other friend's impudent 'coup de scie' operation, shattering the unity of my work on étale cohomology.

Congratulations to my former pupil Illusie, the clever "editor"-digger...

natural dualising coefficients (\*). Moreover, if  $F, F^\sharp$  are dual crystalline coefficients on  $X$ , Mebkhout proves that the C-vector complexes "crystalline cohomology" of  $F$  and  $F^\sharp$  on  $X$  (\*\*)

$$R\Gamma_{\text{cris}}(F)_!, \quad R\Gamma_{\text{cris}}(F)^\sharp$$

as complexes of topological vector spaces, are "in duality" by a natural coupling, in other words we have a coupling *which is a duality* (of EVT)

$$\begin{matrix} H^i_{\text{crie}}(X, F)_! & \times H^{-i}_{\text{crie}}(X, F^\sharp) \\ \text{s} & \text{crie} \end{matrix} \rightarrow C$$

(for any integer  $i$ ). This duality theorem "caps" the ("absolute") duality known in the case of discrete coefficients (which Mebkhout calls "Poincaré-Verdier duality"), and in the case of coherent coefficients (which Mebkhout calls "Serre duality"), into a duality which I would call "Mebkhout duality", and which he called "Poincaré-Serre-Verdier duality" (\*).

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(\*) For the tautological functor  $N$ , this compatibility is itself tautological. On the other hand, for the Mebkhout functor  $M$  (or what amounts to the same thing, for its quasi-inverse  $m = (G) \rightarrow DR(G) = {}_{R\text{Hom}}(\mathcal{O}_X, G)$ ), this is a profound result, proved by Mebkhout in 1976 (under the name of "local duality theorem"), at the same time as the global duality theorem for  $\mathbb{Q}$ -Modules, which will be discussed just now. All the same, 'everyone' now uses this result as a matter of course, and above all (something that is even more self-evident) without ever the slightest allusion to some vague unknown...

(\*\*) As a reminder (see "The five photos", n° 171 (ix)), the ("absolute") crystalline cohomology of  $F$  on  $X$  is defined as

$$R\Gamma_{\text{cris}}(F) \stackrel{\text{def}}{=} {}_{R\text{Hom}}(\mathcal{O}_X, F) \cdot R\Gamma({}_{R\text{Hom}}(\mathcal{O}_X, F)) = R\Gamma(DR(F)).$$

On the other hand, the index 1 designates cohomology (crystalline in this case) with its own supports, i.e..

$$R_1(F) \stackrel{\text{def}}{=} R\Gamma_{{}^{R\text{Hom}}(\mathcal{O}_X, F)}.$$

(\*) As I have already said elsewhere (in the note "Le compère", n° 63□□□), Mebkhout "could do no less" than tip his hat to his "benefactor" Verdier (since the latter had communicated to him the providential "good reference"), wherever he had the opportunity. Yet *none* of the essential ideas for either duality (and even less, if one may say so, for the duality that covers them) are due to Verdier. In fact, apart from Poincaré's and Serre's duality theorems in their initial form, which of course served as my starting points, all the essential ideas are contained in the formalism of the six variances and biduality that I introduced and developed at length in both contexts, coherently and discretely, in solitude. It was with this in mind that I wrote last year in the note 'The victim - or the two silences' (n° 78<sup>2</sup>) that

As I see it, these are the first steps in a programme of duality of vast dimensions, including in particular (among other things ( <sup>171(xi)</sup> )) the development of a formal- ism of six operations (and of biduality) for the coefficients of De Rham \* Mebkhout on schemes of finite type over a field of zero characteristic (while waiting for something better). Given the conditions of isolation and the indifferent atmosphere in which Mebkhout had to work, it was out of the question for him to develop a complete formalism, such as the one I had developed in the two contexts from which he had drawn inspiration ( <sup>171(xii)</sup> ). Among the main results that he produced and proved over the eight years 1972-1980 ( <sup>171(x)</sup> ), the one that seems to me to be the most important in terms of my programme for the 1960s is of course the one that highlights the right category of crystalline coefficients, known as "de Rham - Mebkhout" coefficients. As it happens, it is also this result which, from October 1980 onwards, has enjoyed the most brilliant, even astounding, fortune, even though it has been appropriated (like *A-adic* cohomology, or the crystalline cream pie of car. *p*) as a *tool* only, torn from a vision which gives it all its meaning and all its strength.

Even more than for Mebkhout's other results, and just as in my work developing the biduality and six operations formalism, the language of derived categories is essential here to bring out the simple and profound relationship between discrete coefficients and coherent co-efficients (\*) described in the theorem of the good God (aka Mebkhout the never-named...). Thus, almost twenty years after the creation of the scalar cohomological tool

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Mebkhout's 'protectors' had 'kindly allowed him to carry with his hands a small corner of the coffin bearing my remains'. It would have been fair for me to point out at this point that Zoghman had the courage, even though he could feel the wind blowing in the beautiful world, to state clearly in each of his articles that he was inspired by my ideas, instead of doing as everyone else did and plundering the deceased while passing over him in silence (in writing) and displaying an air of condescension (in words).

As for the name 'Serre duality', which has come to be given to the theory of coherent duality that I had been developing for years in total solitude, it has all the more merit (and Serre, who didn't ask for so much), I'm sure he'll appreciate it better than anyone!), that Serre had shown a total lack of interest in my work on duality, thus depriving me of the only interlocutor I could have hoped to have for my cogitations! I think it's fair to say that this lack of interest has remained intact right up to the present day, including with regard to the notion of derived category (and other useless details. . . ).

(\*) (May 7) Specifically, to a holonomic  $\square$ -Module (complex reduced to degree zero) the functor of good God generally associates a constructible complex of **C**-vectorials which will have more than one non-zero cohomology bundle, and vice versa. The simplest and most striking example is when we take a divisor  $Y$  over  $X$ , hence an inclusion  $i : UX \setminus Y \rightarrow X$ , and the subbundle of  $i_*(\mathcal{O}_U)$  formed by the meromorphic functions along  $Y$ .

(which the whole world today takes for granted, while treating with contempt the vision that gave rise to it. . . ), and thanks to this result (which has become 'pie-in-the-sky') of an obscure posthumous pupil, that the language of derived categories will suddenly find itself rehabilitated (as if it had never been buried. . . ), in the limelight and to the ovations of the crowd, who have come to acclaim yesterday's mourners playing (modestly) the new fathers. But again, I anticipate...

(<sup>171(iii)</sup>) It was Verdier who more or less acted as Mebkhout's 'thesis supervisor', whose work over the last seven years had been carried out in complete solitude. At no time did he show any interest in the work of this young man, who was clearly as stubborn as he was stubborn.

- a vague, retarded Grothendieckian being treated from the height of his stature. In the four years since our first meeting in 1975, he has granted a total of three 'interviews' to this nobody from nowhere. None of my other cohomology students deigned to take an interest in the work of this quidam either. Its relevance to their own research escapes them completely (although it's obvious, even to an old-timer like me who 'dropped out' of the whole thing fifteen years ago. . . ). They are far too wrapped up in their trip-burial, and in a sullen crank routine, to be able to apprehend anything new that presents itself without a calling card and without pretence, with the sheer force of things that are all too simple and all too obvious. They long ago buried

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It is a profound result of Mebkhout, obtained as early as 1976 (and subsequently absorbed into the Good God Theorem) that this is a regular holonomic  $\square$ -Module (nobody before Mebkhout had ever even thought of looking at this bundle as an  $\mathbb{Q}$ -module, and suspecting moreover that it was even coherent...). Its transform by the good-god functor is  $Ri^*(\mathbf{C}_U)$ , which has non-zero cohomology bundles in sion 0 and 1 at least.

This is an aspect of Mebkhout's philosophy that was absent from Deligne's approach, who obtained a dictionary between bundles of constructible ( $\mathbf{C}$ -vectorials and certain pro-objects of  $Coh(\underline{\mathcal{Q}}_X)$ ) (the category of coherent Modules on  $\underline{\mathcal{Q}}_X$ ) provided with a stratification, without having to pass to plexes and derived categories. (He did, however, take care to bring in the latter, at a time when I was still around and no one would have thought that we would one day bury the said categories. . . ). This (at least at first sight) is an advantage of Deligne's approach, which is closer to the direct geometric intuition of discrete coefficients - but it is also a sign, no doubt, that his approach is less profound. I tend to think that it will still have a role to play, though, but no doubt in 'tandem' with Mebkhout's point of view, which (I presume) is somewhat dual.

(24 May) For details along these lines, see the sub-note "The Five Photographs ( $\mathbb{Q}$ -Modules Crystals)" (n° 171(ix)), part (c), in particular pp. 1009 et seq.

their own creative faculties, confining themselves to being consumers of fashionable branded products. Later, however, they will largely take their revenge on the intruder who has allowed himself to see what they, and everyone else, had missed (even though they had everything they needed, like him and beyond, to see and do...). But here again I'm anticipating...

The defence took place on 15 February 1979, to general indifference. Mebkhout sent his thesis to all the mathematicians he could think of, rightly or wrongly, who were interested in the cohomology of analytic or algebraic varieties - starting, of course, with all my students. Of all those who received a copy of his thesis, *not a single one* even acknowledged receipt, or sent a word of thanks. It is true that Mebkhout's thesis, even more (it seems to me) than some of his articles, is affected by the conditions of adversity that surrounded it - it seemed thick and not easy to access, to say the least, and those who were not in the loop had excuses for not having caught on straight away. On the other hand, I found Mebkhout's oral explanations of his philosophy perfectly clear and immediately convincing, and there is no reason why those he gave to Verdier (1976), Berthelot (1978), Illusie (1978) and Deligne (1979) should be any less so than those I received.

It was at the Bourbaki seminar in June 1979 that Deligne learnt from Mebkhout of the "*Riemann-Hilbert correspondence*" which appeared in the unread thesis (this was the name given by Mebkhout to the category equivalence (or "dictionaries") referred to earlier). Apparently, Verdier had never thought to say a word to Deligne about the work of his obscure pupil in the four years that had elapsed, a work whose interest obviously escaped him completely until around the time of the Pervers colloquium in 1981 (when Deligne had to take it upon himself to explain to him what it was all about...), for Deligne, on the other hand, it was bound to 'click' immediately - it was *1a* solution, complete and lapidary, to the problem that he himself had left to one side ten years earlier!

The reflex that would seem to go without saying in such a situation (so much so that, even now, I find it hard to imagine how anyone could act any differently...) is to immediately congratulate the young stranger for having finally found the answer to a question that, I'm sure, is profound, that we'd been working on for a whole year, and that we'd finally written off. Times have changed... Deligne, always affable of course, confined himself to a vague compliment (and yet it warmed the heart of the candid Zoghman, who was not spoiled, it must be said, and far from suspecting what awaited him): yes, he had indeed received his thesis and in

had even read the introduction, and found it to be 'beautiful mathematics'. For Zoghman, it was an auspicious day! It was probably the first time (and the last too...) that he had received a compliment from such a great man, whom everyone knows and quotes... (\*)

I can't say what was going through Deligne's mind at the time and in the year that followed, concerning this remarkable theorem that he had just learned from a stranger. I presume he must have been talking about it (\*) - in any case, in October of the following year (\*\*) he communicated it to the Soviet mathematicians Beilinson and Bernstein, no doubt guessing that they would use it. That same year, in fact, it was this 'correspondence' (always referred to as the 'Riemann-Hilbert correspondence' when someone deigns to name it, and without Mebkhout's name ever being mentioned) that was the essential ingredient, the *new fact* that had been missing until then, for the demonstration of a famous conjecture (\*\*\*) of which I know little more than the name, the 'Kazhdan-Lusztig conjecture'. At the same time, this was the kick-off for a sudden and spectacular revival in the cohomology of algebraic varieties, finally emerging from a long stagnation of more than ten years (if we leave aside Deligne's work on Weil's conjectures). This unexpected revival took shape the following year, with the "happening" of the Colloque... de Luminy in June 1981, on the theme "Analyse et topologie sur les espaces : singuliers" (\*\*\*\*).

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(\*) (14 May) This was the one and only time Mebkhout had the honour of a conversation with Deligne.

(7 June) For another compliment, from Illusie the previous year (June 1978), see the note "carte blanche pour le pillage - ou les Hautes Œuvres" (n° 1714), especially page 1091.

(\*) (14 May) On reflection, and from what I know about Deligne, I doubt he really has any.

"He did so with a very precise idea and a well-defined plan. See the note "La valse des pères" (n° 176<sub>4</sub>) about Deligne's very special performance, and the role he had the two straw-fathers Beilinson and Bernstein play (see also "Marché de dupes - ou le théâtre de marionnettes", note n° 172<sub>2</sub> (e)).

(\*\*) (14 May) This appears from a letter from Deligne to Mebkhout (received on 10 October 1980). For details of the Kazhdan-Lusztig episode, see the sub-note "The Mafia" (n° 171<sub>2</sub>), part (d), "The Dress Rehearsal".

(\*\*\*) The same conjecture is proved, independently and nevertheless with a remarkable set, at the same time (give or take a few days) by BrylinskiKashiwara, with the same main ingredient, and the same cover-up, *and* the key role of this new fact, and the name of its author. For further details, see the sub-note already quoted "The Mafia" (n° 171<sub>2</sub>) parts (c) and (d).

(\*\*\*\*) The proceedings of the Colloquium were published in Astérisque n° 100 (1982). These proceedings are not im-

(<sup>171(iv)</sup>) On the subject of this 'memorable Colloquium', I refer the reader to the note 'L'Iniquité'

- ou le sens d'un retour" (n° 75), and the following notes, written in the heat of the moment and in the amazement (the word is not too strong) of the discovery. These notes form Procession VII of the Burial, which I have called 'The Colloquium - or bundles of Mebkhout and Perversity'.

Suffice it to say that in the Introduction to the Proceedings of the Colloquium, signed by Bernard *Teisier* and Jean-Louis *Verdier*, the famous "Riemann-Hilbert correspondence" is presented as the "Deus ex machina" of the Colloquium. The same is true of the main article in volume I of the Proceedings (together with the Introduction cited above), signed by A. A. *Beilinson*, J. *Bernstein* and P. *Deligne* (and in fact written and presented at the colloquium by the latter, in the absence of the other two co-authors). Moreover, the first two authors named had been informed directly by Mebkhout (and independently of Deligne) of the ins and outs of his theorem, as early as the previous year (November 1980) - Mebkhout had even travelled to Moscow expressly for this purpose (\*). Teissier had also known first-hand for a long time - not to mention Verdier, who had chaired Mebkhout's thesis jury... Finally, I would like to add that it had been decided 'in extremis' to ask Mebkhout to give a talk on the theory of  $\mathbb{Q}$ -Modules (which nobody apart from him knew too much about, among the people there), Mebkhout thus had the opportunity to inform the entire Colloquium (\*\*) about the theorem he had modestly called by the name of

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(\*) On this instructive episode, see the sub-note quoted "La maffia" (n° 171<sub>2</sub>) , part (d) "La Répétition" ("The Repetition").

General (before Apotheosis)".

(\*\*) (14 May) On the subject of the participants in this strange Colloquium, very much a 'festival of Grothendieckian maths', but with absolute silence on the late ancestor himself, as well as on the obscure posthumous pupil 'who had the gift... of bringing all these fine people together'... The only 'pre-1970' students taking part in the Colloquium were Deligne and Verdier, but they were enough to take centre stage. Strangely enough, Berthelot and Illusie (whose work has been particularly marked, I might add, by the absence of Mebkhout's point of view, exhumed with great fanfare) did not take part. On the other hand, Contou-Carrère (a pupil of 'après') has wandered in, quite happy to have been invited to talk about his method of solving Schubert's cycles.

I remember that he came back euphoric, fully identified with all these brilliant and famous people with whom he felt at home, and who had come to listen to him, obviously interested, but yes! He put on a contrite face to tell me about Mebkhout, who had opened up to him with bitterness but he couldn't really say why - for him Contou, in any case life was obviously good!

That was in June 1981. Four months later, (in response to his sole candidature for a post in Perpignan) it was

of Riemann and Hilbert, without leaving the slightest ambiguity (as you would expect) about the authorship of this result, which had the gift (unexpected for him as for everyone else) of bringing everyone together.

It is in vain that the reader would look for any trace of Mebkhout's presentation in the Colloquium Proceedings. Verdier kindly explained to him afterwards that only papers presenting *new* results would be included in the Proceedings, whereas those in his thesis were already two years old and more. Readers will also be hard-pressed to find the slightest bibliographical reference or the slightest indication of the origin of this famous theorem, which is not due to Riemann or Hilbert. He will also find it hard to find the name of Zoghman Mebkhout. This name does not appear in the first volume, either in the text or in the bibliography. In the second volume, it appears twice in the bibliography, in the form of references - "thumb! "These references have nothing to do with the theorem of the good God - alias Riemann-Hilbert - alias Deligne (and above all nothing to do with Mebkhout) (\*).

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the hard slap he received as a humiliation and an affront. (See, for this episode, the note "cercueil 3 - ou les jacobiniennes un peu trop relatives" n° 95, in particular pp. 404-406. This note was written without my having yet made the connection with the episode of Contou-Carrère's participation, a little out of his depth no doubt, in the brilliant Colloquium).

(\*) (14 and 26 May) Apart from the participants already named, I was informed by name of the participation of Brylinski, Malgrange and Laumon. All three were perfectly familiar with Mebkhout's work, and he had had the opportunity to inform each of them in detail, even outside the lecture he had given at the Colloquium. This did not prevent Brylinski and Malgrange, in their article in the Proceedings, which makes essential use of Mebkhout's ideas and the theorem of the good God, from glossing over both the crucial role played by the emergence of these new ideas and new tools, and the name of their author.

As for Laumon, he made up for it later, in an article in collaboration with Katz. This is the same N. Katz who had already distinguished himself in 1973 with the "APG 7 operation", mentioned in the note "Episodes of an escapade" (n° 169 (iii), episode 2). Mebkhout had already informed him directly of the results of this operation in 1979 (see "Carte blanche pour le pillage", no.° 171<sub>4</sub>). The article in question is entitled 'Fourier transformation and exponential sum augmentation' (which is also Laumon's doctoral thesis), and has been circulating in preprint form for the past two years (I was even given a copy by Laumon). These authors develop a Fourier transformation for *A-adic* coefficients, on the model of that introduced by Malgrange in 1982 in the case of  $\square$ -modules (in the wake of the work of the vague unknown, and without mention of his name, as a matter of course). Mebkhout's work represents the heuristic foundation of the theory developed by Malgrange as well as that of Laumon-Katz, in the same way as they were

To return to the Colloquium in the flesh, it must be said that none of the brilliant mathematicians assembled here, deigning to come and listen to the talk given to them by a vague stranger on duty, realised that the 'Riemann-Hilbert correspondence' that the latter presented to them as being of his own making, was in fact the very one that the most brilliant of them had already so brilliantly introduced as the heuristic keystone of his brilliant talk, which formed (in the very opinion of the organisers, Teissier and Verdier (\*)) the 'highlight' of the evening.

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for the article already quoted by Beilinson-Bernstein-Deligne (on what they wrongly call 'perverse' beams). That said, Laumon and Katz also follow the general trend (no mention of the 'unknown' in either the article or the bibliography - nor, of course, any mention of the ancestor. . . ), following in the footsteps of Deligne, Verdier, Berthelot, Illusie, Teissier, Malgrange, Brylinski, Kashiwara, Beilinson, Bernstein - I apologise for the alphabetical order, but there are already twelve of them directly and actively involved in the brilliant mystification-escroquerie of the Colloque Pervers - not counting Hotta, who did his bit across the Pacific, and thirteen of them!

Malgrange is not quoted in the article in question either - apparently there is a coterie of allied authors who quote each other all the time, avoiding quoting those next door even when they're pumping on them as much as they can. In any case, when it comes to the ancestor or the vague unknown, they all agree. It's often brilliant maths, surely - but as an old-fashioned person, I'm not indifferent to the mentality and it takes away my appetite for reading, and ultimately, even for doing it. Not the ones they make, in any case. The smell is too distressing...

I also had a look at J. L. Verdier's article, "Spécialisation et faisceaux de monodromie modérée", which appeared in the same Proceedings. Not surprisingly, I saw "Riemann-Hilbert correspondence", with no allusion (in the text or in the bibliography) to the vague unknown whose thesis he had chaired. He must have forgotten... There is also mention of a Riemann-Roch étale theorem (that name rings a bell...) - and I had also seen that in the Laumon-Katz article. Since neither of them breathe a word about a certain deceased person, I say to myself that this "theorem" must surely be due to Messrs Riemann and Roch, just like the particular case to be found among the "technical digressions" and "nonsense" of SGA 5 (not to mention the exposition of conjectures, providentially emptied by the far-sighted and astute "editor" Illusie. . . ).

Mebkhout had, moreover, sensed a link between his philosophy and the Fourier transform as early as 1977, at a time when he was rigorously alone in his interest in a yoga of duality, linking  $\square$ -Modules and discrete coefficients (as I myself had been in the past, for the formalism of coherent, then staggered duality). This "Fourier transform" intuition remained vague - the context was no more encouraging at the time for him to continue along this path, than it was for me, around 1960, to extend my theory of coherent duality to a theory encompassing complexes of differential operators (see b. de p. note (\*\*)) page 946 - There is an allusion to the Fourier transform on p. 2 of the introduction to the paper "Dualité de Poincaré" by Z. Mebkhout, in seminar on singularities. Université Paris VII (1977-79).

(\*) This is the implicit "opinion" that is clearly expressed in the Introduction to the Colloquium, already mentioned,

signed by Teissier and Verdier.

of this brilliant Colloquium on so-called (one wonders why) 'perverse' beams. And yet it seems that none of them was surprised that the name of the vague stranger was not mentioned in this paper, which was certainly flying so high that there was no need to bother; nor, two and a half years later, with the publication of the Proceedings (early 1984), that the name of the said stranger did not appear either, either in the introduction (already mentioned)/ or in the article in question by Deligne et al. Moreover, this article left little room for doubt as to the true authorship of this correspondence, which the main author and presenter-prestidigitator (\*), with his customary modesty, refrained from naming, not even the names of its two illustrious precursors.

If there are some who were surprised, they have not made themselves known until now - not to me, in any case, nor especially to the main person concerned who provided the sauce for the farce, namely the posthumous pupil and rigorously unknown as it should be, today as before - Zoghman Mebkhout (\*\*).

(<sup>171(v)</sup>) (\*\*\*) (a) (4 May) Even Serre is no exception to the rule, having long (like André Weil) developed an annoying tendency to declare that maths that doesn't interest him is 'bullshit'. Yet he and Weil are of a calibre that (one might think) should put them above such childishness. In the event (and apart from Deligne's 'last twenty pages'), it was through two or three thousand pages of Grothendieckian 'bullshit' that Weil's conjectures were finally demonstrated (and quite a few other things too that neither Weil nor Serre had ever dreamed of). This did not encourage Serre to be more modest, since in the very text in which he describes Deligne's demonstration of the last step in these conjectures (in the Bourbaki seminar of February 1974, paper no.° 446), he takes this opportunity of all times to ironise (in polite terms, of course) about the useless details with which the "1583 pages" of SGA 4 must be crammed. In this facile irony, I do not detect malice or bad faith, but rather an unconsciousness and a

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(\*) For details of my friend Pierre's conjuring tricks surrounding the authorship of the never-named theorem, see last year's note "The conjurer" (no.° 75 ).<sup>122</sup>

(\*\*) (19 May) for details of the misadventures of my friend Zoghman, candidly lost in a Amongst the "tough" and affable, see the series of sub-notes "The blossoming of a vision - or the intruder", "The mafia", "The roots", "Carte blanche for looting" (n° 171(i) to 171(iv))

(\*\*\*) This note (in three parts (a)(b)(c)) is derived from two b. de p. notes to the note "L'ancêtre" (n° 171 (i)) - see footnotes (\*\*) p. 944 and (\*) p. 945.

lightness. He will have taken the trouble to note the number of pages in three volumes (which he avoided reading and whose substance escapes him) and to add them up - just to mock them with 'elegance'.

But it all adds up, from my complacency in the past towards such brilliant pupils, to this 'elegance' of Serre's (at a time when l'Enterrement had already been going well for four years. . . ) (\*), and everything that followed. Barely three years later, it is as if my non-pupil Deligne, with added malice and impudence, were writing about the very words of Serre or their undertones, with those 'useless details' that are being pruned away, the 'confused state' and the 'gangue of nonsense' (where this same Deligne learnt his trade and found his main source of inspiration), which a pale digest of his writing is charitably intended 'to make us forget'. Thus, from complacency to ease and impudence, we have arrived in the mathematical world, in barely ten years, at a state of morals where the simple feeling of decency seems to have disappeared.

It was not Weil or Serre, and even less Deligne, who created the new tools that were lacking for '*La Conjecture*', but the one they like to ironise about - through deliberate ignorance or calculated malice, the effect is not very different. But I who, with infinite care, have written and rewritten, and had written and rewritten, tirelessly, throughout the months and years, a text which sets out with all the breadth it deserves, the language and certain basic tools for a vast, unifying, new and fruitful vision - I know, and with full knowledge of the facts, that there is not *one page* among the 1583 left behind by Serre, by my students and by the unanimous fashion, which has not been weighed and reweighed by the workman and which is not in its place and fulfilling its function, which no other page written to date could fulfil. These pages are not the product of a fashion or of a vanity that takes pleasure in putting itself above others. They are the fruits of my loves and of the long, obscure labours that prepare a birth.

For this part of my work, as well as for all my major contributions to mathematics which have now become part of the common heritage, *no one has* yet been able to redo what I did (with all its 'bullshit', 'useless details' and 'nonsense'), except by copying me (apart from insignificant variations (\*\*)). Some copy it (as it is or in neighbouring or even new contexts) by saying it (it begins

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(\*) (27 May) For a further reflection on the evocation of Serre, see part (c) of this note.

(\*\*) (7 June) I recently read Fulton's fine book Intersection Theory ("Ergeb-

to be more than rare. ... ), the others by playing the new fathers, and adopting an air of disdainful condescension towards the work they shamelessly plunder, and towards the worker who taught them their trade. This kind of indecency has only been able to flourish and flourish because it has found a consensus ready and willing to embrace it, first and foremost among those who (often by virtue of their exceptional stature) have set the tone.

(b) The yoga of the six operations is an integral part of this vast unifying vision' developed in the SGA 4 and SGA 5 seminars. I would even go so far as to say that this yoga is the central theme of the SGA 5 oral seminar, or to put it better, that it is its 'nerve' and soul. Illusie has therefore taken care to remove it from the massacre edition (destined by his 'care' to become a volume of 'technical digressions'...).

In the note "L'ancêtre" (n° 171 (i), p. 945) I write (without further clarification) that the vision- force of the six operations "has given eloquent proof of its power". For me, perhaps the most striking concrete sign of this power is to be found in our mastery of staggered cohomology. To arrive at this mastery, in 1963, the 'six operations' vision that came to me from coherent duality was my constant guideline. I also believe that I am the only person in the world qualified to comment on what was decisive in the development of this tool.

It is understood here that in the process of discovery, the so-called 'heuristic' elements are almost always decisive. If I'm talking about the 'power' of a point of view or a vision (something quite different from a theorem in itself), this cannot be measured in strictly technical terms. It is above all its 'suggestive' power, as a discreet and sure guide in the voyage of discovery, whispering to us at sensitive moments 'the' right notion to introduce, 'the' right statement to identify and prove, 'the' theory that remains to be developed. It is the fact that we have forgotten such a visionguide (after burying it) that, in the cohomological theory of algebraic varieties, the powerful impetus of the 1960s ended, in the years following my departure, in a state of confusion and stagnation. Apart from the great 'prestige question' (i.e. that of the absolute values of the Frobenius eigenvalues), all the essential questions were stubbornly avoided. ...

As another sign of the power of the vision (or, in this case, the formalism) of the six operations, I see the Lefschetz-Verdier formula of fixed points, both in the context of

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nisse", Springer Verlag, 1984), and notes that an exception should be made for the Riemann-Roch-Grothendieck theorem.

discrete coefficients, than coherent. Here, the role of the "six operations" formalism was both heuristic (in the sense that the formula is irresistibly suggested by this formalism) and *technical* (in the sense that the formalism also provides the necessary and sufficient means for the proof of the formula). It is true, in view of the Burial, that only a tiny portion of the cohomological formalism that I had developed was used, at least up to the time of the 'rush' on intersection cohomology and on so-called 'perverse' beams (where part of the formalism was exhumed without any mention of the worker. . . ). But I am well aware that, along with Weil's conjectures and the omnipresent intuition of topos, the vision of the six operations was my main source of inspiration in my cohomological reflections throughout the years 1955-1970 (\*). In other words, the 'power' of this vision is for me an obvious fact, or to put it better, a reality that I have experienced almost daily for fifteen years of my life as a mathematician. This experience has been strikingly reconfirmed in the last few weeks, as soon as I got back in touch with the 'abandoned sites' of crystalline coefficients, De Rham and motifs (\*\*).

This entirely 'subjective' experience that I have of the power of a certain vision-force, has

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(\*) (15 May) It is understood that the vision itself took shape gradually during this period, from the first seeds contained in my 1955 article "On some points of homological algebra" (in Tohoku Math. Journal). It reached full maturity in 1963, with the sudden start of stale cohomology. This happened (as if by chance) in the same days, more or less, that I introduced the "missing functor"  $Rf_!$  (direct image with eigenstands). But the role of the six operations, as a 'vision-force' and as an omnipresent thread, only became fully conscious, I think, with the SGA 5 seminar. Back in 1966, when crystalline cohomology started up, it was clear to me that the first objective (over and above the limited 'running-in' programme that would be carried out in Berthelot's thesis work) was to arrive at a formalism of the six operations (and biduality) for the 'right' crystalline coefficients. It took an old man (declared deceased) to emerge from the coffin prepared for him, so that (almost twenty years later, and inspired by the ideas of a vague stranger on duty and co-buried) these 'good coefficients' could finally be *defined*. A description of this, for finite type schemes over  $\mathbb{Z}$  in particular, can be found in volume 3 of Réflexions (with the fifth and last part of Récoltes et Semailles).

(\*\*) (15 May) For the image of 'abandoned building sites' (or 'desolate' building sites), see part 6 of the Funeral Ceremony (notes 176<sup>¶</sup>, 177, 178), and in particular the last of the three notes quoted. While writing Récoltes et Semailles, I spent a few hours here and there on the problem of De Rham's crystalline coefficients and on that of "motifs", and a convincing definition of the former appeared, and a principle at least for the construction of the latter, in the crucial context of finite-type schemes on  $\mathbb{Z}$ . (Compare with the comments in the previous b. de p. note).

also has an 'objective' meaning, which is difficult to dismiss out of hand. This sense emerges when one remembers that (apart from a few rare exceptions) the main ideas and notions concerning the cohomology of "abstract" algebraic varieties and schemes (which everyone today uses as if they dated back to Adam and Eve (\*)) were developed by none other than myself, during the same period 1955- 1970. (It is understood that I am putting aside here my starting point FAC, and Weil's conjectures).

Mathematically speaking (and from what I've been able to see so far), this great era has led to a morose mediocrity, the root cause of which is in no way technical. It is one of the signs of this mediocrity that a powerful vision, designed to inspire and nurture grand designs, has been buried or made a mockery of by the very people who were its custodians and primary beneficiaries. And another sign is that neither Deligne, Verdier, Berthelot nor Illusie, overwhelmed as they were by all the facilities conferred by position and prestige, brilliant gifts and consummate experience, were able to produce the work that was needed on the basis of De Rham's coefficients, in line with their own research (and the vision rejected...); or even to recognise the innovative and fruitful work when they were confronted with it. And it was in this *same* spirit (because everything ties in, once again...) that, once they had finally recognised the significance of one of the tools produced by the new work, they hastened to seize it without even understanding it, and to bury, alongside the ancestor, the unknown worker who had fashioned it...

(c) (27 May) (\*\*) The way I express myself about Serre came about spontaneously, and stems from a perception of things, concerning him, that must have formed in me over the last few weeks or months. However, as I was writing these lines, there was a residue of uncertainty or perplexity, or reserve, about what I had just written. In short, I was suggesting that Serre, on this occasion, lacked 'elegance'!

The fact is that in the nearly thirty years that I have known Serre, he has been for me the very embodiment of '*elegance*'. I'm sure I'm not the only one to think so.

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(\*) On the subject of this mentality of the 'user' (or 'consumer') of finished mathematical products, who has forgotten (if he ever knew...) what creation is, and also on the subject of Adam and Eve and the good Lord, I refer the reader to last year's notes "A feeling of injustice and powerlessness..." (no.° 44<sup>¶</sup>) and "L'inconnu de service et le théorème du bon Dieu" (no.° 48<sup>¶</sup>). See also "Teaching failure (2) - or creation and fatuity" (note n° 44).<sup>¶</sup>

(\*\*) This third part of the "Unnecessary details" note is taken from a footnote to the first part of the "Unnecessary details" note.  
part. See the reference in the footnote (\*) on page 965.

to be perceived in this way. It is an elegance, both in his work and in his relationships with others, which is by no means purely formal. It also implies scrupulous probity in his work, and an equal demand for probity in his dealings with others. On more than one occasion I have noted his acute judgement in the face of any attempt by a less scrupulous colleague to 'muddle things up', trying to hide an embarrassing difficulty (so as not to have to admit that he didn't know how to overcome it), or some mistake of his own making... This elegance also implied *rigour*, both towards himself and towards others.

It is all these things, which for me remain inseparable from the person of Serre, that must have played a part in this 'residue of reserve' in me that I have just mentioned, in the face of the spontaneous expression of *another* perception of things, unexpectedly taking the lead over the familiar perception. There is no question of my wanting to dismiss one of the two for the 'benefit' of the other. Both have something to teach me, different aspects of a complex reality that is by no means static. It's up to me to situate them in relation to each other, to arrive at a nuanced apprehension of a person to whom I am linked by a past, and by feelings of sympathy and respect.

This 'rigour' I have just mentioned did not, however, extend to everything relating to Serre's relationship with mathematics and mathematicians. I referred earlier to an 'unconsciousness' or a 'lightness', which I could just as easily have called a '*closed-mindedness*'. This is in contrast to the attitude of 'prudence and modesty' that I encountered in most of my elders who, like Serre himself, welcomed me with kindness in my early days, and sometimes (as was his case) with warmth. I say more about this later (in the note "Liberté...", n° 171 (vii)), where I note that this attitude was part of "the atmosphere of respect... that permeated the environment that welcomed me".

The 'closure' that I noticed at Serre, on certain occasions, did not start yesterday. I saw the first signs of it in the second half of the 1950s. I believe that it greatly limited the depth and scope of his work from the 1960s onwards. I sense a link between this aspect of 'closure' to approaches to mathematics different from his own, and a deliberate intention that developed in him little by little, to confine his apprehension of mathematical things and mathematics to a purely technical or technicist view (or 'binders', I would have liked to write), by closing himself off to anything resembling a *vision*; to something, therefore, that goes beyond the tangible, immediate, *provable* statement (or set of statements) or (at the very least) takes the form of a conjecture.

"In short, he was 'closed' (except that he has yet to prove it...). With hindsight, it seems to me that he ended up pushing this aspect of his creative abilities to the extreme limit, the exclusively 'yang' and 'superyang' aspect, the '*macho*' aspect. Given his exceptional ascendancy over the mathematicians of his generation, and of two or three others that followed, it seems to me that Serre contributed a great deal to the advent of the excessive technicist spirit that I see rampant in the seventies and eighties, the only one nowadays that is still tolerated, while any other approach to mathematics has become the object of general derision.

To use C.L. Siegel's expression, we are now witnessing an extraordinary 'Verflachung' (\*), a 'flattening', a 'shrinking' of mathematical thought, deprived of a dimension - the visionary dimension, that of dreams and mystery, that of the depths - with which it had never before (it seems to me) lost all contact. I experience it as a *drying out*, a *hardening* of thought, losing its living suppleness, its nourishing quality - becoming a pure *tool*, stiff and cold, for the impeccable execution of tasks '*à l'arrachée*', tasks at public auction (\*) - when the sense of purpose and direction, and the sense of these tasks themselves as parts of a vast Whole, are forgotten.

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(\*) I have taken this expression (in German) from a letter I recently received from Serre. The expression is taken from the preface by C. L. Siegel to Hecke's works. Serre quotes this impression of C. L. Siegel at the very end of his letter, adding immediately: 'it was unfair, and it would be even more unfair now, it seems to me'. My brief reflection on the relationship between Serre and myself probably came out of that.

I think, moreover, that if Serre quoted Siegel, it's because in some way this impression, coming from one of the great mathematicians of our time, must already have been working in him; it was like a blip, no doubt, in the mathematical '*vie en rosé*'. It was like a blip, no doubt, in the mathematical '*vie en rose*'. A blip, no doubt, among others, but less easy to get rid of, apparently...

"Flach" in German means 'flat', 'devoid of depth'; 'Verflachung' designates the process leading to such a state of 'flatness', or the outcome of such a process that has just taken place. In the main text, I have endeavoured to follow the associations aroused in me by this very telling term, which unfortunately cannot be translated as it stands. Of course, I have no idea whether the way I perceive the thing overlaps in the slightest with the perception of Siegel, whose text Serre quotes I have not read.

(\*) This image of "public auctions" must have been suggested to me by the advertisements for "invitations to tender" (sic).

This jargon, among many other signs, shows the extent to which this 'flattening' of the work of discovery is by no means confined to the environment I knew well, nor to mathematical science. This jargon, among many other signs, shows the extent to which this 'flattening' of the work of discovery is by no means limited to the environment I had known well, nor to mathematical science. I haven't yet found a call for tenders in pure mathematics, but it won't be long - and I can easily imagine one of my friends or students of antarysiér giant seriously

by everyone. There is a deep sclerosis, hidden by a feverish hypertrophy.

This imbalance in thinking is just one sign of a more fundamental imbalance, a deeper emptiness, a deeper deficiency. It is no coincidence that this drying up of thought has spread and taken hold over the last two decades, at the same time as the customary forms of delicacy and respect in relationships between people have been eroded. And it's no coincidence either that the wind of contempt that has blown in and whose breath I have finally felt, has been accompanied by a more or less widespread corruption, which I've been working on for over a year now.

To this day, Serre has felt none of this corruption, which surrounds him on all sides. I knew he had a fine nose, though. But it's not enough to have a fine nose, you have to use it, take note of what it has to tell us, even when the smells it tells us about are likely to bother us; or even worry us, when they put us in question ourselves. I'm well aware that Serre, no more than I, wouldn't dream of howling with the wolves, of looting, skulduggery and debunking where 'everyone else' is looting, skulduggery and debunking. He doesn't do any of that, of course - he just plugs his nose (and too bad if he loses a hand as a result...), and pretends he hasn't smelt a thing.

And he is here in good company - not one of those who were my friends, in the world we shared and whose scent reaches me even in my retirement - not one has yet spoken to me, even by allusion, of a smell that he smelt and that made him incom- moderate. I am sure that there are still many of my colleagues who continue to practise the profession of mathematician with probity, a profession that deserves this respect. But among those who sit in the front seats, I don't know of *one* who has had the simplicity to believe the testimony of his healthy faculties (olfactory, in this case), rather than plugging his nose so as not to have to say to himself: something smells bad here - perhaps we should go and have a look.... .

But I'd like to come back to Serre and myself, and to this 'closure' that I sensed in him, which began I don't know when and has become more pronounced over the years. I think it

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behind padded doors, in a committee with a boring acronym, to decide which "lines of research" should be declared priorities, which "approach strategies\*" should be promoted, and which "bids" from "winning" teams should be "retained" for "pre-selection", or even to win the jackpot, the official grant from the Ministry responsible, renewable every two years after a favourable opinion from the competent committee...

that the most fruitful part of his work, the one that had the most profound influence on the mathematics of his time, came at the beginning, before the emergence of this closure, or at least before it had taken a decisive hold on his relationship with mathematics and mathematicians. It was also in those years, in the 1950s, that contact with him was most fruitful for me; it was in those years that Serre played the role of 'detonator' for me, giving my work some of its most decisive impulses. It was during those years, too, that a vast vision was born and grew within me, a vision that inspired and fertilised my work in those years and right up to the present day. I can say, with full knowledge of the facts, that if there was anyone apart from me who had a part in the blossoming of the vision, it was him, Serre, and in those years. And this was only possible because, in those fertile and decisive years, he was open to mathematical things for what they are, including those that still elude immediate grasp; those that seem reluctant at first to allow themselves to be encircled by the meshes of language already formed.

- those that may require years of obscure and patient labour, if not a lifetime, before they condense into tangible substance and reveal the limbs, shapes and contours of a *body*, alive and vigorous, attesting to the unexpected appearance, in the familiar context of the known, of a *new being*.

I think that in the early years when I knew Serre, and right up to the end of the fifties, he retained a sensitivity for that impalpable and delicate thing called "creation", and for the humble labours that prepare a birth. I think there was a moment when he sensed the blossoming of a vision, and the language that gave it form, like the soul or the spirit, and the body... There was then a warmth without speech, a discreet and effective availability, where he could support a laborious and intense work which was not his, and yet, by a sympathy and an expectation, he participated.

I can't say when or how this liveliness in him, at the level of our shared passion, became blunted and gave way to something else, which I have tried to define. By the early sixties, if not before, he had already stopped seeing the forest, and only agreed to see this or that tree that he found to his liking. The rest was irrelevant. It simply annoyed him, I think, to see me so absorbed in tirelessly clearing vast expanses of seemingly nothing and patiently planting all those things that didn't yet look like anything, with the air of someone who could already see a flourishing forest (\*).

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(\*) (17 June) Among the six "building sites" I review in the note "Le tour des chantiers - ou outils et

That hasn't stopped me from continuing to clear the way, to plant and replant, to prune and replant and replant - nor has it stopped us from being buddies as ever and spending hours and hours talking maths (usually on the phone). When I had a clear-cut question, and on a question that wasn't on the index, it was to him above all that I used to turn, in case he had any insights - and often, indeed, he did. I continued to learn lots of things from him, and I'm sure he was learning things from me that would interest him. It was better than an exchange of favours or services.

- there was always a common passion that linked us, there was fire and spark.

But he had already ceased to be a source of inspiration for me. That source was now to be found in myself alone (\*\*).

(<sup>171</sup> (vi)) (5 May) (\*\*\*) My memory here was a bit hazy, and became clearer over the following weeks, when I had the opportunity to get back in touch with these questions.

There were in fact two distinct questions in my mind, one perfectly precise, the other rather vague.

The first question concerned the need to derive a complete theory of the six varieties, for "De Rham coefficients" that had yet to be precisely defined. My crystalline ideas, both in characteristic  $p > 0$  and in zero characteristic, provided a very precise starting point - we already knew, in advance, what was to replace the A-adic (or Betti, in the transcendental framework) "local systems" (or "twisted constant bundles"), and we had to manage to define "coefficients with singularities", in the spirit of the derived categories of course (\*). So what was missing was a good "finiteness" condition for

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vision" (n° 178), only *one* of them (the "motifs" workshop) had ever been of any interest to Serre - and even then... When I wrote to him recently, without comment, in a PS, that I thought I had the principle of a construction in form of the category of motifs on a finite type scheme over  $\mathbb{Z}$ , he didn't mention it in his reply.

Clearly, this "Grothendieckian maths" doesn't make him hot or cold any more. ... (\*\*) (12 June) For a continuation of this reflection on the relationship between Serre and myself, see the note "The family album" (n° 173, part c. (\*\*)) This note is taken from a b. de p. note to the note "The ancestor" (n° 171 (i)) - see note (\*) on page

946 .

(\*) It is also clear, when the base field was  $C$ , that we wanted a category equivalent to that of complexes of  $C$ -vector bundles with algebraically constructible cohomology bundles. This very precise indication suggested that, by unscrewing, the neuralgic question was that of associating, with any crystalline local system on a subschema (not necessarily closed), a crystalline bundle on the am-diagram.

crystalline complexes. In the null characteristic, it's ' $\square$ -coherence' (which neither I nor any of my students thought of, even though it's such a simple and natural idea), combined with the more delicate conditions of holonomy and regularity, that gives the answer, as the philosophy of the good God alias Mebkhout taught us (twelve years after starting crystalline yoga). I'm waiting with curiosity to see if any of my ex-students will end up moving (without naming the stranger on duty, or the ancestor, it's a given...) to find the corresponding conditions for  $p > 0$ , or rather no doubt, in the rigid-analytic context of zero characteristic. Better late than never.... . (\*).

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biant. This is essentially what Deligne did in 1969, except that it turned out that instead of a crystalline beam there was a crystalline *pro-beam*, which represented an important new idea (and an "obvious" one, as soon as you take the trouble to look...). But systematic work with pro-objects would have required a fairly considerable amount of groundwork, of which the work done by Jouanolou for his thesis (on  $A$ -adic coefficients) gave a foretaste. It would have been necessary to roll up one's sleeves again...

Mebkhout's new approach using  $\square$ -Modules therefore amounts (from Deligne's and my point of view) to replacing a crystalline pro-beam by a crystalline ind-beam (thanks to the ordi-coherent dualising functor). naire  $R\text{Hom}_{\Omega_X}(-, \Omega_X)$ ), and go to the five limit to find an ordinary crystalline beam, i. e. (assuming now  $X$  smooth over a field of zero characteristic) an  $\square_X$ -Module. The unexpected "miracle" then, established by Mebkhout between 1972 and 1976 (starting from an opposite "end", cf. the note "The three milestones" n° 171 (x)), is that this  $\square$ -Module is *coherent* (more precisely, with coherent\* cohomology bundles). Another miracle

equally unexpected, is that we can characterise the  $\square$ -modules (or rather, the complexes of  $\square$ -modules) that we obtain in this way, by simple conditions of an entirely new nature compared with Grothendieckian crystal optics (namely the "mierolocal" holonomy condition, in addition to a "regularity" condition introduced by Mebkhout and which has become familiar in the meantime).

(26 May) For details of the duality relationship between De Rham - Mebkhout coefficients and De Rham - Deligne coefficients, see the note "The five photos (crystals and  $\square$ -Modules)" (n° 171 (ix)), part (c). For the necessity of replacing Deligne's point of view of procoherent modules by that of crystals in coherent promodules, and on the possibility (not yet proved) of replacing the cumbersome point of view of pro-objects (crystalline or stratified) by crystalline bundles without more (by passage to the projective limit), see the same note, parts Ce) and (d).

(\*) (26 May) Since these lines were written, and as an unexpected result of my efforts to write an account of the Apotheosis which is worthy of passing into posterity, I have been led (almost unintentionally) to come up with what now seems to me to be *1a* good definition of De Rham coefficients, at least for a finite-type scheme on  $\text{Spec } \mathbb{Z}$  (which seems to me to be the most crucial case of all). Of course, the essential new ingredient, compared with my 1966 ideas, is the philosophy of the vague unknown, which I will refrain (like everyone else) from naming here.

The approach I am planning for finite type schemes on  $\text{Spec}(\mathbb{Z})$ , must also give the right coefficients.

I didn't pursue this question myself in the 1960s, as I had enough other things to do and thought that with Berthelot and Deligne on the job, it was in good hands (which proves that you can be wrong...). However, Deligne's work in 1969/70 provided, in principle, an answer in terms of a null characteristic, which would undoubtedly have satisfied me, had Deligne completed his work.

But in my mind, such a conjectural theory of De Rham coefficients, even if it were to relate "discrete" cohomology (in the form of a crystalline cohomology) and "coherent" cohomology, did not for all that "cap" the theory of coherent duality. Thus, I did not see that a Zariskian coherent bundle defined an "enveloping crystal" (\*\*)(NB in the language of  $\mathbb{Q}$ -modules, this is the extension of the Ring of scalars  $\underline{\mathbb{Q}}_X \rightarrow \square_X$ , for  $X$  smooth at least...) - and even if I had seen it, the tal obtained (already for  $F = \underline{\mathbb{Q}}_X$ , which gives the crystal  $\square_X$ ) is *not* of De Rham's type. However, I wondered if on a complex analytic space  $X$ , coherent duality (for example in Serre form, if  $X$  is smooth and for locally free coefficients) could not be obtained as a "special case" of discrete duality, developed by Verdier on the model of the étale theory. As it stood, it looked a bit crazy and immediately raised a host of questions: how to explain "in discrete terms" the role of the dualising module (differential forms of maximum degree)  ${}_{\omega X}$ , and how to take account of evethetic pathologies, that had no analogue in 'discrete' duality?

It was Mebkhout who was the first (and the only one to this day apart from me, it seems) to understand that there is indeed a deep link between the two dualities, but that this is expressed *not* by saying that one 'caps' the other, but by finding a third theory of duality (\*) that of  $\square_X$ -modules (or "crystals" on  $X$ ), which "caps" both of them, and by limiting itself, moreover, on the "discrete" side, to C-vector complexes which have beams

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cients of De Rham (Mebkhout or Deligne style, your choice) for schemes of finite type over any field (of zero characteristic, or not). I intend to outline this approach in the 'De Rham coefficients' section of volume 3 of Réflexions, among other 'technical digressions' that my students will be able to copy at their leisure. ...

(\*\*)(26 May) It may be better to use the enveloping "co-crystal" (see note 171 (ix) part B, for allusions to the notion of co-crystal). I will no doubt come back to this question in the presentation promised in the previous b. de p. note.

(\*) For more information on this "third theory of duality... which overshadows the other two", see the note "The work... "(n° 171 (ii)).

of *analytically constructible* cohomology. There is no doubt in my mind that this is the 'correct answer' to this 'vague question' (and a bit off the mark...) that I never had the opportunity to ask my posthumous pupil...

(15 May) The writing of 'L'Apothéose' became at the same time an unforeseen opportunity to familiarise myself somewhat with Mebkhout's work, and with the yoga of  $\square$ -modules that he introduced into the cohomological study of varieties. Along the way, this also brought back memories that had sunk. In particular, I realised that as early as the end of the fifties, or the beginning of the sixties, I had been closer to Mebkhout's philosophy than I realised only ten days ago, when I wrote the beginning of this note ("Les questions saugrenues"). In the framework of clean and smooth schemes on an arbitrary basis, I had in my hands a duality statement (in terms of a complex of relative differential operators and the "adjoint" complex), "capping" the coherent duality and the duality for De Rham cohomology. Technically speaking, this was more or less equivalent to the algebraic version of Mebkhout's duality theorem (discussed, in the complex analytic context, in the note "L'œuvre... l', n° 171 (ii)). For all that, my statement of duality did not satisfy me, and I did not think of publishing it or even advertising it, because it seemed to me, in the said form, too close to Serre's duality theorem (relativised on some basis, it is a given), of which it is a more or less immediate corollary. To arrive at a statement that satisfied me, I would have had to know how to make a 'derived category' with complexes of differential operators, so as to be able to formulate a statement of intrinsic duality in terms of the objects of these categories, on the model of the theory of coherent duality worked out over the previous years.

What was missing, then, was a good notion of 'quasi-isomorphism' for a morphism between complexes of differential operators. so as to form a derived category (by formally inverting these quasi-isomorphisms). It was clear that the usual definition (via the associated cohomology bundles) was not usable in the algebraic framework (and it is probably no more usable in the transcendental framework (\*)). The passage to the corresponding  $\square$ -Module complexes now gives a marvellously useful answer.

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(\*) I am mistaken here. Mebkhout assures me that for a (differential) homomorphism between complexes of differential operators, this is a quasi-isomorphism (in the naive sense of complexes of associated C-vector bundles) if and only if the corresponding homomorphism for complexes of associated -Modules

simple to my perplexity of yesteryear!

Seeing no ready definition for the notion of quasi-isomorphism, I didn't try to find out whether it existed or not, and whether it would indeed be a remarkable derived category. This was at a time when I was the only one interested in derived categories (which were far less sophisticated) formed from coherent modules and the *linear* morphisms between them. . . I didn't clearly feel that this question of a notion of quasi-isomorphism (which was also a bit vague, not to say far-fetched) touched on a fertile mystery, which mystery admitted a 'key' of childlike simplicity! And that there was a category of remarkable 'coefficients' just waiting to be defined. For this to happen, my thoughts would undoubtedly have had to be pursued in an atmosphere where they met with a minimum of interest and resonance, if only from someone who was involved!

It was De Rham's cohomology that drew my attention to the obvious fact that the global cohomology spaces of coherent bundles, on an algebraic variety  $X$  over a field  $k$ , say, are "functors" not only with respect to  $\mathcal{O}_X$ -linear homomorphisms, but even with respect to *all* homomorphisms of  $\mathcal{O}_X$ -linear bundles.

*k-vector* networks, and in particular for differential operators. It is this observation that was the reason for an embryonic reflection on a theory of 'coherent' (or 'quasi-coherent') duality, where the 'morphisms' between bundles would be differential operators, instead of being linear. As I said, this line of thought was short-lived, to such an extent that it didn't even stick in the back of my mind as one of a number of things that would one day have to be cleared up - it sank (I think) into total oblivion until just a few days ago. Even my sporadic reflection on crystals, around 1966, didn't bring it up in my memory, as far as I can remember. And yet, without my even realising it at the time (because I couldn't remember the question at the time!), this crystalline reflection was to provide me, as early as 1966, with *another* key, 'dual' in a way to Mebkhout's, for my perplexities of yesteryear, via the complex of principal parts of infinite order associated with a complex of differential operators. I make al-

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is a quasi-isomorphism. It is in fact equivalent (using the mapping-cylinder) to say that a complex of differential operators is quasi-zero in the naive sense, if and only if the associated complex of  $\square$ -Modules is quasi-zero, something apparently well known (at least to Mebkhout, who demonstrates it in his inexhaustible thesis. . . ).

lusion in a b. de p. note written yesterday (note (\*\*)) page 946), and I intend to come back to it in detail in the part of volume 3 of the Réflexions, developing the yoga of "types of coefficients" and giving, in particular, a formal definition of what I presume to be "the" good De Rham coefficients (Mebkhout style, or Deligne, as the case may be) on a finite type scheme over  $\mathbb{Z}$  (for example).

Technically, and even 'psychologically' (in terms of the problems already posed at that time/and the overall vision that gave them strength and life) everything was ready, from the second half of the sixties, to bring out this definition of De Rham's coefficients. After me, Deligne came very close to the right notion, and he could not have avoided coming up with it, if a force to which he had given all-power over his life and his work had not put a premature and peremptory end to his reflections along this path. . . (\*)

Discovery is not about hitting a nail, a chisel or a steel wedge with a hammer or sledgehammer. Above all, discovering is knowing how to listen, with respect and intense attention, to the voice of things. The new thing does not spring out of a diamond like a sparkling jet of light, any more than it comes out of a machine tool, however sophisticated and powerful it may be. It doesn't announce itself with a bang, boasting its letters of nobility: I am this and I am that. . . It is a humble and fragile thing, a delicate and living thing, a humble acorn perhaps from which an oak tree will grow (if the seasons are favourable...), or a seed that will give birth to a stem and this one to a flower. It is not born in the limelight, or even in the sunlight. It is not the fruit of the known. Its mother is the Night and the penumbra, the elusive mists without contours.

- the presentiment that eludes the words that would capture it, the absurd question that is still being sought, or such vague and elusive dissatisfaction that is nonetheless very real, with that indefinable (and indisputable. . . ) feeling that something is wrong or askew and that there is something fishy about it...

When we know how to listen humbly to these voices that speak to us in whispers, and to follow their elusive message obstinately, passionately, then - at the end of obscure and groping labours, muddy perhaps and without appearance - suddenly the mists become incarnate and condensed, in *substance*, firm and tangible, and in *form*, visible and clear. In that solitary moment of intense attention and silence, the new thing, daughter of the night and the mists, appears...

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(\*) See the discussion in the sub-note ". . . and hindrance" (n° 171 (viii)).

(<sup>171(vii)</sup>) (4 May) (\*) I don't pretend to be a 'mature' or 'wise' man, surrounded by the immaturity and irresponsibility of his fellow men - I don't imagine that's the image that emerges of me in the pages of *Récoltes et Semailles* (\*\*). And yet, at least in my relationship with mathematics, I think I can say that throughout my life I have maintained a good-natured simplicity (\*\*\*)<sup>1</sup>, as well as a fidelity to my original nature. Vanity, which has been as pervasive in my life as in that of any of my colleagues, hardly interfered (as far as I can remember) with my sound judgement and my flair for mathematics (\*).

In fact, it was only after I left 1970 that I began to realise, little by little and each time with amazement, how common it is, even among men of exceptional abilities, that these sometimes seem to be annihilated, hopelessly blocked, it would seem, by prejudices of an 'irrational' nature - and all the more so because of their 'irrational' nature.

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(\*) This sub-note is taken from a p. b. note to the note "The ancestor" (n° 171 (i)) - see note (\*\*) on page 945.

(\*\*) (26 May) I can even say that if writing Harvest and Sowing revealed anything to me on this subject, it is indeed a state of 'immaturity', a lack of 'wisdom', and by no means the opposite, it was perhaps the most unexpected discovery of all, and also the most crucial because of its immediate implications, that the strength of my attachment to a certain past and to my work as a mathematician, this attachment in a form that is still relatively discreet, was first revealed to me at the end of March last year, in the course of the reflection in the final note "The Weight of a Past" (n° 50) of *Fatuité et Renouvellement*, it was being confronted with the brutal reality of the Burial, in its aspects above all of deliberate contempt and violence, that set in motion in me powerful egotistical defence reflexes. At the same time, they reveal to me the strength of the ties that bind me to a past that I had once thought had been detached from me. Over the past year, these ties seem to have taken on a new vigour, and very often (especially recently) I feel them as a *burden* indeed, an exhausting burden indeed - like other burdens that once weighed on me, and which have now been resolved. . .

(\*\*\*) (16 May) I'd have to make an exception here for a certain possessive attitude towards my 'chasses gardées', to which I put my finger in *Fatuité et Renouvellement*, in the section "La mathématique sportive" (n° 40). These 'sporting' dispositions were to lead me to play down the ideas of others, whenever these were already known to me on my side. We can therefore say (contrary to what I assert in the main text) that in these cases my vanity did indeed interfere with my 'sound judgement', and tended in such cases to encourage me to adopt a discouraging attitude, where benevolent encouragement would have been in order. It seems to me, however, that such situations have been exceptional in my life as a mathematician, and that they have not hindered my mathematical creativity.

(\*) See previous b. de p. note for reservations on this subject.

more tenacious! My first experiences in this area date back to 1976 (\*\*), and are mentioned in the note "You can't stop progress" (n° 50), and a first written reflection on this subject is continued in the note "The Gravedigger - or the whole Congregation" (n° 97) (\*\*\*)<sup>1</sup>, in the particular context of the Burial. It was also only gradually, and against considerable forces of inertia, that I came to realise that these 'irrational' causes are nonetheless perfectly intelligible, provided we take the trouble to stop and look into them. That's how I came to 'accept' them too, as best I could...

To come back to myself and my relationship with mathematics. Because of my working style, I tend to work on the basis of often hasty presumptions, without worrying about 'prudence' (\*); but I follow each of the intuitions (or 'presumptions') that emerge right to the end, which means that the many errors that are scattered throughout the early stages of the work are eventually eliminated, giving way to an understanding that is unfailingly solid, and which (more often than not) really gets to the heart of things. My spontaneous way of proceeding is quite different when it comes to passing judgement on someone else's work, especially when it deals with a subject or registers with which I am not familiar. It seems to me that I've always tended to be cautious and modest. In fact, that was the example set to me by most of the

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(\*\*) (16 May) these are not really my first experiments in this direction - I had done others in previous years, with Deligne in particular, and also in my past before I left. But these experiences had remained sporadic, whereas the episode around Ladegaiillerie's thesis was impressive, because of the perfect concordance in the acts and omissions of five mathematicians (all of high calibre), who certainly hadn't consulted each other. This was my first contact with the Burial, beyond the vicissitudes of my relationship with my friend Pierre.

But this extraordinary weight of 'irrational' factors in so-called 'scientific' thought goes far beyond the context of the Burial, and even beyond that of an era. You don't need to be a specialist in the history of science (and I'm not) to realise that it is affected at every step by the effects of an 'irrational' factor.

- immense inertia, opposing the emergence of any innovative idea, and its blossoming when the idea has nevertheless appeared. For thoughts along these lines, see in particular the first two parts of Fatuity and Renewal ("Work and Discovery" and "The Dream and the Dreamer"), sections 1 to 8.

(\*\*\*) This theme is explored in greater depth in "The key to yin and yang", particularly in the two notes (concerning this same "Congregation") "La circonstance providentielle - ou l'Apothéose" and "Le désaveu (tî - ou le rappel" (n° s 151, 152). See also the note "The muscle and the tripe (yang buries yin (1))" (n° 106), which opens up the long-running debate on yin and yang.

(\*) On the subject of this style of work, see in particular the note "Brothers and spouses - or the double signature" (n° 134), and also the section (in Fatuity and Renewal) "Error and discovery" (n° 2).

elders who welcomed me into their midst, such as Cartan, Dieudonné, Chevalley, Schwartz, Leray and others.

- to name but a few. I don't recall any of them ever expressing themselves peremptorily, whether for good or ill, about a work whose substance they didn't understand. This caution, I now realise, was part of the atmosphere of *respect* that I have mentioned elsewhere, which permeated the environment that welcomed me (\*\*). It seems to me that it was this prudence, a sign of respect, that first deteriorated in the environment with which I identified for more than twenty years of my life. Perhaps my memory is betraying me and I'm deluding myself, but it seems to me that I was relatively unaffected by this aspect of the deterioration of an atmosphere of respect. I've always been aware, I think, of the extent of my ignorance of mathematics in general, and of my limitations in being able to grasp the work of others, as soon as it fell outside my own, usually strongly centred, sphere of interest.

As for other people's work that I was able to understand and therefore appreciate or judge (provided I was willing to take the trouble), I don't recall any gross errors of judgement, either good or bad, that I had to make afterwards. The same is true of the feeling I had about my own ideas and intuitions, whether this feeling concerned the presence (or absence) of a 'good question', or that of a rich substance to probe, or the scope of a given idea, or the more or less complete and more or less profound understanding I had of a situation or a thing. In all these cases, if there was an error, it was always in the sense of a 'minus'. Yes - more often than not, the richness of a new theme or a new idea, its true depth and breadth, are only fully revealed little by little, over weeks and months, if not years. This gradual confirmation of an initial feeling that is right (more often than not), but which at first remains vague and diffuse, through more or less thorough and meticulous 'work on parts', then comes to us as a surprise and a wonder, constantly renewed as the hours and days go by. This is surely the reason for the extraordinary fascination of research work (whether mathematical or otherwise): at every step, the reality that is revealed to us surpasses even our most reckless dreams, in richness, delicacy and depth...

But I come back to my apprehension of other people's work, when it was placed in

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(\*\*) See the section "Foreigners welcome", n° 9.

subjects that were familiar to me, even 'hot' subjects for me. I think I can say that my ability to sense the true significance of an idea (which often escapes the author himself) has played a key role in my work. I'm thinking first and foremost of the exceptional role played by Serre, and of the fact that during the fifteen exceptionally rich years of my work, between 1955 and 1970, most of my ideas, and most of my major investments too, had their starting point in some idea or approach of Serre's, sometimes seemingly innocuous. I intend to discuss this in more detail in the 'Historical Comments' to the Thematic Outline (\*). But this does not mean that I am particularly open about Serre alone. The same thing (all things considered) has happened with other mathematicians, both in my past as a functional analyst and in my past as a geometer (\*\*). I can say that, throughout my life as a mathematician, I have been abundantly 'rewarded' for this simplicity of approach to mathematics, which I have just tried to define to some extent. This simplicity, which I have often lacked in other areas of my life, is a blessing in itself. In fact, the fruitfulness and power of my work are due to this simplicity, which is also that of *a child*. ...

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(\*) These "Comments" are announced in "Compass and Luggage" (Intr. 3).

(\*\*) As an example (among many others), I mention the principle of reduction of statements on relative schematic situations "of finite presentation" on any basis, to the case where the latter is the spectrum of a *finite* local ring (or even, of a finite field), a principle of great significance that I extracted from an idea of striking demonstration of a remarkable (and very particular) result of D. Lazare. See on this subject the note "Pouce I" (n° 77) and the b. de p. note (\*\*\*), p. 297 to this one.

(16 May) I am not sure that every time I drew on an idea from someone else I took care to mention it. For example, I don't remember, in the relevant paragraph of EGA IV, taking the trouble to cite Lazare as the source of the general method of reduction developed there. It was an oversight which, at the time, didn't seem to have any consequences. I think that people like Dieudonné (who co-edited the EGA with me) or Serre, who must have known as I did that Lazare's result was (undoubtedly) the first of its kind, would not have considered it imperative (or even appropriate) to cite it either - in any case, it was not part of the Bourbaki style! It is true that Bourbaki made up for it in the historical notes, which are lacking in the EGA and elsewhere in my work. Today, informed by the appalling degradation of scientific ethics in mathematics during the 70s and 80s, I would be much more meticulous than I have been, in carefully indicating my sources, not only in the technical sense, but also in the heuristic sense, which is often even more crucial. In the historical 'Commentaries' already quoted, I think I have made good at least some of my omissions in this respect.

<sup>(171(viii))</sup> (4 May) (\*) I made a mistake here, and my memories have been clarified (and rectified) over the past two months, as I have got back in touch with the subject a little better. In fact, Deligne's main aim had been to give this "purely algebraic description" of constructible discrete ( $\mathbf{C}$ -vector) bundles and the corresponding derived category (\*\*). The coefficients he introduces (via an ad hoc "constructibility" condition on a pro-crystalline bundle, a condition defined by the existence of a suitable "unscrewing", modelled on the one I had introduced in the stale or complex analytic context) are "tailor-made" to meet this wish. From then on, it became (heuristically) "obvious" that a formalism of the six operations *should* exist for these coefficients (in zero characteristic), and it should even be possible to demonstrate this rigorously, "brutally and stupidly", by judicious application of the "Weyl principle" of reduction to the (known) case where the base body is  $\mathbf{C}$ .

It may therefore seem a mystery, if we stop to think about it, that a Deligne should have abandoned an approach that was visibly full of promise, in favour of the description of "categories of coefficients" which (it was quite clear from the mid-sixties) were to play a crucial role in the cohomology of algebraic varieties. So he left it to someone else to come up with, eight years later, a somewhat dual and more penetrating approach (\*), which would immediately (\*\*) renew the cohomological theme in geometry. It hadn't really struck me before, given that Deligne's initial theory came shortly before I left, and that nothing at that time could have foreshadowed the fate that would be reserved for it. After my departure, on the other hand, and practically until the last few months, I had completely lost touch with the cohomological theme.

(\*) This note is taken from a p. b. note to the note "The ancestor" (n° 171 (i)), see note (\*) on page 947.

(\*\*) This is the category (denoted  $\underline{\text{Cons}}^*(X, \mathbf{C})$ ) in the note "The work . . . ", n° 171 (ii) formed by complexes of  $\mathbf{C}$ -vector bundles on  $X$ , with analytically constructible cohomology bundles, seen as a full subcategory of  $D^*(X, \mathbf{C}_X)$ .

(\*) I have no doubt that if Deligne had not dropped the subject of De Rham (which he inherited from me), he couldn't help discovering (eight years before the stranger on duty) the 'dual' yoga of the  $\mathbb{D}$ -modules, and thus becoming familiar with the ideas of the Sato school.

(\*\*) The term "aussitôt" (immediately) does not quite correspond to reality as it was (but rather to reality as it was/"qui should have been", if... ). In fact, three years passed between the moment when the new philosophy and the new tool were ready, and the moment when the people who set the tone finally realised that there was something there that could be used (and pocketed...).

I had recently thought, rather hastily and without giving it much thought, that the reason for Deligne's disaffection with a theory in which he had invested himself for a whole year might be that he was not satisfied with his criterion-definition of 'constructibility' by unscrewing. This might have seemed too simplistic, and it is a fact that it is certainly less profound than the local algebraic condition of holonomy and regularity, identified by Mebkhout in 1976 in his 'dual' point of view. But on reflection, this 'explanation' simply doesn't hold water! It is certainly *not* because an approach to a neuralgic question is 'too simple' that a mathematician in full possession of his means would abandon both the approach and the question! At the very most, he would abandon his initial approach the day he found another that would enable him to arrive at a deeper and more complete vision of this same question (\*)!

As soon as I reflect a little on this strange situation, it becomes clear that in this case too, as in many others, my friend Pierre's motives were neither mathematical nor even 'rational'. Thinking about it again, I realised the extent to which the problem of De Rham's coefficients, which only made sense from the point of view of the six operations and crystalline yoga (\*\*) (a yoga that I had introduced a few years earlier with the crystalline topos, and precisely in the spirit of the six operations...), has

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(\*) In fact, in this particular case, it seems to me that there is no reason to 'abandon' Deligne's approach in favour of that of the good Lord (not to mention Mebkhout). The two approaches complement each other, Deligne's having the advantage of being closer to geometric intuition, and Mebkhout's being technically simpler (by avoiding recourse to pro-objects), and in various respects more profound.

(\*\*) I remember that in Deligne's presentation of his theory, he systematically avoided the use of the crystalline language, which nevertheless gave his theory a deeper dimension, by inserting it into an already existing topologic cohomological formalism. I also realised that, like Berthelot and my other cohomology students, he had lost the sense of the profound *uniqueness* between p-characteristic crystal cohomology and zero-characteristic crystal phenomena (which were the subject of his semiotics). These are signs of a deliberate intention to ignore a fundamental Unity, which is arbitrarily fragmented and thereby destroyed. This deliberate intention is in the nature of a "blockage", through the intervention of egotic forces, alien to the drive for knowledge. For an illustration of this blockage in another of my cohomology students, whom I knew to be gifted with a fine intuition, see sub-note n° 91<sub>2</sub> to the note "Les cohéritiers. . .".

(\*\*) This seems to be clear from Serre's report on Deligne's work, cited in sub-note no.° 165<sub>1</sub> to the note "Requiem pour vague squelette" (in particular p. 813). For an exploitation of this filiation, see "Les points sur les i" (note n° 164), I 4 (in particular p. 793), and its sub-note n° 164<sub>1</sub>.

The extent to which all these issues were rooted in my work and in myself, and in a way that was *clearly apparent to everyone*.

It is true that Hodge's problem of coefficients also came from the same master, from whom the pupil was already distancing himself inwardly (and perhaps unwittingly). But here the filiation was much less obvious to the outside world (and no one, including Serre, seems to have perceived it (\*\*)), and above all: a first tranche of the far-reaching work that had to be done was not part of an ostentatiously Grothendieckian vision ('six operations' or whatever...), not in a way that was clearly apparent to everyone, at least. But it is no coincidence, as I have pointed out on more than one occasion, that the cohomological theory of Hodge-Deligne, after a spectacular start at the end of the sixties, is still in its infancy, where the only tolerated coefficients are constant (or, *a la rigueur*, "smooth", i.e. equivalents in the "Hodge-Deligne" sense of local systems), and where operations as crucial

as the direct superior images of Leray Rf\*

(to name but a few) do not exist! The question of defining the right notion of "Hodge's coefficients" and the relevant operations on them, is not only *mentioned* in Deligne's work (as far as I know), although it was already familiar to me, except for error, even before I had the pleasure of making his acquaintance. When, after I'd left and over the years, I'd sometimes ask him (I ended up getting bored, of course...) what he was waiting for to develop the theory that was needed at the end of the day, he'd reply variably: "it's too difficult... ." (\*) I wasn't convinced, that's for sure - if I wasn't

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(\*) This response has recently been combined with 'L'Éloge Funèbre' (or burial by compliment), by Deligne, which was mentioned again recently (see the note 'Les joyaux' n° 170 (iii)). This 'Éloge' ends with this question (which is worth its weight in Pierre...):

He left the IHES in 1970 at a time when his passion for mathematics was waning. Are we to believe that the problems he was working on *had become too difficult*?

This kind suggestion is taken up again in section 2 of L'Éloge, devoted to Pierre Deligne, where we learn that certain conjectures of the deceased, 'still as unapproachable today as they were then', had undoubtedly been (or so it is clearly suggested) the main obstacle that the aforementioned Deligne had to overcome in order to prove a certain conjecture 'of proverbial difficulty'.

These similarities make me realise that in the stereotypical response "it's too difficult...." by my friend Pierre, there was an undertone of derision, which must have given him all the more piquant satisfaction, since it was obvious that this great dodo of a deceased man was a thousand leagues from suspecting the said undertone (any more than he would have imagined it).

I'm off on a completely different adventure, but I'd have got on with it just as quickly, to develop this 'too difficult' theory and that of De Rham's coefficients at the same time...

With hindsight, I am struck by the parallelism between the stagnation in the Hodge-Deligne theory on the one hand, and on the other hand Deligne's aberrant attitude towards the De Rham coefficients theme (culminating in the 'perverse' iniquity that will remain attached to the memorable Colloque de Luminy of June 1981...). These two aberrations now seem to me to be intimately linked, and this at a completely different level from the mathematical one. It is true that, visibly, the development of a formalism for Hodge coefficients is *subordinate* to that for De Rham coefficients (something that was obvious to me in 1966, and that people seem to have been discovering over the last year or two, on the heels of the work of the - never-named - Posthumus pupil...). This mathematical fact makes more striking both the link between the two sets of facts, and the aberrant nature of both: for this 'objective' link was a powerful additional incentive (for someone at least 'in full possession of his faculties') to develop both the one and the other theory, which could then only become clearer and mutually reinforcing.

The stagnation in both theories (until the Pervers Colloquium in 1981 in the case of De Rham, and up to the present day in the case of Hodge) is largely responsible for the general stagnation of the cohomological theme, a stagnation to which I have had occasion to allude on more than one occasion (\*). Even if we disregard the spiritual dimension of the human being, and take into account only the factors of 'profitability' through 'cutting-edge' scientific production, this stagnation illustrates for me in a striking way both the unsuspected empire that occult egotic forces can take over a being, and this even in the exercise of a supposedly 'disinterested' science, and the (apparently) aberrant nature of this empire, which here (at first sight at least) seems to be constantly working against the aim pursued (\*\*).

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his or her status as a deceased person...).

(\*) On the subject of this slump, see in particular "Les chantiers désolés" (La cérémonie Funèbre, 6.), and more particularly the note "Le tour des chantiers - ou outils et vision" (n° 178).

(\*\*) This is the case, at least, if we take as our "goal" the one we have set before the world ("the advancement of Science', let's say), or even that, by no means bogus, which would consist in the growth of prestige, through the accumulation of works commanding esteem and admiration. Yet it seems to me that even this 'benefit' is secondary to the satisfactions pursued by the most powerful occult forces, those to which my friend has chosen to give empire over his being.

(<sup>171 (ix)</sup>) (\*).

(a) (4 May and 19-20 May) I remind you that for a smooth complex analytic space, we denote by  $\square_X$  (or simply  $\square$ ) the bundle of rings (more precisely, of C-algebras) of complex analytic differential operators on  $X$ . A first crucial fact, highlighted by Sato, is that this is a *coherent* ring bundle, a second fact, tautological in nature and nonetheless also crucial, is that the category of locally free  $\underline{\Omega}_X$ -Modules, where we take as morphisms not only  $\underline{\Omega}_X$ -linear morphisms, but differential operators between such Modules, plunges as a *full subcategory* (but by an a priori *contravariant* functor into that of the locally free  $\square$ -Modules, by the contrafunctor

$$(1) \quad F \rightarrow \underline{\text{Hom}}_{\underline{\Omega}_X}(F, \square_d) \xrightarrow{\sim} \underline{\text{Opdiff}}(F, \underline{\Omega}_X) \quad (**),$$

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(\*) This sub-note to the note "The work. . . "( n° 171 (ii)) is of an exclusively mathematical nature. It may be omitted by a reader who would not feel prompted to apprehend even a little, in mathematical terms, the work of Zoghman Mebkhout and "the yoga of  $\square$ -Modules", as a new "theory of coefficients" in the cohomological theory of varieties. The following pages can be seen as a short introduction to this yoga, or to Mebkhout's "philosophy", situated in terms of a conceptual baggage and a crystalline overall vision. This had already become clear to me in 1966.

This vision was systematically and almost completely obscured by my cohomology students Deligne, Berthelot, Illusie and Verdier, who had been its main custodians. The only written trace that survives is the text of my lectures at the IHES in 1966, "*Crystals and the De Rham cohomology of schemes*", notes by I. Coates and O. Jussila, in *Dix exposés sur la cohomologie étale des schémas*, North Holland pub. Cie (1968). However, from a technical point of view, this paper contains all the basic ideas of crystal cohomology. Apart from Mebkhout's work, it does not seem that any really crucial progress has been made at the conceptual (or other) level - on the contrary, I note a staggering regression compared with my ideas of the sixties. Unfortunately, these ideas only appear in a very fragmentary way, or between the lines, in the presentation quoted - the most important gap, here as elsewhere, being the absence of any explicit mention of the problem of De Rham coefficients, and of a formalism of the six operations (and biduality) to be established for such coefficients (x). I was able to observe that Mebkhout, despite being more familiar than anyone else with my written work on cohomology (and that of my students), was entirely unaware of this original problem (until two years ago) - and it seems to me that from the point of view of the mathematical 'substratum' (and leaving aside non-intellectual psychological factors), this has been his main handicap to this day.

Hereafter, I will refer to the presentation cited in 1966 by [Crystals].

(x) (16 June) For a correction, see footnote b. (\*\*) page 990.

where  $\square_d$  denotes  $\square$ , equipped with its  $\square$ -Module structure induced by its *right* canonical  $\square$ -Module structure, which commutes with the left  $\square$  operations on itself (which make the second member of (1) a  $\square$ -Module). This fully faithful functor moreover induces an (anti-)equivalence between the full subcategories formed of the free Modules. This does not admit a canonical quasi-inverse functor, "commutating to the restriction to an open" - which is why the first contrafunctor considered is probably not (in general) an equivalence. If  $C$  ( $C$  as "crystal", see below) denotes  $\square$ -locally free module (or even free, never mind), we can associate with it, admittedly, a functorially dependent bundle of  $C$  :

$$(2) \quad C \rightarrow_{\text{Hom } \square} (C, \underline{\mathcal{O}}_X),$$

This is a contravariant functor, which might seem to provide "the" natural candidate for a quasi-inverse functor of (1). The trouble is that this bundle (2) is not naturally provided with an  $\underline{\mathcal{O}}_X$ -Module structure, but only with a  $C_X$ -Module structure (where  $C_X$  is the constant bundle on  $X$  defined by the complex field  $C$ ). When  $C$  comes from a locally free  $\underline{\mathcal{O}}_X$ -Module  $F$  by the contrafunctor (1), then (2) is canonically isomorphic to the  $C$ -vector bundle underlying  $F$ .

The functor (1) extends (like any additive functor) to categories of complexes: it transforms a complex of differential operators on  $X$  (in the ordinary sense) into a complex of locally free  $\square_X$ -modules, and the (contra-) functor thus obtained is of course fully faithful (for differential morphisms between complexes of differential operators, in the first category of complexes). It is in this sense that we can say that the complexes of  $\square$ -Modules (with locally free components) "generalize" the complexes of differential operators on  $X$ .

The point of view of complexes of  $\square$ -Modules has the decisive advantage, over that of complexes of differential operators, of fitting directly into the yoga (first developed in my 1955 article "On some points of homological algebra" (\*)) of complexes of Modules on an annulated space, and hence, and above all, into that of *derived categories* (which I had designed in the years following the cited article). The crucial notion of "*quasi-isomorphism*" does not appear to the naked eye, when one adopts the point of view of differential morphisms in-

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(\*\*) The isomorphism written here is  $u \rightarrow s \circ u$ , where  $s : \square \rightarrow \underline{\mathcal{O}}_X$  is the "augmentation"  $\square \rightarrow \square(1)$ . (\*) In Tohoku Mathematical Journal, 9 (1957) p. 121-138.

This point of view becomes manifest by passing to the associated complex of  $\square$ -modules. So, even more than a *generalisation* of the point of view of complexes of differential operators, the point of view introduced by Mebkhout (\*\*) represents a *crucial assouplissement*: it is thanks to this point of view, and thanks to it alone, that complexes of differential operators can now be used as "coefficients" for a new cohomological theory, with all the wealth of intuitions that goes with it. If I were to draw a parallel between De Rham's theory of coefficients and that of A-adiac coefficients (which, incidentally, was one of Mebkhout's main sources of inspiration in the development of his philosophy), I would say that this first step of a *conceptual nature*, a 'childlike' step, is similar to the one I took (in 1958) when I introduced the notion of étale faisceau (containing in germ the crucial unifying notion of *topos*). In the same analogy, the 'theorem of the good God' (which will be recalled below) is similar to the theorem of change of basis for a proper morphism in stale cohomology, which was (in 1963) the first great theorem for the start of stale cohomology, leading in the space of a few weeks to a situation of almost complete 'mastery' of the stale cohomological tool. The analogous work in the  $\mathbb{Q}$ -Modules framework (or more generally in the crystalline framework), to arrive at a mastery of "crystalline cohomology" (or "De Rham", in a broad sense that I saw such a theory as early as the sixties) - this work still remains to be done, in the seven years since the first major breakthrough was finally achieved by Zoghann Mebkhout.

The new category of coefficients introduced by Mebkhout, which "contains" (in the ex ante sense of the term) the coefficients of the coefficients of the coefficients of the coefficients.

plicity in the note "The work. . . ", n° 171 (ii)) both the "analytically constructible discrete coefficients", and the coherent coefficients introduced by Serre (systematised\* by me into a cohomological theory of "coherent coefficients" (\*), is that formed of the complexes of  $\mathbb{Q}$ -Modules with *coherent* cohomology bundles (as  $\mathbb{Q}$ -Modules), seen as a full subcategory

$$(3) \quad D_{coh}^*(X, \square_X) \quad \text{or} \quad \underline{\text{Cris}}_{coh}^*(X)$$

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(\*\*) (8 June) It should read here: introduced by Mebkhout into the Grothendieckian panoply, for the purposes of a new theory of coefficients. It is of course understood that "the  $\mathbb{Q}$ -Modules point of view" is due to Sato, but used in a quite different light.

(\*) This is the formalism of the six operations and biduality, which I developed in the coherent framework in the second half of the 1950s.

of the usual derived category  $D^*(X, \square_X)$ . If we restrict ourselves to complexes with cohomology bounded (forming the full subcategory  $\underline{\text{Cris}}_{\text{coh}}^b(X)$ ), such a "coefficient" can be represented *locally*. This can be done by a complex of free  $\square$ -Modules of finite type in any degree, and with bounded degrees; or also, which essentially amounts to the same thing, by a complex of differential operators with bounded degrees (\*\*).

When working with derived categories, it is of course necessary to replace the fundamental functors (1) and (2) with the total derived functors

$$(4) \quad F \rightarrow {}_{\text{RHom}_0}(F, \square), \quad C \rightarrow {}_{\text{RHom}^\square}(C, \underline{\mathcal{O}}_X).$$

If we are looking for *covariant* functors of a similar nature to these two functors, we first come across the "scalar extension" functor (denoted by  $N$  in the above note) :

$$(5) \quad F \rightarrow \square \otimes_{\underline{\mathcal{O}}_X} F,$$

(total tensor product), where in the tensor product we still use the structure of  $\underline{\mathcal{O}}_X$ -Module to the right of  $\square$  i. e.  $\square_d$  (\*) This functor in  $F$  has the disadvantage, compared to (1), of not extending to morphisms between arguments  $F \rightarrow F^\square$  which are only differential operators (instead of being linear). The second functor (4), which must be regarded as a contrafunctor

$$\underline{\text{Cris}}_{\text{coh}}^*(X) \rightarrow D^*(X, \mathcal{C}_X),$$

also has an important covariant counterpart, given by

$$(6) \quad C \rightarrow {}_{\text{RHom}^\square}(\underline{\mathcal{O}}_X, C) = \overset{\text{def}}{=} \text{DR}(C) \quad (\text{"De Rham complex associated with } C\text{ }),$$

where the second member is indeed explained by a complex of De Rham type, thanks to the canonical "Spencer" resolution of  $\underline{\mathcal{O}}_X$ , by locally free  $\square$ -Modules of finite type, (this resolution is deduced from the ordinary De Rham complex, taking

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(\*\*) (16 June - see end of note (\*) on page 988). Mebkhout has just pointed out to me that this is not entirely correct - this problem is discussed in loc. cit. 1.5 d) (p. 312). Mebkhout refers to it explicitly in his work "Dualité de Poincaré" (seminar "Singularités" de Paris VII, 1977-79), in the last three lines of §4.4 (relative duality theorem for  $\square$ -modules).

(\*) It is known that  $\square$  is flat as an  $\underline{\mathcal{O}}_X$ -Module to the right or left (can be seen immediately on the canonical filtration of  $\square$ , and the known form of the associated gradient. . . ). It follows that the "total" tensor product in (5) is in fact an ordinary tensor product.

the complex of  $\square$ -Modules associated by functor (1).) In crystalline terms (which will be explained below), the DR functor can be explained as the total derivative functor of the function  $C \rightarrow {}_{\text{Hom}[\square]}(\underline{\mathcal{O}}_X, C)$ , associating with each  $\square$ -Module" (or "crystal") the bundle of  $C$ -vectorials formed by its "horizontal" sections (on variable openings). This is a *local nature* operation. The correct (global) notion of "*integration*" (or global *cohomology object*) for a "coefficient"  $C$  (i.e. an  $\square$ -Module or complex of such) is not here the usual functor

$$R\Gamma_X(C) \stackrel{'}{\rightarrow} {}_{\text{RHom}[\square]}(X; \square, C),$$

but the functor (familiar to me as a *total crystalline cohomology* functor) total derivative of the "horizontal (global) sections" functor  $C \rightarrow {}_{\text{Hom}[\square]}(\underline{\mathcal{O}}_X, C)$ ; I denote this total derivative by  ${}_{\text{R}\Gamma_{\text{cris}}}(C)$ , so that we have tautological isomorphisms

$$(8) \quad {}_{\text{R}\Gamma_{\text{cris}}}(C) \stackrel{\text{def}}{=} {}_{\text{RHom}[\square]}(\underline{\mathcal{O}}_X, C) \stackrel{'}{\rightarrow} R\Gamma(\text{DR}(C)),$$

i.e. the crystalline cohomology of  $C$  on  $X$  is obtained by taking the ordinary (global) cohomology of the associated De Rham complex.

A *dualizing functor* can be defined in  $\underline{\text{Cris}}^*_{\text{coh}}(X)$ , giving rise to a bid- theorem. uality, on the model of those I have identified in the coherent (commutative) context first, and then in the discrete (spread) context. I will denote it  $D$  (as in the contexts mentioned):

$$(8) \quad D: \underline{\text{Cris}}^*_{\text{coh}}(X) \xrightarrow{\sim} \underline{\text{Cris}}^*_{\text{coh}}(X)$$

It is an anti-equivalence, essentially involutive (i.e. we have a bidu- ality isomorphism, functorial in  $C$ ):

$$(9) \quad C \dashv D(D(X)) \quad ).$$

This functor transforms (by composition) the contrafunctors (1) and (2) into covariant functors. The simple fact to remember is that if  $C$  and  $C'$  are "dual" to each other, then the De Rham complex (6) of one identifies with the "co-De Rham" (2) of the other:

$$(10) \quad {}_{\text{RHom}[\square]}(\underline{\mathcal{O}}_X, C) \dashv {}_{\text{RHom}[\square]}(C^\square, \underline{\mathcal{O}}_X), \quad \text{and vice versa.}$$

On complexes of differential operators/ this operation  $D$  is expressed (with a "shift" of  $n$  on the degrees) by passing to the "adjoint" complex of differential operators, of com- posants  ${}_{\text{Homo}_X}(F, \omega_X)$ , obtained by taking the adjoint operators term by term. Thus,

the dualising functor for  $\mathbb{Q}$ -modules is compatible with the familiar dualising functor in Serre duality,

$$(11) \quad F \rightarrow \underline{\text{Hom}}_{\mathbb{Q}}(F, \omega_X) \xrightarrow{\sim} F^* \otimes_{\mathbb{Q}} \omega_X \quad (F \text{ un } \mathbb{Q}_X\text{-Moulo loc. lib. of finite type}),$$

where  $\omega_X$  denotes the "dualizing module" of differential forms of maximum degree over  $X$ . Note that the De Rham functor

$$\text{DR}: D_{\text{coh}}^*(X, \square) \rightarrow D^*(X, \mathbb{C}),$$

does not in general commute to dualising functors (taking in the second category the functor  $\underline{\text{RHom}}(\cdot, \mathbb{C}_X)$ ). But it is a profound theorem of Mebkhout (which everyone uses without quoting anyone of course and as if it were a simple sorite) that for *holonomic* arguments, so for the induced functor

$$\underline{\text{Cris}}^*(X)_{\text{hol}} \rightarrow \underline{\text{Cons}}^*(X, \mathbb{C}) \quad (' \rightarrow D^*(X, \mathbb{C})),$$

there is commutation to dualising functors. I do not "recall" here the *holonomy* condition, and limit myself to pointing out that a complex of  $\mathbb{Q}$ -Modules is holonomic if its cohomology bundles are holonomic  $\square$ -Modules, and that this is a condition of *local* nature on  $X$ , and moreover, "*algebraic*". On the other hand, Kashiwara's constructibility theorem (which he stated for a holonomic *Module*, at a time when neither he nor anyone else - except Mebkhout - was working with derived categories...) implies that the restriction of De Rham's functor to holonomic complexes does indeed lead to  $\underline{\text{Cons}}^*(X, \mathbb{C})$ . Introducing Mebkhout's notion of *regularity*, which is also local and "*algebraic*" (\*), we find the "God's functor" (alias Mebkhout)

$$(12) \quad m : \underline{\text{Cris}}^*(X)_{\text{hol rég}} \xrightarrow{\sim} \underline{\text{Cons}}^*(X, \mathbb{C})$$

which, this time, is an *equivalence* (as we saw in the note "The work. . . ", n° 171 (ii)), which is therefore compatible with natural dualising functors. It is the quasi-inverse functor

$$(13) \quad M : \underline{\text{Cons}}^*(X, \mathbb{C}) \xrightarrow{\sim} \underline{\text{Cris}}^*(X)_{\text{hol rég}} \rightarrow \underline{\text{Cris}}^*_{\text{coh}}(X)$$

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(\*) I would remind you that Mebkhout's original definition of regularity was transcendental in nature. For a 'purely algebraic' translation, I refer you to the planned presentation of De Rham's coefficients ('Mebkhout'-style or 'Deligne'-style) in volume 3 of Réflexions.

which allows us to consider the category of "constructible discrete coefficients" (of  $C$ -vectors) on  $X$ , as a full subcategory of  $D^*(X, \square)$  and more precisely of

$D_{\text{cons}}^*(X, \square) = \underline{\text{Cris}}_{\text{coh}}^*(X)$ , which will be interpreted either as a category of coefficients "crystalline".

(19 May) For the moment, we can say that we have described in three different "languages" or "points of view", as if by so many different "photos", the same reality, or (essentially) the "same" type of "coefficients", known as "De Rham coefficients": there is the point of view of bundles of  $d$ -vectorials and complexes of such (the "topological" point of view), with a condition of "analytic constructibility" (\*\*), playing the role of a condition of finiteness (essential, in particular, for being able to write theorems of the Riemann-Roch type, implying "Euler-Poincaré characteristics" and suitable "Grothendieck groups"). There is the 'complex of differential operators' point of view, with holonomy and regularity conditions taking the place of constructibility conditions. And there is the " $\square$ -modules" point of view, with coherence, holonomy and regularity conditions at the end. The second 'picture' (taken from the 'analysis' angle) is seductive, because it is intelligible to us in 'classical' terms, and the objects it shows us, namely complexes of differential operators, appear to us to be of reasonable 'dimensions', while the  $\square$ -Modules, however coherent (starting with  $\square$  himself!), seem out of proportion when viewed through the ' $\mathcal{O}_X$ -Modules' goggles. Technically speaking, however, these furnish a more complete picture. Indeed, while it is 'clear' that locally, each complex of  $\square$ -Modules with coherent cohomology and bounded degrees (let's say) can be represented by a complex of differential operators via (1)/ it is unlikely that this is also the case globally, unless we make draconian assumptions about  $X$  (such as a "Stein variety" or, in the algebraic framework, a quasi-projectivity assumption) (\*).

Photo 1 has the advantage of retaining a meaning when  $X$  is no longer assumed to be smooth, but is

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(\*\*) I recall that a bundle of ( $C$ -vectorials on an analytic space  $X$  is said to be "analytically constructible", if in the vicinity of each point, it admits a composition sequence whose successive factors are of the form  $i_!(F)$ , where  $i : Y \rightarrow X$  is the inclusion of an analytic subspace  $Y = Z \setminus T$  of  $X$  (with  $T \subset Z$  two analytically closed subspaces of  $X$ ), and  $F$  a locally free  $C$ -bundle of finite type (or "local system of  $C$ -vectors") on  $Y$ .

(\*) Of course, nothing prevents us from constructing a "derived category" from the category of complexes of differential operators on  $X$  and differential morphisms between such complexes, by formally "inverting" the "quasi-isomorphisms" (defined by passing to the corresponding  $\square$ -Module complexes). We will find

any complex analytic space. On the other hand, as they stand, pictures 2 and 3 are reasonable only under the smoothness hypothesis. Admittedly, we can still define a bundle of rings  $\square_X$  without the smoothness assumption on  $X$ , and we can still find a tau-topological dictionary between complexes of differential operators (with components of locally free  $\mathcal{O}_X$ -Modules) and complexes of  $\square$ -modules (with locally free components), but  $\square_X$  (it seems) ceases to be consistent, too bad! There is probably little chance that a "good God theorem" will emerge in the singular case, on the model of the one known in the smooth case. On the other hand, it's obvious that we need pictures of the kind 2 or 3 in the singular case as well, given that picture n° 1 is *transcendental in nature*: if we were to naively model it in terms of Zariski or stellar topology for an algebraic variety, we would find "coefficients" that are far too particular to be usable (because these topologies are too coarse, compared with transcendental topology). On the other hand, photos 2 and 3, which are restricted to the 'smooth' field of vision, still make sense in 'abstract' algebraic geometry (over a zero-square body, let's say, to begin with), which is (for me) their main charm. In other words, it is essential to enlarge them in such a way that the singular varieties are included in the field of view.

Mebkhout didn't seem to mind, as he had other things to worry about. When I asked him the question, his immediate idea was as follows: suppose  $X$  is immersed in a smooth variety  $X^\sharp$ , as a closed analytic subspace. Then the category  $\underline{\text{Cons}}^*(X, C)$  can be interpreted as the full subcategory of  $\text{Cons}^*(X, C)$  formed by objects whose restriction to  $U = X^\sharp - X$  is zero (i.e. objects "supported in  $X$ "). But this can also be interpreted, by the theorem of the good Lord, in terms of photos 2 or 3, as the category of "De Rham - Mebkhout coefficients" on  $X^\sharp$  whose restriction to  $U$  is zero. It should be easy to check a priori (while remaining in the context of "De Rham coefficients

- Mebkhout", i.e. the one in photos 2, 3), that this category, with equivalence itself defined to within a single isomorphism, is independent of the chosen "lissification"  $X^\sharp$  of  $X$ . I've done lots of things like this myself, and I'm willing to believe that it works. If, on the other hand,  $X$  is not "smoothifiable", then never mind (says Mebkhout), we'll "do cohomological descent" to reconstitute a global category from these local pieces, or else introduce the "site of smoothifications" of openings of  $X$ , and work on that. There are

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(I presume) a sub-category *full of*  $\underline{\text{Cris}}^*(X)$ , but probably not the whole category, in the absence of hypotheses such as "Stein" or "projective  $X$ " (or only, quasi-projective, in the algebraic case).

But instead of a 'smoothing site' (improvised by Mebkhout for the purposes of the reply, in a conversation that remained platonic), a site that seems to me to be highly redundant, why not work with the crystalline site, which has proved its worth (even if it has been forgotten, it would seem, with a touching ensemble, by those who were my students... . ) ? And all the more so because it was quite clear to me, from 1966 when I first came up with the ideas for starting crystalline yoga, that the future 'De Rham coefficients' should be expressed precisely in crystalline terms!

This leads me to dig out of my drawer a photo that has had time to gather dust, poor thing - and yet, once I've blown on it, it looks as good as new, and in perfect sharpness, which was one of the first things I thought of when I wrote last year (before I'd even met the Burial....) the note 'My orphans' (n° 46), feeling obscurely that it was time for someone to express themselves with respect about things that deserve respect... . Incidentally, ever since Mebkhout told me about  $\mathbb{Q}$ -modules (in 1980 - God knows I wasn't 'hip' then!), I haven't been able to stop thinking of them as 'crystals' instead, and using the words ' $\square$ -Modules'.

and "crystals" (of  $\underline{\mathbb{Q}_X}$ -Modules) as synonyms, with (of course) a marked preference for the latter.

This brings me to the promised fourth photo, the 'crystalline' photo. Let us first assume that  $X$  is smooth. Giving oneself an  $\square$ -Module  $F$  on  $X$  is the same as giving oneself an  $\underline{\mathbb{Q}_X}$ -Module, with an additional structure, which can be expressed in various equivalent ways. One, the tautological one, consists in saying that we "extend" the operations of  $\underline{\mathbb{Q}_X}$  on the abelian bundle  $F$ , into an operation of the Ring  $\square_X$  (which contains  $\underline{\mathbb{Q}_X}$ ). Since  $\mathbb{Q}$  is engendered by  $\underline{\mathbb{Q}_X}$  and the additive sub-bundle of derivations, we can see that it amounts to the same thing to give ourselves on  $F$  what we call an "*integrable connection*", i.e. a law which, to each derivation  $\xi$  on an open  $U$  of  $X$ , associates a " $\xi$ -derivation"  $\square \xi$  of  $F$ , linearly in  $\xi$ , and in a way compatible with the "hook" operation of derivations (\*). We can say that this is a structure of a "differential" nature on  $F$ , of order 1.

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(\*) There must also, of course, be a compatibility condition for the restriction to an open.

(\*\*) In what follows, we can dispense with any characteristic hypothesis (within the framework of a smooth relative scheme, let us say), by replacing the formal completion of  $X \times_S X$  along the diagonal, by the formal completion "with divided powers". This also leads, for a bundle of  $\underline{\mathbb{Q}_X}$ -modules  $F$  on  $X$ , to replacing the pro-bundle  $P^\infty(F)$  of its "principal parts of infinite order" by "principal parts with divided powers".

Since we are in zero characteristic (\*\*), this structure can also be interpreted as a richer structure, a differential structure of infinite order, which I have called a "*stratification*" on  $F$  (which  $F$  then takes the name of "*stratified module*"). One way of expressing a stratification is as an "*infinitesimal descent datum of infinite order*" on  $F$  (with respect to the morphism  $X \rightarrow$  a point), or more precisely, as the datum of an isomorphism, above the formal completion of  $X \times X$  along the diagonal, between the two inverse images of  $F$  (by the two canonical projections  $\text{pr}_1$  and  $\text{pr}_2$ ), an isomorphism which extends the identity on the diagonal, and moreover satisfies a suitable "transitivity condition".

The transition from an integrable connection to an 'infinitesimal descent data' (or stratified structure) represents a new idea - and a 'trivial' one, like all the new ideas I've had the honour of discovering! However, it only takes on its full force when reinterpreted in terms of the notion of a *crystal of modules*. We show that the structure in question on  $F$  also amounts to the fact that, for any "infinitesimal neighbourhood"  $U^\square$  of an open  $U$  of  $X$ , of an *extension*  $F_{U^\square}$ , from  $F/U$  to  $U^\square$  (in short,  $F$  "grows" above the infinitesimal neighbourhoods, like a "crystal" - a crystal of modules, in this case, but there are crystals of all kinds...) - this extension behaving in the way we can guess, for the notion of restriction to an open  $V$  of  $U$ , and for morphisms between infinitesimal neighbourhoods (or "thickenings")  $U^\square$ ,  $U'^\square$  of the same  $U$  (morphisms inducing the identity on  $U$ , of course).

What is interesting from the crystalline point of view is that the objects to be studied (the  $\square$ -modules) can be interpreted as bundles of "ordinary" Modules on a suitable site (\*), ringed in *commutative local rings*, namely the "crystalline site" formed by the  $U$  thickenings $^\square$  of the  $\square$ -modules.

various open  $U$  of  $X$  (the crystalline structural bundle being simply  $U^\square \rightarrow \Gamma(U, \mathcal{O}_{R^\square})$ ). From then on, we have the whole arsenal of geometric intuitions associated with such a situ-

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(of infinite order)". On the dual side, this amounts to replacing the ring bundle  $\square_{X/S}$  of relative differential operators (which has nothing coherent about it even if  $S$  is noetherian), by the "enveloping" ring bundle of relative derivations of  $\underline{\mathcal{O}}_X$  over  $\mathcal{O}_S$  (which, according to what Mebkhout assures me, would be quite coherent!). This is, in fact, the conceptual context for De Rham coefficients, which will extend that of Mebkhout of  $\square$ -Modules, for the development in particular of a theory of De Rham coefficients for schemes of finite type over  $\mathbb{Z}$ .

(\*) Note that not *all* moduli bundles are found at the crystal site, but only those that satisfy a simple additional condition (called "special" bundles in [Crystals]).

ation. A remarkable relationship which I discovered in 1966 and which stunned me at the time was that the cohomology of the crystal site (or of the crystal topos which corresponds to it), with coefficients in the structural bundle (or more generally, with coefficients in  $F$ , at least when  $F$  is coherent on  $\underline{Q}_X$ ), is identified with the De Rham cohomology of  $X$  (with coefficients in  $F$ , in this case, i. e. the ordinary hypercohomology of  $X$  with coefficients in  $DR(F)$ ). e. the ordinary hypercohomology of  $X$  with coefficients in  $DR(F)$ ). This was the start of crystalline cohomology (\*\*).

So we have a perfect dictionary, explained at length in my 1966 lectures already quoted (\*), between four types of objects on  $X$ , or four types of structure on an  $\underline{Q}_X$ -Module :

$$\begin{array}{c}
 \text{□□□ - Modules} \\
 (\text{Cr}) \quad \begin{array}{c} x \text{ □□O - Modules with integrated} \\ \text{connection} \end{array} \\
 \text{Stratified modules (infinitesimal descent data of infinite order)} \\
 \text{□□cristaux de } \underline{Q}_X\text{-Modules.}
 \end{array}$$

This dictionary is valid without any coherence or quasicoherence restrictions on  $F$ . Note, however, that if we compare the extreme terms

$$\text{□ - Modules} \iff \underline{Q}_X \text{ crystals - Modules},$$

the natural notions of "coherence" in either context do *not correspond*. The crystalline structural bundle is coherent, but the coherent Modules on the crystalline an- nely related topos correspond exactly to □-modules which are coherent as  $\underline{Q}_X$ -modules, in which case they are even free of finite type. The category they form is canonically equivalent, by the "scalar extension" functor relating to  $C_X \rightarrow \underline{Q}_X$ , to the category of locally free bundles of  $C_X$ -modules, i.e. to that of "*local systems of (C-vectorials*" over  $X$ . So, for this kind of object, there are five possible descriptions (or five "photos", counting the four in the previous table (Cr))! But these are "coefficients" of an excessively special nature (\*\*), among those (de Rham - Mebkhout) which

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(\*\*) Here again, the start-up ideas are so 'trivial' that there's really no point in bothering with them when you've spent fifteen years of your life developing a small part of them (and forgetting the rest. . .').

(\*) See the presentation [Crystals], cited in the first footnote to this sub-note (note (\*) on page 988).

of interest to us.

Instead, let's go back to the four photos in table (Cr) above, and see what happens when we no longer assume  $X$  is smooth. The four types of object considered still make sense. On the other hand, it would seem that the first two do not form important categories - rather, that all  $\mathbb{Q}$ -Modules, and all  $\underline{\mathbb{Q}}_X$ -Modules with integrable connection, which we naturally encounter, as "having a geometrical sense", "come from" (in a The latter can still be interpreted as crystals of  $\underline{\mathbb{Q}}_X$ -Modules, just as in the smooth case (\*\*\*)).

I confess that, because I haven't really thought about it, I can't quite visualise the exact relationship yet, for  $X$  immersed in  $X^\sharp$  smooth (let's say), between crystals on  $X$  and crystals on  $X^\sharp$  (and this even when  $X$  itself is smooth) (\*). What is certain is that the crystalline site, or better still, the topos

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(\*\*) In fact, it is  $\mathbb{Q}$ -coherence, of course (which had escaped me in the sixties) that is the important notion of finitude here.

(\*\*\*) This assertion was made hastily, and is false as it stands. For it to be true, we must replace the "crystalline site", formed by all infinitesimal thickenings of openings in  $X$ , by the subsite (called the "stratifying site") formed by those which locally admit a shrinkage on  $X$  (a condition which is automatically satisfied when  $X$  is smooth). When we give ourselves a stratified module  $F$  on  $X$ , its inverse image by such a shrinkage *does not depend*, apart from a single isomorphism, on the chosen shrinkage, hence a "canonical extension" of  $F$  above the envisaged thickening.

We can therefore see that when  $X$  is not smooth, a crystalline structure on  $F$  is "richer" than a simple stratification, since it makes it possible to extend  $F$  (i.e. to "make it grow") over *any* infinitesimal neighbourhoods of openings of  $X$ , and in particular (and this is something of particular importance), over infinitesimal neighbourhoods of any order of  $X$ , immersed in a *smooth* ambient space. In fact, it turns out that the most crucial and fruitful new notion, between that of the stratified Module and that of the crystal of Modules, is the latter. It is this notion that is destined to dominate De Rham's theory of coefficients. In this connection, I would like to remind you that for a clean and smooth relative scheme  $Z$  on  $X$ , the relative De Rham cohomology of  $Z$  on  $X$  (both in the transcendental and algebraic context) is "not only" provided with a stratification, but also with a crystalline structure, making it "grow" over any infinitesimal neighbourhood.

This is a crucial mathematical *fact*, which Deligne had already forgotten before I left, in 1969, when he described coefficients of the De Rham type in terms of *stratified* procohesive Modules, instead of the stronger crystalline version, i.e. in terms of *crystals* of procohesive Modules. It has to be said that my name was less notoriously attached to the notion of stratified Modules (so natural that you'd swear it must date back to the last century), than to that of the notion of Modules crystals, which is much less 'traditional' in appearance. On this subject, see the reflections in ". . et entrave" (sub-note n° 171 (viii)).

(\*) (26 May) The situation has become considerably clearer for me with the introduction of the notion of co-ownership.

crystal, referred to in D) below.

crystalline  $X_{\text{cris}}$ , with its ring structure, depends covariantly on the analytic space  $X$ , i. e. if  $f: X \rightarrow Y$  is a morphism between analytic spaces, we deduce that

$$f_{\text{cris}}: X_{\text{cris}} \rightarrow X^{\square}_{\text{crys}}$$

hence, in particular, a "direct image" functor for bundles of Modules on these ringed topos. We would like to understand this operation (in the case of a closed immersion  $X' \rightarrow X^{\square}$ , in particular), and to understand under which condition a crystal is transformed into a crystalline. We would also like this functor to be exact in the case of a closed immersion. The idea here is

if  $F$  is an object of the derived category  $D^*(X_{\text{cris}}, O_X)$  and  $F^{\square}$  its image by the functor total derivative of  $f_{\text{cris}*}$ , and further assuming  $X^{\square}$  smooth, the condition that  $F^{\square}$  is holonomically regular *should not depend on the chosen immersion of  $X$  in a smooth space  $X^{\square}$* . If this is indeed the case, then we will define the category of De Rham - Mebkhout crystalline coefficients on

$X$  as the full sub-category (of the derived category) defined by the previous condition (obviously local to  $X$ ).

Thus, modulus of a fundamental work which should have been done twenty years ago and which ap- parement still remains to be done (concerning the fundamental operations on crystalline moduli), we can say that in the case where  $X$  is any analytic space (not necessarily smooth), there remain *two* pictures (instead of four) to describe the "De Rham coefficients" to which we have them: there is Cons\*( $X, C$ ) ne varietur, and there is the category (which for the moment remains hypothetical, and which as it stands I still find hard to see (\*)) of "De Rham - Mebkhout" coefficients  $\text{DRM}^*(X)$ , for which I have just hazarded a principle of definition. The Cons category\* ( $X, C$ ), the description of which offers no problem from the transcendental point of view, *disappears* as soon as we move on to the algebraic context. This makes it clear that we need a good definition of  $\text{DRM}^*(x)$ , which makes sense in this context. And it's also clear to me that the right 'frame' for this picture, which at first sight seems to be the only one left, is the one formed by the crystalline modules (\*\*).

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(\*) I refer below to a "fifth photo", which is much clearer for me from now on, to capture the "good" coefficients of De Rham by a purely algebraic language in crystalline terms, guaranteeing a sense without assumptions of smoothness. This photo is taken from an angle that is somewhat 'dual' to that of the De Rham-Mebkhout photo.

(\*\*) I call a "crystalline Module" on  $X$  a bundle of Modules on the crystalline ring topos  $X_{\text{cris}}$ . It is possible to

module crystals can therefore be considered as special cases of crystalline modules.

I have to admit that even in the case where  $X$  is smooth, I don't find myself in Mebkhout's description of the "de Rham" coefficients in terms of the God's functor. The latter does not respect natural multiplicative structures: it is Mebkhout's contra-functor, discussed in (b), which (it seems) is compatible with them (\*\*\*)� A fortiori, this functor does not commute "to the six operations". The intuition that attaches to Mebkhout coefficients therefore seems very different in nature, at first sight, from that which attaches to discrete coefficients. From a certain point of view, this is an advantage - we're talking about two photos taken from radically different angles! It simply makes it more difficult for someone who is used to looking from one of these angles to recognise himself in the photo taken from the other.

In fact, in addition to the four photos already reviewed (for the "De Rham coefficients", I mean), there's a *fifth* (\*) that I've been keeping in reserve: it's Deligne's, with stratified pro-modules (\*\*). It has the advantage of 'sticking' very closely to the intuition of constructible discrete bundles: an object 'of degree zero' corresponds to an object of the same type, the notions of tensor product and inverse image correspond to each other through Deligne's equivalence; so it - will be the same for all six operations.

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(\*\*\*) This "it seems" is a rather flippant way (almost like a "new style"...) of hiding a beautiful theorem, always due to the same unknown person on duty (but of a more recent vintage, I understand, than that of the good Lord). For example, for two analytically closed subspaces  $Y$  and  $Z$  of  $K$ , it implies the following formula on local cohomology, which is obviously too good to be true (and yet...):

$$R\Gamma_{Y \cap Z}^{\text{alg}}(\underline{\mathcal{O}}_X) \xrightarrow{\sim} R\Gamma_Y^{\text{alg}}(\underline{\mathcal{O}}_X) \otimes^L R\Gamma_Z^{\text{alg}}(\underline{\mathcal{O}}_X),$$

which I'm sure some handsome gentlemen will pocket one of these mornings, as if they'd always known about it - while waiting to award it to the most handsome of them all...

(\*) So I've done better than live up to the promise of the title of this note 'The Five Photos': I've actually put highlighted *two series* of five photos, the first describing only the "De Rham coefficients", and the second the crystalline coefficients in general.

(\*\*) As mentioned in a previous b. de p. note (\*\*\* on page 998, this photo of De Rham - Deligne was taken with a slightly distorted 'lens' (for reasons beyond the skill of the maker). It had to be retouched, and also enlarged, by taking it out of the null characteristic. This will be done in volume 3 of Réflexions, where my dear ex-students will be able to come and pump out all the 'useless details' and other 'technical digressions' that they haven't had the leisure to find for themselves, in the nearly twenty years since I left them to fend for themselves with a splendid subject in their hands...

(which can indeed be described in terms of these two). On the other hand, the operation of passing from the "De Rham - Deligne coefficients"  $\text{DRD}^*(X)$ , to those of De Rham - Mebkhout  $\text{DRM}^*(X)$ , seems to me in principle particularly well understood, in terms of operations (" $\underline{\mathcal{O}}_X$ -duality") on  $\underline{\mathcal{O}}_X$ -Modules (at least, initially, for smooth  $X$ ) - I have already alluded to this in a previous footnote (\*\*\*)). So here I have the impression that I'm on solid and familiar ground, which should enable me to recognise myself as soon as I get the chance. I was even thinking of outlining Deligne's point of view in this note, and making the link with Mebkhout's point of view and with the formalism outlined in my aforementioned 1966 lectures. But this sub-note is getting long, and is becoming more and more of a digression! So I prefer to refer the matter to volume 3 of Réflexions, where I also intend to give a description of the 'good' coefficients of De Rham (Deligne style, or Mebkhout, as the case may be) on finite type schemes over  $\mathbb{Z}$ .

(b) (5 May and 21 May) I would like to come back to the description of the Mebkhout functor (also known as the "good God" functor).

$$(1) \quad M : \underline{\text{Cons}}^*(X, \mathbb{C}) \xrightarrow{\sim} \underline{\text{Cris}}^*(X_{\text{coh}}), \quad (= \underset{\text{coh}}{\overset{\text{def } D^*}{\sim}} (X, \square_X)),$$

where  $X$  is a smooth complex analytic space. As we said in the note "The work . . ." (n° 171 (ii)), this is a functor of deep nature, which is defined as quasi-inverse of the restriction functor of the De Rham functor DR to the full  $\text{DRM}$  subcategory\* ( $X$ ) (of the "De Rham-Mebkhout coefficients on  $X$ ") of  $\underline{\text{Cris}}^*(X_{\text{coh}})$

$$(2) \quad m = \text{DR}|_{\text{DRM}^*(X)} : \text{DRM}^*(X) \xrightarrow{\text{def}} \underline{\text{Cris}}^*(X_{\text{hol reg}}) \xrightarrow{\sim} \underline{\text{Cons}}^*(X, \mathbb{C})$$

which turns out to be an equivalence ("good God's theorem"). In fact, Mebkhout obtains a remarkable direct description of the function  $_{M_\infty}$  deduced from the functor  $M$  by the functor  $i$  "extension of scalars" by the Ring homomorphism

$$(3) \quad \square_X \xrightarrow{\sim} \square_X^\infty$$

where  $\square_X^\infty$  (or  $\square^\infty$ ) denotes the Ring of "infinite-order differential operators on  $X$ ", i. e. (by definition) that of the  $\mathbb{C}$ -endomorphisms of the bundle  $\underline{\mathcal{O}}_X$ , seen as a bundle of spaces

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(\*\*\*) This "previous b. d e p. note" has since been transformed into part (c) of this note "The five photos".

complex topological vectors. It is known that  $\square^\infty$  is faithfully flat left and right on  $\square$ , so that the total derived functor of the Ring extension functor

$$(4) \quad i : \underline{\text{Cris}}^*(X) = D(X, \square) \rightarrow D(X, \square^\infty) \stackrel{\text{def}}{=} \underline{\text{Cris}}_\infty(X)$$

can be explained by an ordinary tensor product. Note that it is not known whether the Ring  $\square^\infty$  is coherent, but apparently we don't need it. We define the full subcategory

$$\underline{\text{Cris}}_\infty(X)_{\text{hol}} \hookrightarrow \underline{\text{Cris}}_\infty(X)$$

complexes of  $\square^\infty$ -Modules which are "holonomic", by the condition of being deduced locally (by functor  $i$ ) from a complex of  $\square$ -Modules  $C$  which is holonomic. (It will follow from the double God's theorem, recalled below, that we can then take even  $C$  to be both holonomic and regular, i. e. a "De Rham - Mebkhout coefficient", and this determines  $C$  on all  $X$  to within a single isomorphism. ... ) Consider the functor  $M_\infty = i M$ , fitting into the commutative if diagram

$$\begin{array}{ccc} & \underline{\text{Cons}}^*(X, C) & \\ M \swarrow & & \searrow M_\infty \\ \underline{\text{DRM}}^*(X) & \xrightarrow{i} & \underline{\text{Cris}}_\infty(X)_{\text{hol}} \end{array} .$$

$= \underline{\text{Cris}}^*(X)_{\text{hol rég}}$

It turns out (or rather, the unknown worker proves...) that the functor  $M_\infty$  is also an equivalence of categories (so  $i$  is too). It can also be obtained as a quasi-inverse of the  $m_\infty$  functor of the "De Rham" type analogous to  $m$ , defined on  $\underline{\text{Cris}}^*(X)_{\text{hol}}$ . To describe the functor  $M_\infty$ , it is more convenient to describe the contrafonctor

$$(6) \quad \Delta_\infty = \underset{\text{def}}{M_\infty} D = \underset{\text{D}\infty}{m_\infty} M_\infty = i(MD) = i(DM),$$

where  $D$  denotes the dualising functor already mentioned, in  $\underline{\text{Cons}}^*$  or  $\underline{\text{DRM}}^*$ , and  $\underset{\text{D}\infty}{m_\infty}$  the functor similar dualising effect that exists in  $\underline{\text{Cris}}_\infty(X)_{\text{hol}}$  (and even in  $\underline{\text{Cris}}^*\underset{\infty}{(X)}$ ). (NB The three  $\underline{\text{Cris}}^*$  functors in (5) commute to dualising functors). The quasi-inverse  $\delta_\infty$  of  $\Delta_\infty$  is therefore given by the formula analogous to (6)

$$(7) \quad \delta_\infty = \underset{\text{D}\infty}{m_\infty} \underset{\text{D}\infty}{D} = \underset{\text{m}\infty}{D} \underset{\text{D}\infty}{m}.$$

We then find the Mebkhout expression of  ${}_{\Delta_\infty, \delta_\infty}$  by the following two remarkably symmetric formulae:

$$(8) \quad \begin{aligned} {}_{\Delta_\infty}(F) &= {}_{R\text{Hom}_C}(F, \underline{\mathcal{O}}_X), \\ {}_{\delta_\infty}(F) &= {}_{R\text{Hom}_C}(F, \underline{\mathcal{O}}_X). \end{aligned}$$

Note that in the first of these formulas, the second member inherits a  $\mathbb{D}^\infty$ -structure, thanks to  $\mathbb{D}$  operations <sup>$\infty$</sup>  on the second argument  $\underline{\mathcal{O}}_X$ , whereas in the second formula, the second member is interpreted simply as a complex of  $C$ -vector bundles. The second of these formulae, put there "for the record", is moreover essentially tautological, and simply says that the functor  $\delta_\infty$  associates the complex of

$\infty$ -Modules  $\square C$  the complex of differential operators (of infinite order) "adjoint" to the one associated.

This complex is interpreted as a complex of  $C$ -vector bundles. (That we find a complex with constructible cohomology bundles in this way is equivalent to Kashiwara's constructibility theorem).

It is a deep theorem, on the other hand, that the first functor  ${}_{\Delta_\infty}$  transforms constructible bundles into (complexes of)  $\mathbb{D}^\infty$ -Modules which are holonomy. The only finiteness theorem implied by this result (\*) (without even mentioning holonomy) is already in itself

a remarkable new result. What is even more extraordinary, however, is that *the two functors are quasi-inverses of each other*. Formally, this fact resembles biduality relations, which can be expressed either in the category Cons<sup>\*</sup>, or in the category

Cris<sup>\*</sup> <sub>$\infty$</sub> ( $X$ )<sub>hol</sub> - except that the "dualizing" contrafactors (expressed in both cases as a RHom( $\cdot$ ,  $\underline{\mathcal{O}}_X$ )) link together two *different* categories. It is this formal analogy that led Mebkhout to call the theorem that affirms isomorphism

$$(9) \quad {}_{\Delta_\infty} \dashv id \quad (\text{in } \underline{\text{Cris}}^*(X)_{\text{coh}})$$

the "*biduality theorem*" for  $\mathbb{D}$ -complexes <sup>$\infty$</sup> -holonomic moduli (terminology, incidentally, that is likely to lead to confusion). This relation, plus the fact that the functor  $\delta_\infty$  is fully faithful (or more precisely, that  ${}_{\Delta_\infty}$  is an adjoint of it, something it includes in

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(\*) This finiteness result implies, for example, that locally on  $X$ , the complex  ${}_{R\text{Hom}_C}(F, \underline{\mathcal{O}}_X)$  is isomorphic (in the derived category) to a complex  $\mathbb{D}^\infty$ -Modules which is locally free of finite type in each degree, and that its Cohomology Modules arise (locally), by extension of scalars,  $\mathbb{D}$ -Coherent Modules. In fact, the latter can even be assumed to be holonomic and regular.

the statement of his biduality theorem) had been obtained by Mebkhout as early as 1977, before the complete good God theorem. The so-called "biduality theorem" thus essentially means (just like "my" biduality theorem, from which it is inspired) that a complex of  $\mathbb{D}^\infty$ -*holonomic moduli* can be *reconstituted*, as an object of a derived category, by knowledge of the associated complex of (infinite-order) differential operators, seen as simply a complex of C-vector bundles (in the appropriate derived category); and more precisely, that it can be reconstituted by the explicit inversion formula (8- (first formula)). A fortiori, a morphism between complexes of holonomic  $\mathbb{D}^\infty$ -Modules is a quasi-isomorphism if and only if the corresponding morphism for complexes of differential operators (of infinite order) is so in the naive sense (i.e. induces an isomorphism on cohomology bundles) (\*\*).

Mebkhout's biduality theorem is in a way "half" of the Good God theorem (for  $\mathbb{D}^\infty$ -Modules), when the latter is taken in its strongest form, that asserting that the functors (8) are quasi-inverses of each other. This was the central result of Mebkhout's thesis, submitted in January 1980. But this 'half' alone is already a new and (as far as I know) entirely unexpected result. It constitutes a typical result, bridging the gap between Sato's ideas and my own, but from the point of view of my long-standing programme: to formulate 'discrete coefficients' by the 'continuous' or 'differential' route (and from the point of view of derived categories). In this respect, it seems to me that the spirit and inspiration of this result totally escape the problematic of the Japanese school of analysis. Kashiwara's constructibility theorem seems to have been a sideline, and in no way the starting point for a new theory of coefficients. As the publications for the period between 1976 and 1980 show beyond any doubt, Mebkhout was the only one to develop such a philosophy.

Mebkhout had spoken about his results to Kashiwara, who was visiting Paris in January 1978, when he had just finished writing his thesis. At Kashiwara's request, the candid Mebkhout, delighted to have finally found someone who seemed interested "in what he had to say, sent him the hot off the press chapter III - the one containing, among other things, the

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(\*\*) (26 May) In fact (as I point out below, at the beginning of (c)) Mebkhout proves this last result, even outside any holonomy condition, in the equivalent form: if the complex of differential operators associated with a complex of  $\mathbb{D}^\infty$ -Modules is quasi-zero, so is the latter (and so are the  $\mathbb{D}$ -Modules).

the so-called "biduality theorem". This was in February 1978. Three years later, this same result appeared (with a pretence of demonstration) in a famous article by Kashiwara-Kawai (\*). It was renamed the 'reconstruction theorem' for the occasion, without the slightest allusion to a certain Zoghman Mebkhout. Incidentally, that was also the memorable year of the Colloque Pervers - the glorious year in which a certain 'new style' (\*\*) conquered with its own hands (and without encountering the slightest resistance. . . ), that part of mathematics, of all places, where I used to feel at home...

(c) (May 21) The "biduality theorem" (9) is from 1977. To prove the other half of the "good God theorem" for  $\mathbb{D}^\infty$ -Modules, which from then on amounted to proving that the  $\delta_\infty$ -functor is essentially surjective, a first difficulty was to prove that for  $F$  in Cons\*, and defining the complex of  $\mathbb{D}^\infty$ -Modules  $C = {}_{\Delta_\infty}(F)$  by the first formula (8), that the latter could be obtained via the functor  $i$ , at least locally on  $X$ , using a complex of  $\mathbb{D}$ -Modules (holonomic, regular). A priori, according to Mebkhout's ideas (i.e. according to the good God's double theorem, implying that the functor  $i$  in (5) is an equivalence), the latter had to be unique up to within a single quasi-isomorphism.

I have not tried to understand how Mebkhout finally managed in his thesis to construct  $\mathbb{D}$ -Module. It seems to me that the situation should be clarified, here, by using Deligne's idea of the procoherent bundle associated with a constructible  $\mathbb{C}$ -vector bundle  $F$  (\*) This idea had been developed by him in the context of *algebraic* varieties over  $X$ , but should be adaptable mutatis mutandis to the analytic case, provided perhaps that we work "locally" on  $X$ , or on each compact of  $X$ . The procoherent bundle associated with  $F$ , which is therefore (at least on each compact  $K$  of  $X$ ) a projective system  $({}_F i)$  of bundles

(\*) M. Kashiwara, T. Kawai, On holonomic Systems of micro-differential equations, III Systems with regular singularities, Publ. RIMS 17, 813-979 (1981). The "reconstruction theorem" plundered from Mebkhout can be found in par. 4 of this long work (received in November 1980). The main result of the work is a weakened variant of the fact that the functor  $i$  in (5) is a category equivalence. This is therefore an immediate corollary of Mebkhout's (geometrical) theory, a consequence which these authors obtain by analytical means (independently of Mebkhout). For further details, see the sub-note "The Mafia" at 171 (ii), part (b): "Premiers ennuis

- or the kingpins across the Pacific".

(\*\*) On the subject of this "new style" (of which Kashiwara and Hotta are eminent emulators from across the Pacific), see the note "Congratulations - or the new style" (n° 169).<sub>9</sub>

(\*) This was the idea he had developed in his seminar at the iHES in 1969-70, but then abandoned. On this subject, see the sub-note "... and hindrance" (n° 171 (viii)).

(defined in the neighbourhood of  $K$ ), can be defined very simply as the bundle that pro-represents the functor

$$G \rightarrow {}_{\text{Hom}\mathcal{C}}(F, G)$$

on the category of coherent  $\underline{\mathbb{Q}_X}$ -Modules  $G$  on  $X$  in the neighbourhood of  $K\dots$ ), which functor, being exact on the left, is well pro-representable. For example, if  $F$  is the constant bundle  $C$  over a closed analytic subspace  $Y$  of  $X$ , "extended by zero" over all  $X$ , we find the profundum formed by the  ${}_{OX}{}_n$ , where the  $x_n$  are the infinitesimal neighbourhoods of  $Y$  in  $X$ . (NB The projective limit of this projective system is the formal completion of  $\underline{\mathbb{Q}_X}$  along  $Y$ .) We see (returning to the general case) that the pro-beam  $(F_i)$  has a canonical stratification (\*\*). Deligne's idea is that the "*Deligne functor*" from the category of constructible  $C$ -vector bundles on  $X$  to the category of stratified pro-coherent bundles is *fully faithful*, and thus allows us to interpret the first category (which is transcendental in nature) in terms of a full sub-category of the category of stratified pro-coherent bundles. The latter has a purely algebraic meaning, and the full sub-category in question can also be defined (more or less tautologically (\*)), also in purely algebraic terms. This is the category I'll call

$$(10) \quad \text{DRD}^*(X) \text{ or } \text{Del}^*(X),$$

which constitutes the '*fifth photo*', which I didn't want to explain yesterday (\*\*). I seem to remember that Deligne had taken the trouble to develop his interpretation ( and the statement

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(\*\*) The notion of stratification for a pro-Module is defined in the same way as for a Module - the description given in the previous day's notes (part (a) i applies in principle whenever we have a "relative" notion (such as Modules, pro-Module, relative diagram etc) admitting a notion of inverse "image", i.e. giving rise to a "fibred category" on the category of "varieties" on which we are working. ... Note that if  $(F_i)$  is a pro-Module, its stratification cannot in general be described in terms of a "compatible" system of  $F_i$  stratification - the objects considered are of a much more general nature.

than pro-objects in the Stratified Modules category.

(\*) "Tautological" at least in terms of the already known dictionary (first worked out by Deligne) between bundles of locally constant  $C$ -vectorials (or "local systems") on the complementary  $Y-Z$  of a divisor  $Z$  in an analytic space  $Y$ , and stratified coherent modules on  $Y-Z$  which are "regular" (in Deligne's sense) along  $Z$ .

(\*\*) In the end, this explanation (described as "tautological"!) is not given here either, at least not for the following reasons

not on the spot. However, it will be given below (page 1011). Note that notation (10) refers to the "derived categories" variant.

(at a time when it had not yet been decided by my unanimous cohomology students, led by Deligne, to scrap the latter), and it is indeed the "derived category" version that I designate by the notation (10), of course.

That said, the "algebraic part" in  $R\text{Hom}_C(F, \underline{\mathcal{O}}_X)$  must be very easy to define. as an inductive limit (in the proper sense) of the  $\underline{\mathbf{R}\text{Hom}}$  in particular (passing to cohomology bundles) we describe canonical arrows

$$\varinjlim_i \underline{\mathbf{Ext}}^d_{\underline{\mathcal{O}}_X}(\underline{F}_i, \underline{\mathcal{O}}_X) \rightarrow \underline{\mathbf{Ext}}^d_{cx}(F, \underline{\mathcal{O}}_X) (\forall d \in \mathbb{Z}).$$

Using the stratification on the pro-object  $(\underline{F}_i)$  and the tautological stratification of the second argument  $\underline{\mathcal{O}}_X$ , we should be able to define on the first member of (11) a stratification i. e. a  $\square$ -Module structure, such that (11) is compatible with the homomorphism of the corresponding Rings of operators  $\square \rightarrow \square^\infty$ . Having said that, Mebkhout's Good God Theorem should be able to be made more precise, by saying that (11) identifies the second member with the

$^\infty$ -Module  $\square$  deduced from the first by extension of scalars (\*) - which implies in particular that the arrow is an *inclusion*. Thus, the left-hand member must be visualised as being a kind of "algebraic" (or "meromorphic") part in the right-hand member (which, for its part, is "transcendental" in nature).

The general situation is much clearer in the previous example, where  $F = i_*(\mathcal{C}_Y)$  where  $i : Y \rightarrow X$  is the inclusion of a closed analytic subspace of  $X$ . Then the second member of (11) is a local cohomology bundle with supports in  $Y$  - a *transcendental* invariant, while the first member

$$\varinjlim_n \underline{\mathbf{Ext}}^d_{\underline{\mathcal{O}}_X}(\underline{\mathcal{O}}_{X_n}, \underline{\mathcal{O}}_X),$$

is the well-known expression I introduced for the local cohomology in the schematic framework. The fibre of this bundle at a point  $x \in Y$  is nothing other than the local cohomology, on the spectrum  $X_x$  of  $\mathcal{O}_{X,x}$ , of the structural bundle with supports in the "trace"  $Y_x$  of  $Y$  on  $X_x$ .

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(\*) In addition, of course, the first member of (11) (in accordance with Mebkhout's philosophy) must be a  $\square$ -Coherent, holonomic and regular module.

This example shows how close Deligne's idea is to those I developed on the theme of local cohomology in the early 1960s (\*\*). However, the main theme of Mebkhout's work between 1972 and 1976 was simply to study the arrow (11) in this crucial case.

$$(12) \quad \lim_{\rightarrow n} \underline{\text{Ext}}^d(\underline{O}_{X_n}, X_n^{\text{def}}) \xrightarrow{\cong} \underline{H}^d(\underline{O}_X) \xrightarrow{\text{alg}} \underline{H}^d(\underline{O}_X)$$

It proves in this case the relation announced above, and moreover (something I had omitted too-early to include in the statement) that the first member of (12)  $\square$ -Module *consistent/* and even, holonomic and regular. From there, the analogous statement for (11) must be an immediate consequence by unscrewing (\*\*\*)�, including in the case where  $F$ , instead of being a constructible bundle of  $C$ -vectors, is a complex in  $\underline{\text{Cons}}^*(X, C)$ . The only problem, apart from the

construction in the form of the Deligne functor, is in the definition of  $\underline{\text{RHom}}_{\underline{O}_X}$  a complex of stratified promodules, with values in a complex of stratified Modules i.e. in a complex of  $\square$ -Modules (in this case,  $\underline{O}_X$ ), as a complex of  $\square$ -Modules (and as the object of a derived category).

Module ce grain de sel, on retrouve donc une description tout ce qu'il y a de simple et conceptuelle, du foncteur du bon Dieu  $M$  "algébrique" (par opposition au foncteur du bon Dieu  $M^\infty$  "transcendant"), ou plutôt du contrafoncteur associé  $\Delta$  et de son quasi-inverse  $\delta$

$$(13) \quad \Delta = M D = DM, \quad \delta = mD = Dm,$$

by a double-formula that paraphrases (8). But to write it, using Deligne's equivalence

$$(14) \quad \text{Del} : \underline{\text{Cons}}^*(X, C) \xrightarrow{\sim} \text{DRD}^*(X),$$

we will instead look at the corresponding functors  $\Delta^\wedge, \delta^\wedge$  between  $\text{DRD}^*(X)$  and  $\text{DRM}^*(X)$ , where the signs  $\wedge$  are meant to remind us that we will be working (on the "constructible" side) with *pro-objects*.

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(\*\*) It will appear below that Deligne's idea is also closely related to the one I introduced in 1966 (in [Crystals]: for any complex of differential operators, I consider its "formalised"  $p^\infty(L^\bullet)$  as a complex of stratified pro-modules or, better still, as defining a *crystalline complex*, whose (global) crystalline cohomology is identified with the (global) cohomology of  $L^\bullet$ .

(\*\*\*) (22 May) I'm being a bit brisk here! The "elementary types" of  $C$ -constructible bundles are more general in nature than just  $C_{Y^\square}$  (But it is true that the proof of the general theorem uses the same technique as the 1976 special case).

We then find the remarkable formulae (morally contained in (8), but this time linking coefficients that are both "algebraic in nature", and this by formulae that are also "algebraic in nature"):

$$(15) \quad \begin{aligned} \square\hat{\Lambda}(C^\square) &= {}_{R\text{Hom}_0}^{\wedge} {}_x(C^\square, \underline{0}_X) \\ \square\delta(C) &= {}_{R\text{Hom}_{\underline{0}_X}}(C, \underline{0}_X). \end{aligned}$$

So here we have twice the "same" formula, with the only difference that  $C^\square$  is here a complex of stratified pro-coherent bundles (or what amounts to the same thing (\*)), a complex of pro-coherent Module crystals), whereas  $C$  is a complex of  $S$ -Modules (which we can see, morally, as a complex of stratified ind-coherent  $\underline{0}_X$ -Modules, or again, as a crystal of ind-coherent Modules). It's essentially the "same" functor that passes from one to the other, namely, the "ordinary dualising functor" (coherent), my old friend from the fifties... It is "obvious", of course, that this functor must exchange pro-objects and ind-objects (even if it means going to the inductive limit in the latter...).

Of course, there is a lot of groundwork to be done to give these formulas a precise meaning.

- work of the type done by Deligne in his famous scuttled seminar, or by Jouanolou in his famous thesis, also scuttled (which everyone quotes, since the Col-loque Pervers, and which no one has held in his hands...). This work, I'm sure, will be a little long, but essentially 'sorital'. The 'hard' part is contained in Mebkhout's theorem of the good God, completed by Mebkhout's formulae (8) known (improperly perhaps) as 'biduality' formulae. Their algebraic translation by con-tre, asserting that the two functors (15) are quasi-inverses of each other, is indeed (morally) "the" ordinary biduality theorem for  $\underline{0}_X$ -coherent coefficients, put in the ind-pro sauce and with stratifications at the end (which must "pass" without problems in the dualising functor).

The correspondence between the two types of dual objects can be visualised perfectly (without any work on the foundations!) in terms of complexes of differential operators. (In this duality, moreover, the condition of holonomy (and a fortiori, that of regularity) does not apply.

plays no role). At such a complex  $L^\bullet$ , the functor  $F \mapsto \underline{\text{Hom}}_{\underline{0}_X}(F, \square_d)$  (contravariant) envisaged yesterday (in (a),(1)), associates a complex of  $\square$ -Modules with locally free components

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(\*) See the b. de p. note (\*\*\*) on page 1006, concerning this translation.

of finite type, i.e.  $C$ . On the other hand, the "formalisation" of this complex  $L^\bullet$ , passing to the principal par-ties of infinite order  $P^\infty(L^i)$  (regarded as stratified promodules) provides a complex  $C^\square = P^\infty(L^\bullet)$  of stratified pro-modules. Having said that, we can see that these two complexes correspond to each other by the formulae (15), in which here, obviously, the RHom reduces to Hom. (It suffices to check this duality term by term for the components  $L^i$ , and it then reduces to the more or less tautological fact that the "continuous" linear homomorphisms  $P^\infty(L^i) \rightarrow \underline{Q}_X$  correspond exactly, just like the linear homomorphisms  $L^i \rightarrow \square$ , to the differential operators  $L^i \rightarrow \underline{Q}_X$ , using respectively the "universal" (of infinite order) dif-ferential operator  $L^i \rightarrow P^\infty(L^i)$ , and the "augmentation"  $\square \rightarrow \underline{Q}_X$ , given by  $\square \rightarrow \square(1)$ ). Since at least locally on  $X$ , any object of  $\underline{\text{Cris}}^*(X)$  (i.e. any complex of  $\square$ -Modules with coherent cohomology) is described using a complex of differential operators  $L^\bullet$ , we can consider that, for all practical purposes, this particular case gives a perfect grip on the duality (15) between the two types of coefficients, provided we make suitable  $\square$ -coherence and " $\square$ -pro-coherence" assumptions on  $C$  and on  $C^\square$ , "dual" to each other. It would then suffice to develop the "sorite" to which I alluded, restricting ourselves, on the  $C^\square$  or "pro" side, to complexes of stratified procoherent bundles which, lo-cally, can be described (with near-isomorphism) as a  $P^\infty(L^\bullet)$ .

Compared with Deligne's original approach, the fact that the pro-coherent and complex Modules of such as he introduces, can be realised locally by a complex of differential operators, is moreover an *entirely unexpected phenomenon*, brought about by Mebkhout's theory. It seems to me to be essentially equivalent (\*) to Mebkhout's theorem mentioned above (dating from 1976, before the proof of the theorem of the good God), concerning the  $\square$ -coherence of Hbeams<sup>d</sup>  $(\underline{Q}_X)_{\text{alg}}$  (which appear in (12) above). This is This is a profound theorem, the result of four years' work, using all the strength of Hironaka's resolution of singularities (not to mention the courage of the worker who worked it out and proved it, against general indifference). The consequence (\*) that I have just pointed out is a profound relationship between De Rham coefficients (as I saw them from 1966 onwards) and complexes of differential operators, a relationship that I had not previously foreseen (nor had Deligne, when he developed his first approach to De Rham coefficients). As for the condition of holonomy and regularity on the complex

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(\*) (26 May) Here again, I am "a bit lively", the 1976 result is not enough. Compare with the commentary on the b. de p. note (\*\*\*) on page 1008.

of differential operators under consideration, it must be equivalent (a posteriori, thanks to the providential theorem of the good Lord) to Deligne's "finiteness" (plus "regularity") condition (which I omitted to explain earlier, by introducing the DRD category\*  $(X) = \text{Del}^*(X)$ ). It is as follows: the cohomology pro-beams of  $P^\infty(L^\bullet)$  are "unbundled" locally by composition sequences, in such a way that the successive factors can be described (via the Deligne functor) by local systems of C-vectorials on  $Y - Z$  subspaces of  $X$  (where  $Z \subset Y \subset X$  are closed analytic subspaces of  $X$ ). To complete the "algebraic" aspect of this criterion, it suffices to replace the local system of C-vectorials by a stratified *coherent* bundle on  $Y - Z$  subject to the condition that the connection expressing the stratification (NB we can assume  $Y - Z$  to be smooth) is "regular" in the neighbourhood of  $Z$ , in the sense of Deligne (\*\*). (NB. The associated pro-beam is obtained by growing the crystal we have on  $Y - Z = T$  above the infinitesimal neighbourhoods of  $T$ , and by "squashing" along  $Z$ , to have coherent beams everywhere, not only in the complementary of  $Z\dots$ )

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(\*\*) This condition of regularity is introduced here in a natural way, taking into account the equivalence of categories identified by Deligne, between local systems of t-vectorials on  $Y-Z$ , and fibres with integrable connection on  $Y-z$ , provided with a "meromorphic structure" along  $Z$ , and with regular connection along  $Z$ . This meromorphic structure (implying the possibility of extending the coherent Module on  $Y-Z$  into a coherent Module on  $Y$ , at least locally in the vicinity of each point of  $Z$ ) was implied in the description given earlier.

Unless I'm mistaken, when we drop the regularity condition in the previous condition (by simply supposing a meromorphic structure of  $E$  in the neighbourhood of  $Z$ , so that we can associate a pro-coherent Module to it over  $X$  as a whole, by Deligne's procedure), we find a "cohomological" description of the holonomy condition. Sato's definition is "microlocal" - I've never really read it before, I must admit...

(d) When  $X$  is no longer assumed to be smooth, what remains to describe the "De Rham coefficients" on  $X$ , in addition to the transcendental "photo" Cons<sup>\*</sup> ( $X$ ,  $C$ ), are the two "photos" (both of a crystalline nature)  $\text{DRM}^*(X)$  or  $\text{Del}^*(X)$ , which have a purely algebraic meaning. I sketched out yesterday (in a principle of definition for  $\text{DRM}^*(X)$ ) and today even the DRD category<sup>\*</sup> ( $X$ ). It is the latter that is now perfectly intelligible to me. As I pointed out yesterday (see (a), b. de p. note (\*\*\*) page 998), the point of view of stratified pro-Modules needs to be refined by that of crystals in (pro-coherent) pro-Modules (\*). The only remaining problem with this point of view is the "pro" sorite that will have to be developed, a sorite which (in my modest experience in such matters) is likely to grow to prohibitive dimensions! These promodule crystals, which associate, with each infinitesimal thickening  $U^\square$  of an open  $U$  of  $X$ , a pro-coherent Module on  $U^\square$ , "in a way compatible with inverse images" for morphisms  $U^{\square\#} \rightarrow U^\square$  of thickenings, cannot even be interpreted as pro-beams on the crystalline site (or what amounts to the same thing, on the crystalline topos  $X_{\text{cris}}$ )! So we cannot a priori apply to them the cohomological formalism known from bundles of Modules on (commutatively) ringed topos, such as  $X_{\text{cris}}$ .

There is a great temptation here to go to the projective limit of the prof-ive beam on each thickening. In this way we find crystalline Modules (if not crystals in Modules), whose "value" on each  $U^\square$  is neither coherent nor quasi-coherent. The hope is that, at least for the type of pro-Module crystals we are interested in (notably those obtained by the Deligne functor), such a pro-Module crystal can be *reconstructed* from the crystalline Modulus  $C$  deduced by passing to the limit, by taking on each thickening  $U^\square$  the "pro-coherent envelope" of the Zariskian bundle  ${}_C U^\square$  (restriction of  $C$  to Zariskian openings of  $U^\square$ ) (\*) This seems to me to be the case, at least for crystals of pro-modules associated with a coherent Module stratified on a  $Y - Z$  as above, for example in the standard case where we take the formal completion of  ${}_{OX}$  along  $Y - Z$  and extend it by zero elsewhere (and so on the thickenings). If my "hope" is justified, then

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(\*) (27 May) On reflection, I even find it hard to believe that Deligne's theorem Cons<sup>\*</sup> ( $X$ ,  $C$ ) 'Del<sup>\*</sup> ( $X$ ) is true for non-smooth  $X$ , when  $\text{Del}^*(X)$  is defined as Deligne does without recourse to the crystalline site. It was perhaps because he realised this that he finally preferred to scuttle the whole theory, rather than agree to reintroduce the taboo site... (Compare with the note "... and hindrance", n° 171 (viii)).

(\*) In speaking here of a 'Zariskian' beam (as opposed to a 'crystalline' one), I have surreptitiously slipped into the schematic context. Readers who prefer the analytical context will have corrected themselves.

the DRD category\* ( $X$ ) of De Rham - Deligne coefficients on  $X$  could be interpreted as follows

as a full subcategory of the ordinary derived category  $D^*(X_{\text{cris}}, \mathcal{O}_X)$ , defined by conditions of the 'finitude' and 'regularity' type (themselves described in terms of unscrewing, as above) on cohomology bundles. This would be a disconcertingly simple description, which I could just as easily have given as early as 1966, if I had then had the leisure to continue my crystalline reflection. ...

This "fundamental" question (whether it is permissible to go to the limit) obviously does not depend on whether  $X$  is smooth or not - if it is not, we plunge it into a smooth  $X^\square$  and reduce ourselves to the smooth case. If this point of view (which is almost too good to be true!) did indeed work, then (in the smooth case now) there would (I think) be grounds for interpreting

biduality" formulas (algebraic version) (15) as  $\underline{\text{RHom}}_{\mathcal{O}_X}$  *ordinary*, without getting bogged down in pro-questions (but simply taking care to transport the stratifications. . . ). A first test in this sense would be the following: if  $u : C_1 \rightarrow C_2$  is a morphism of complexes of  $\square$ -Modules with coherent cohomology, such that its image by the

naive dualizing functor  $\underline{\text{RHom}}_{\mathcal{O}_X}(-, \mathcal{O}_X)$  is a quasi-isomorphism, is the same true for  $u$ ? But this amounts (by a mapping-cylinder argument) to asking whether a complex of  $\square$ -Modules with coherent cohomology, such that its "naive dual" is zero (in the sense of derivative cat., i.e. with zero cohomology bundles), is itself zero (in the same sense). Or again, if we have a complex of differential operators  $L^*$ , is it the same to say that the associated complex of  $\square$ -Modules has zero cohomology bundles, or that this is the case for the "formalised" complex  $P^\infty(L^\bullet)$ , this time seen not as a complex of pro-bundles, but as a complex of coherent bundles?

as a complex of ordinary beams (passing to  $\lim_{\leftarrow}$ ). Mebkhout will surely be able to tell me...

(23 May) I phoned Mebkhout again last night - I've been phoning him almost every night for a week or two now, for mathematical or historical questions - and all in all, it's going to be an astronomical phone bill! But the Apotheosis, which I've been working on and polishing up for the last three weeks, is well worth it. ...

In any case, Zoghman has guaranteed me a result that seems close to the 'question

test" on which I finished last night: if  $C$  in  $\underline{\text{Cris}}^*$ , is such that the complex  
of operators  $L^\bullet = \text{DR}(C)$  is quasi-zero, then  $C$  is itself quasi-zero (analytical case). We have a  
homomorphism of bundle complexes (of  $C$ -vectors), given by

"main parts of infinite order

$$L^\bullet \rightarrow P^\infty(L^\bullet),$$

hence homomorphisms

$$(16) \quad \underline{H}^i(L^\bullet) \rightarrow \underline{H}^i(P^\infty(L^\bullet)) \quad (i \in \mathbb{Z})$$

on cohomology bundles. We would like to say that this homomorphism (16) is always injective, and identifies the first member with the sub-bundle of "horizontal" sections of the second (which would be a sort of exactness property of the functor "bundle of horizontal sections" on a suitable category of stratified pro-Modules...). Injectivity would already imply that if the second member is zero, so is the first, so if this is true for all  $i$  (and according to what Mebkhout assures me) the complex of  $\square$ -Modules associated with  $L^\bullet$  is quasi-zero - which is what I wanted.

Injectivity in (16) also means that for a differential operator  $E \xrightarrow{-d} F$ , and a section  $f$  of  $F$  which at each point  $x \in X$  is "formally" in the image (by passing to the completed local ring of the point), and such moreover that the "formal solution" (of the equation  $d(g) = f$  in  $g$ ) can be taken, for  $x$  variable, analytically dependent on  $x$  - the equation then locally admits a solution. Mebkhout tells me that he is not aware of any such result; yet the question is so natural that the answer should be well known.  
!

To finish with the "five pictures", I would like to return here to the two "crystalline pictures", one corresponding to Mebkhout's point of view of the  $\square$ -Modules, the other to the dual point of view. It goes without saying that we must work in the spirit of the derived categories

- so any "crystalline" interpretation worthy of the name must take this into account. So the two crystalline photos are only "fully faithful" if the corresponding functor, from the category  $D^b_{coh}(X, \square)$  (say), to a crystalline idiosyncratic category, such that  $D^b(X_{\text{cris}}, \mathcal{O}_X)$ , is itself fully faithful. I am hopeful that this is indeed the case *without even bothering with holonomy and regularity conditions* on the  $\square$ -Module complexes under consideration.

The simplest case is undoubtedly that of photo n° 4, which consists in interpreting the category of  $\square$ -Modules as that of crystals of Modules, hence a total derived functor (known as "Grothendieck's" - to take the lead over lovers of "useless details" and of

"technical digressions" ...):

$$(17) \quad G : D_{coh}^b(X, \square) \rightarrow D^b(X_{cris}, {}_{O_X})._{crie}$$

The crucial question here is whether this functor is fully faithful. Only then the notation  $\underline{\text{Cris}}^*(X_{coh})$  for the first member is fully justified - and by the same token The crystalline point of view in De Rham cohomology (at least, in this case, in the complex analytic framework, or the framework of algebraic schemes over a zero-square body). To prove full fidelity, in algebraic geometry let us say, we are reduced by standard arguments to the case where  $X$  is affine (or, in the analytic case, to the case of a polydisc), and to the case where the two objects  $C, C^\sharp$  considered in the first member (whose Hom are to be compared in either direction) are both equal to  $\square$  itself, with simply a shift of degrees. (This reduction is straightforward, at least assuming  $C, C^\sharp$  to bounded degrees, i.e. by restricting ourselves to  $D_{coh}^b(X, \square)$ , which seems to be quite sufficient for the

applications.) We are therefore led to finally verify the formulas

$$(18) \quad \Gamma(X, \square_X) \xrightarrow{\sim} \text{Hom}(G(\square), G(\square)), \quad \text{Ext}_{\underline{O}_{X_{cris}}}^i(X_{cris}; G(\square), G(\square)) = 0 \quad \text{for } i > 0.$$

(for affine  $X$ , resp. Stein). I have not taken the time to check this (\*), but I have little doubt that it is true. I demonstrated something very similar, it seems to me, in [Crystals] (in 1966) (\*\*).

As for photo five, there are several different prints. Deligne's original print is in terms of stratified pro-coherent modules. The first major change, with a view to generalising to the non-smooth  $X$  case, is to interpret the animals in question as pro-module *crystals*. But that's where we get into the (rather unpleasant!) spiral.

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(\*) I apologise, as most of my time over the last year or so has been taken up following the exploits of some of my former pupils.... .

(\*\*) This is the result to which I have already alluded, that for a complex of differential operators  $L^\bullet$  on a smooth relative scheme (or in the analytic framework, surely), the "Zariskian" hypercohomology of  $L^\bullet$  is identified with the crystalline hypercohomology of its formalised  $P^\infty(L^\bullet)$ . In fact, this statement concerns more directly the "dual" arrow (19) of (17), and can also be expressed by saying that for  $C, C^\sharp$  complexes of  $\square$ -Modules with coherent cohomology, the arrow

$$\text{Hom}(C, C^\sharp) \rightarrow \text{Hom}(G^\circ(C), G^\circ(C^\sharp))$$

is bijective, in the case where  $C = {}_{O_X}$  (which is not bad at all and gives us every reason to hope. . . ).

interminable pro-foundations of pro-cohomological algebra - and we lose the benefit of direct topossic intuition, attached to  $X_{\text{cris}}$ . So I prefer (if at all possible) to take another photo, from more or less the same angle, using a *contravariant* functor (also known as a 'Grothendieck functor').

$$(19) \quad G^\circ : D_{\text{coh}}^*(X, \square)^{\text{opp}} \rightarrow D^*(X_{\text{cris}}, \underline{Q}_{X_{\text{cris}}}).$$

We can say that it is the one deduced from the Deligne photo by passing abruptly to the projective limit bundles on each infinitesimal thickening. of an open  $U$  of  $X$ . If  $C$  in the first member is associated (in a countervariant way, as in formula (1) of (a)) to a complex of differential operators  $L^\bullet$ , its image by (19) is obtained by looking at  $P^\infty(L^\bullet)$  (the "formalisation" of the complex  $L^\bullet$ ) as. a complex of stratified promodules (an idea introduced in [Crystal]), or as a complex of crystals of pro-Modules, and passing to the projective limit on any thickening. Another way of saying this is that any locally free  $\mathcal{O}_X$ -Module (for example)  $L$  on  $X$ , is associated with a crystalline module (which is *not* a crystal of modules, unless I am mistaken), which I denote  $P^\infty(L)_{\text{cris}}$ , in an "obvious" way of course (and which my students have long since forgotten), which module depends functorially on  $L$  with respect to differential operators, and thus passes to complexes of differential operators.

Either of the previous descriptions of the functor (19) remains incomplete, in particular because an object of the first member does not necessarily come from a complex of differential operators on all  $X$ . I assume that an intrinsic interpretation of this heuristic description can be given by the formula

$$(20) \quad G^\circ(C) \xrightarrow{\sim} \underline{\text{RHom}}_{\underline{Q}_{X_{\text{cris}}}}(G(C), \underline{Q}_{X_{\text{cris}}}) \quad (\text{where } G \text{ defined in (17)}),$$

but I have not checked that it is correct. By the standard arguments, we are again reduced here (to prove that the natural arrow (20), when  $C$  is associated as above with  $L^\bullet$ , is indeed an iso) to the case where  $C = \square$ , and then (20) reduces to the formulae

$$(21) \quad \underline{\text{Ext}}_{\mathcal{O}_{X_{\text{cris}}}^i}(G(\square), \underline{Q}_{X_{\text{cris}}}) = 0 \quad \text{for} \quad i > 0,$$

which look a lot like (18).

The meaning of the full fidelity of (19) is, in any case, quite clear, and once again reduces, by unscrewing (and as for (17)) to the case where  $C = \square$ ,  $C^\sharp = \square[i]$  (shift of degrees by  $i$ ), and is

is then reduced to the formulas

$$(22) \quad \Gamma(X, \square) \cong \text{Hom}(\#, \#), \quad \text{Ext}_{\underline{\mathcal{O}}_{X_{\text{cris}}}}^i(X_{\text{cris}}, \#) = 0 \quad \text{for } i > 0,$$

so we put

$$\# = P^\infty \underline{\mathcal{L}}_{OX})_{\text{cris}},$$

which is a remarkable Crystalline Algebra on  $X$ . It is assumed here (for the nullity of crystalline  $\text{Ext}^i$ ) that  $X$  is affine (resp. Stein).

Finally, what seemed to me only yesterday to be 'almost too good to be true', when I was still seeing things through Deligne's photo, suddenly looks quite reasonable - once things are written without any conditions of holonomy (and even less, of regularity). God willing, and if no one else does the job for me first, I hope to get to the bottom of this (and the validity of (21) and (18)) before the end of the year, with the part of volume 3 of Reflections that will be devoted to De Rham's coefficients.

As I said, I prefer photo five, the one that 'sticks' most closely to the topological intuition associated with discrete coefficients. It would be with a heavy heart that I would learn that the formulae (22) are false (whereas I would be less annoyed if this were the case for the formulae (18), which, however, seem technically less visible). This would show that we'd have to go back to the pro-point of view (of Deligne's retouched photo) - not a very cheerful perspective! In any case, there's no doubt in my mind that, technical adjustments aside, this is an excellent photo, valid in particular for algebraic geometry (and even for anything other than bodies of zero characteristic), and without any *lis site* hypothesis.

As for photo four, whose fidelity is conditional on the validity of (18), I confess again that I still "don't see it well" outside the smooth case (and even in the smooth case), and am not sure that for  $X$  not smooth, the crystalline interpretation I proposed does indeed work as is. It seems to me, however, that my endemic perplexities of variance, concerning the Mebkhout point of view of  $\mathbb{Q}$ -Modules (and above all, my crystalline interpretation of this point of view), are about to be resolved, by the introduction of a notion dual to that of crystal, which I call *co-crystal*. It was only yesterday that this diffuse feeling of unease that there was (for the "variance" of  $\mathbb{Q}$ -Modules by closed immersions) finally gave birth to a "good notion" (to what seems to me, without having

nothing really written yet). It seems to fit on the "ind" side, as well as the notion of crystal (which I'm familiar with) on the "pro" side. On a smooth variety, the two categories (crystals and co-crystals) are canonically equivalent (and that's why I inevitably tended to confuse them - it's excusable...), but it's no longer the same for any  $X$ . The situation is quite analogous to what happens with the cohomology ring  $H^*(X)$  and the cohomology group  $H_*(X)$ , or the Chow ring  $Ch^*(X)$  and the Chow group  $Ch_*(X)$ , or the Grothendieck ring (I apologise for the oddity...)  $K^*(X)$  and the Grothendieck group  $K_*(X)$  (re-excuses) For a long time the two types of object were also confused when  $X$  is a smooth (topological, or algebraic etc - depending on the case) variety. This is 'explained' after the fact, by the fact that the second term is in any case provided with a moduli structure on the first (the 'cap'-product - in the last two cases this was introduced by an ancestor I dare not name here. . . ), and that in the smooth case, we find that this Module is free of rank 1 and has a canonical basis, which has led to it being confused with the ring (much more beautiful, of course). Well, it's the same for the categories  $\underline{\text{Cris}}^*(X)$  of crystals of Modules on  $X$ , which is given a "ring" structure by the tensor product, and  $\underline{\text{Cris}}_*(X)$  of co-crystals of Modules, on which the former "operates" by a capproduct, perfectly!

But it's time to stop this long mathematical digression, entirely out of place (I admit) in the order of a fine Funeral Ceremony. Readers interested in the rest (which is, of course, rather lengthy) will be reduced to buying volume 3 of Réflexions (if they don't feel sorry for their money), where an unrepentant defunct intends to continue his confusing 'technical digressions' (\*).

(e) (27 May) A 'final' footnote, added to the 'Five Photos' at the last minute yesterday (before I typed the first twelve notes of the Apotheosis), has again taken on 'prohibitive dimensions', and I'm finally going to continue 'this long mathematical digression' with a final (and short) section. So 'The Five Photos' will consist of the *five* sections (a) to (e) - just as everything gets rounded off and perfected. ....

This is a commentary on the real (presumed) domain of validity of Mebkhout's 'theorem of the good God', which goes far beyond (in my opinion) the initial framework of spaces.

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(\*) This time, needless to say, as a 'collaborator' of another of my students, who has long since been promoted to 'father' of crystals.... .

This is not only because of the new *philosophy* it brings (which has already renewed the cohomological theme), but also in a technical sense.

Once the constructible C-vector bundles on (smooth)  $X$  are interpreted either in terms of stratified procoherent Modules (à la Deligne), or (by passing to the projective limit on infinitesimal thickenings of openings of  $X$ ) in terms of crystalline bundles (à la Grothendieck), the "theorem of the good God" alias Mebkhout affirms the equivalence of two categories which, this time, are *both of* a "purely algebraic" nature. In other words, this theorem now takes on a precise meaning, in contexts other than the complex analytic context: both the context of smooth schemes over a body (which need not even be assumed to have zero characteristic - see, on this subject, the note by b. de p. (\*\*\*) page 996 above; because  $p > 0$  the "crystalline with divided powers" point of view is essential here), or rigid-analytic varieties of any characteristic, or smooth schemes of finite type over  $\mathbb{Z}$  (and so on. . . ).

The "formal" part of the Good God Theorem concerns all complexes of coherent  $\mathbb{Q}$ -Modules, not just those that are holonomic, and says that the Good God functor, revisited and corrected by the ancestor (i.e. the duality with respect to the structural beam  $\omega_X$ , essentially) is *fully faithful* to the category  ${}_{\mathrm{Dcoh}}(X, \square_X) = \underline{\mathrm{Cris}}^*_{\mathrm{coh}}(X)$ , to the category  $\mathrm{coeff}$  de coefficients envisagée  $\underline{\mathrm{Coeff}}^*$ , prise au choix du goût de l'intéressé). When you get it right, it should be more or less 'sorital'.

But in the arrival category, we define, "by unscrewing", two remarkable full subcategories, that of "holonomic coefficients" resp. that of "regular holonomic coefficients" (as at the end of (c)), and in the p. b. note (\*\*) on page 1011). Having said that, the "generalised Mebkhout theorem" (in the context envisaged), which will certainly have nothing sorital about it but is certainly profound, will say two things:

1. The  $\underline{\mathrm{Coeff}}^*$  category of holonomic "coefficients" is in the image of the category  $\underline{\mathrm{Cris}}^*_{\mathrm{coh}}(X)$  by the (fully faithful) "MebkhoutGrothendieck" functor. (NB. Morally, this functor is the Mebkhout functor, but viewed on  $\underline{\mathrm{Cris}}^*_{\mathrm{coh}}(X)$  in its entirety, and moreover "revised and corrected by the care of the ancestor", so that the goal is in  $\underline{\mathrm{Coeff}}^*$  which has a purely algebraic meaning...).

2. Characterise the inverse image of  $\underline{\text{Coeff}}^*_{\text{hol}}$  and  $\underline{\text{Coeff}}^*_{\text{hol reg}}$  by conditions 'holonomy' and 'regularity', in terms of complexes of differential operators.

As far as this last point is concerned (which, for my programme of the 1960s, is perhaps only incidental), we have a ready-made holonomy condition in the null characteristic. As for the regularity condition, it's time to see if the Japanese have the right notion up their sleeves - but Mebkhout won't tell me, because he's seen too much to want to hear about it.

As for me, who hasn't seen any like him, it seems to me that there are *three* different *aspects* to regularity, which complement each other:

- 1° ) The "geometric" aspect identified by Deligne by unscrewing the  $\underline{\text{Coeff}}^*_{\text{hol}}$ , reducing it to the regularity condition for a "local system" (e.g. a fibre with an integrable connection) in the vicinity of a singular divisor.
- 2° ) "Microlocal" or "Japanese" aspect, expressed directly in terms of complexes of differential operators (?)
- 3° ) The "cohomological" aspect introduced by Mebkhout, an aspect which for the moment is well understood (it seems to me) only in the complex analytic case I have no idea whether it has any chance of being generalised to the rigidanalytic case.

Aspect 3° ) will of course be crucial whenever we need to establish a *comparison theorem* between "Zariskian" cohomology and "rigid" cohomology, for an algebraic variety defined over a complete value field, with holonomic coefficients.

For my great 'variance programme' of the sixties, it is of course the 'geometric' aspect that is the most important of all. The important thing is to define a formalism of the six operations for the  $\underline{\text{Coeff}}_{\text{hol reg}}$ . If we can even find one for the  $\underline{\text{Coeff}}_{\text{hol}}$ , as Mebkhout seems to believe, so much the better. But (if I'm not mistaken) the motives (which I have before anything else) will only give rise to coefficients that are both holonomic and regular.

I'd like to come back to question 1, which obviously includes a "question l'" (more modest), with  $\underline{\text{Coeff}}^*_{\text{hol}}$  replaced by  $\underline{\text{Coeff}}^*_{\text{hol reg}}$ . Once the full fidelity of the func- of Mebkhout-Grothendieck, we are obviously reduced to the following: we are

gives, on a smooth (not necessarily closed) subvariety  $Y$  of  $X$ , an integrable connected fibre (or a  $C$ -coherent  $F$ -crystal, depending on the context chosen. . . ), with if necessary an additional Deligne regularity condition for it (at the points of  $\bar{Y} - Y$ ). Deligne's procedure (possibly revised by the ancestor to move on to the crystalline context) allows us to associate a Coeff object\* (which by definition will even be "holonomic", or even "regular holonomic"). Is this object in the image of the Mebkhout-Grothendieck functor? Or, which amounts to the same thing, can the Coeff object in question\* be described locally on  $X$  by a complex of differential operators on  $X$ , using the ancestor's patented process of 'formalising' the said complex, interpreted either as a Deligne complex or as a crystalline complex?

The answer to this question is in any case affirmative (unless I am mistaken) in the complex analytic case, as well as in the case of smooth relative schemes over a body of zero characteristic, without even having to introduce the regularity condition. This is the "particularly unexpected phenomenon brought about by Mebkhout's theory" that I was careful to point out earlier (in (c), page 1011) (\*). In the regular case (including "at infinity"), it is essentially the good Lord's theorem. In the general case, if I'm not mistaken, this must result without tears from what I have called the "cohomological criterion of holonomy" (or "re-ciprocal: to Kashiwara's constructibility theorem"), due to Mebkhout, which is discussed in the following note "Three milestones - or innocence" (n° 171 x), see page 1028).

(<sup>171(x)</sup>) (5 May and 23 May) (\*) The philosophy that Mebkhout developed between 1972 and 1980 can be summed up in *three major theorems*, all three intimately linked to ideas that I had developed in the fifties and sixties, but which I (and no one else) had been able to understand.

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(\*) Stressing such facts has nowadays become, at least in the part of mathematics we are dealing with here, a veritable *work of public health*, at a time when almost all publications on the subject of cohomology, and all (I'm afraid) of those appearing under names that are now prestigious, are written in such a way as to *obscure* the main ideas that give life to all these texts, and to *blur* or *eradicate* the role and origin of some crucial tool (old or new), some neuralgic notion, some fertile idea. There is an intellectual *corruption* (a sign of a deeper corruption...) that is spreading across our science these days, in plain sight, that I have never seen in any other science at any other time in history.

(\*) This sub-note "The three milestones" is taken from a footnote to the note The work. . . "(n° 171 (ii)). See the cross-reference at the end of this note.

allow none (\*\*).

The first major theorem is the main result of Mebkhout's work between 1972 and 1976. It concerns H<sub>local cohomology</sub> beams<sup>i</sup> ( $\underline{O}_X$        $Y$       ) (a concept introduced independently Sato and myself) of the structural bundle of a smooth complex analytic variety  $X$ , with supports in a closed analytic subspace  $Y$ . The essential observation here, which nobody had thought of making before Mebkhout, is that the operations of the ring  $\mathbb{D}^\infty$  are infinite-order differential operators on  $X$  (\*\*\*)<sup>1</sup>, because they operate on the argument  $\underline{O}_X$ , also operate on these cohomology bundles. On the other hand, in the 'Zariskian' framework of the algebraic geometry, I had described these bundles (towards the end of the 1950s?) as inductive limits of Ext bundles<sup>i</sup>. This led Mebkhout, by analogy, to introduce an 'algebraic part' of the local cohomology, and a canonical arrow

$$(1) \quad \underline{H}^i(\underline{O}) \xrightarrow{\text{def}} \lim_{\substack{\longrightarrow \\ n}} \text{Ext}^i(\underline{O}, \underline{O}) \rightarrow \underline{H}^i(\underline{O}) \xrightarrow{\text{def Ext}^i} (\mathbf{C}_{Y_X}, \underline{O}),$$

(\*\*\*) As I pointed out in the note "Les questions saugrenues" (n° 171(vi)), however, I had long been aware of a variant of Mebkhout's global duality theorem, for a clean and smooth relative scheme  $X/S$ , in terms of complexes of relative differential operators. Specifically, if  $L^\bullet$  and  $L^{\bullet\dagger}$  are such complexes, "adjoint" to each other, then  $Rf_*(L^\bullet)$  and  $Rf_*(L^{\bullet\dagger})$ , as objects of the derived category  $D(S, \underline{O}_S)$  are "perfect" complexes (locally representable by complexes of free Modules of finite type with bounded degrees), and dual to each other in the usual sense for perfect complexes. In the case where  $S = \text{Spec}(\mathbf{C})$ , this theorem is more or less equivalent to that of Mebkhout (restricted to the case of an analytic variety which is algebraic and proper), with this important difference however that I lacked a "derived categories" point of view, to deal with complexes of differential operators. On the other hand, and above all, I had no ; suspicion that these complexes (subject to suitable conditions identified by Mebkhout) form a perfect substitute for 'discrete coefficients' (or De Rham coefficients). It was clear to me, on the other hand, from 1966 at least, that there had to be such a substitute for algebraically contractible  $\mathbf{C}$ -vector coefficients, making sense for relative schemes in any characteristic, and my crystalline ideas were just a first approach in this direction. As we shall see in [Crystals] (these are the talks cited in the previous note "The five pictures ('crystals and  $\mathbb{D}$ -Modules)", n° 171(ix)), the internal logic of my crystalline reflections had nevertheless brought me back into contact with complexes of differential operators. I was then already very close to Mebkhout's philosophy. My cohomology students (and especially Deligne, Berthelot and Illusie) must have been blocked by the Burial Syndrome not to have identified this philosophy in the years that followed. (I myself was then fully occupied with other fundamental tasks, and had left the crystalline theme to the care of my students).

(\*\*\*\*) For a definition of these operators, whose name is frightening at first, but which give rise to a formalism in every respect parallel to that of ordinary differential operators, see part (b) of the previous note "The five pictures (crystals and  $\mathbb{D}$ -Modules)" (n° 171 (ix)).

where  $X_n$  denotes the nth infinitesimal neighbourhood of  $Y$  in  $X$ , and  $C_X, C_Y$  the constant bundle  $C$  on  $X$  resp.  $Y$  (the latter extended by zero on  $X - Y$ ). The second essential observation is that this time the ring  $\mathfrak{D}$  of ordinary differential operators on  $X$  operates on the first member. It was well known that the kind of bundles we obtained, both the right-hand member of transcendental nature, and the left-hand member of "algebraic" nature, were of rather prohibitive dimensions, as  $_{OX}$ -Modules - nothing coherent, to be sure. It is also true that we had the feeling (at least on the algebraic side) that there was a certain type of "finitude" or "co-finitude", in a sense that no one before Mebkhout had thought of specifying. Mebkhout's remarkable theorem is that the first member is a *consistent*  $\square$ -Module, and that moreover, the second member (which looked even more intractable) is simply deduced from the first by the change of Rings

$$\mathfrak{D} \rightarrow \mathfrak{D} !^\infty$$

Since the second Ring is known to be flat on the first, this implies that (1) is injective. At the same time, given the consistency result, this can be seen as a very strong finiteness theorem concerning the second member (which nobody before Mebkhout understood anything about) - this is in particular of finite presentation as  $\mathfrak{D}^\infty$ -Module (but perhaps not consistent, given that it is not known whether  $\mathfrak{D}^\infty$  is itself consistent). The first case treated by Mebkhout, that of a divisor with normal crossings, is the subject of his postgraduate thesis/ passed in 1974. Already this case is not trivial, and of course entirely new - the very question Mebkhout solved had never been seen before. This case, moreover, turns out to be the crucial one, to which Mebkhout arrives (by approximation (\*), by resolving singularities.

The results I have just described seem to me to be so far-reaching that, under normal circumstances, they would have earned their author international renown. Also, the first crucial case he dealt with already showed an originality of vision which, 'normally', would have earned him the warm encouragement of those among his elders (such as each of my former students, without exception) who were in a position to appreciate its flavour. But never mind...

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(\*) For Mebkhout's theorem on local cohomology, see in particular : La cohomologie locale d'une hypersurface, in Fonctions de plusieurs variables complexes III, Lecture Notes in Mathematics n° 670, pp. 89-119, Springer-Verlag (1977), and Local Cohomology of analytic spaces, Publ. R. I. M. S. Kyoto Univers. 12, p. 247-256 (1977).

In fact, in these four years, Mebkhout arrives at an even more circumstantial result than the one I have just stated. He proves that the  $\mathbb{Q}$ -Module he is studying is not only consistent, but moreover *holonomic* (a notion he found in the Japanese school), and moreover *regular* (\*) (in a sense he defines ad hoc, taking inspiration from my comparison theorem for algebraic-analytic De Rham cohomology). Better still, he proves that the initial constructible  $C$ -vector bundle  $C_Y$  (which enters into the definition of the second member of (1)) is *reconstituted* from the complex of  $\mathbb{Q}^\infty$ -Modules  $R\text{Hom}_{C_X}(C_Y, \mathcal{O}_X) = C$ , by the extraordinary inversion formula :

$$(2) \quad C_Y \stackrel{\sim}{=} {}_{R\text{Hom}(\mathbb{Q}^\infty)}(C, \mathcal{O}_X).$$

no one had ever dreamt of such a formula - and no one would dream of it until D-day five years later, when the power of the philosophy was revealed and at the same time gave the sign for the Burial, alongside the ancestor, of the person who had brought it... To dream of it, you would have had to have buried the ancestor's philosophy (with derived categories,  $R\text{Hom}$  with or without underlining and other 'useless details'). . ); and, what's more, to have been able to appreciate a geometric situation that was quite\* trivial and yet full of mystery (local cohomology with supports in a divisor with normal crossings), and to get to *the bottom of* the mystery. This "end" is not yet to be found in the splendid theorem of 1976 that I have just described - but from that moment Mebkhout had a clear vision of it: it is the double "theorem of the good God", one for regular  $\square$ -holonomic moduli, the other for  $\mathbb{Q}^\infty$ -holonomic moduli, and the double inversion (or "biduality") formula mentioned earlier (\*\*). It is also the wonderfully simple solution to the problem of the relationship between discrete (analytically constructible) coefficients and "continuous" coefficients.

But I'm getting ahead of myself. When he proved the theorem that constitutes the first major milestone in his work and his philosophy, the 'end', clearly perceived, still seemed dizzyingly far away. If he had found a competent, kind-hearted elder with a modicum of experience and mathematical flair, he would have been disabused of this notion: he was clearly already very close, and the difficulty to be overcome, as so often in the work of discovery (not to say, always...), was more psychological than technical. But before

(\*) Mebkhout's original (transcendental) definition of regularity is recalled in the note "L'œuvre. . ." (n° 171 (ii)), b. de p. note (\*) page 950.

(\*\*) In the previous note "The five pictures (crystals and  $\mathbb{Q}$ -Modules)" (n° 171 (ix)), part (b).

set off in pursuit of the infinitely distant, he tackled the global duality theorem - the one that was to "cap" the known duality theorem, both for coherent coefficients and for discrete coefficients. The deep motivation, omnipresent in Mebkhout's work, which links the two problems, that of local cohomology and that of global duality, is the presentiment of an *essential unity* between discrete coefficients *and* continuous coefficients. This was also the thread running through my crystalline approach of 1966, which tried to understand the "De Rham coefficients" (essentially discrete in nature) in "continuous" terms...

This is not the place to go back over the statement of Mebkhout's duality theorem (\*). His proof came up against serious technical difficulties, due to the transcendental context, which he overcame using cohomological descent and nuclear EVT techniques (techniques to which I myself was no stranger, even if Mebkhout is the only one who still insists on quoting the ancestor . . .). From the point of view of his philosophy of duality, this theorem is an essential milestone. If we bear in mind, with Mebkhout, that applied to complexes of holonomic  $\mathbb{Q}$ -Modules it contains global duality for analytically constructible discrete coefficients (\*\*), in addition to coherent duality, we can say that it too already contains in germ the whole philosophy of  $\mathbb{Q}$ -Modules à la Mebkhout. Its significance, as soon as he spoke to me about it for the first time, in 1980 (the year after he defended his thesis (\*\*\*)�, appeared to me as something obvious. I don't think I've ever had the honour of inspiring a work of comparable scope in any of my students (\*).

Mebkhout also had great difficulty in getting this theorem published, as it smacked of "the

(\*) This statement is recalled in the note "The work . . ." (n° 171 (ii)).

(\*\*) At the time Mebkhout established his global duality theorem (1976), moreover, he had not yet proved that *every* analytically constructible bundle of C-vectors comes from a complex of  $\mathbb{Q}$ -Modules. But he had no doubts about it.

(\*\*\*) See the note "Rencontres d'outre-tombe" (n° 78).

(\*) I'm thinking here mainly of students who prepared a thesis with me. Deligne is a special case, since he did his thesis after I had left, without mentioning my name, even though the inspiration for his work (on Hodge-Deligne cohomology) came from my problem of "coefficients" of all kinds, which also provided for a formalism of "Hodge coefficients". Deligne's work is a first step in this direction, much more fragmentary than that accomplished by Mebkhout, in the direction (closely linked to that of Hodge) of "De Rham coefficients". It is true that Mebkhout, who was severely handicapped by the indifference and disdain of his elders, was not afflicted by the burial syndrome that paralysed my students. (On this subject, see the note ". . and hindrance", n° 171 (viii).)

(The Annals of Mathematics sent it back to him, telling him that this sort of thing was not at the required level. It ended up appearing anyway, in Mathematica Scandinavica, in 1982 (\*\*)). I think that was his favourite theme, when he was lecturing on the philosophy of  $\mathbb{Q}$ -Modules, but in a very different spirit from the Japanese. He told me that this theorem had a way of astonishing listeners, or occasional interlocutors, with the exception precisely, every time, of those who were part of the establishment (\*\*\*)). That's one thing that comforts me. It shows that this spirit of smugness, which tarnishes the beauty of everything, however beautiful it may be, has not become general in the mathematical community. It prevails above all (if not exclusively) in the upper echelons, where I have had ample opportunity to become acquainted with it over the last ten years or so...

This global duality theorem should be completed by the already mentioned result of a local nature, which is also profound, stating that the natural dualising functor for complexes of  $\mathbb{Q}$ -Modules, with bundles of coherent cohomology, which transforms holonomic complexes into holonomic complexes (and the same for regular holonomic complexes), is moreover compatible on these with the De Rham functor DR ("associated differential operator complex", viewed as a complex of bundles of  $C$ -vectorials with cohomology

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(\*\*) Global duality theorems for coherent  $\mathbb{Q}$ -Modules, Mathematica Scandinavica 50 (1982) pp. 25-53. See also "Dualité de Poincaré" in séminaire sur les Singularités de Paris VII (Pub. n° 7), 1977- 1979, and especially "The Poincaré-Serre-Verdier duality" in Proceedings of the Conf. of Algebraic Geometry, Copenhagen (1978), Lecture Notes in Mathematics n° 732, pp. 398-418, Springer Verlag (1979). The introduction to both of these lectures, and especially to the second, represents a sketch of the philosophy contributed by Mebkhout, at a time when he was the only one to be its depositary and advocate.

(\*\*\*) (24 May) This ties in well with my own observations. It would seem that being a man en - vue is predisposed to such complacency, for whom 'nothing is good enough for her to deign to rejoice'. I don't know whether such attitudes are the rule in the scientific world as a whole these days, or indeed ever since. I was very lucky to have been welcomed in my early days by an environment where such a spirit of complacency did not exist - not yet.

It must have crept up on us over the years, taking up residence in all of us, little by little, without any of us noticing (apart from Chevalley...). Everything seemed the same as before - and yet everything was already different. It was already like a fine layer of dust inside us, covering the original freshness of things. I was touched by that dust, as were others. And today, when I find myself confronted once again with one of my former students or friends, I often have the impression that this dust has accumulated in thick, dense layers, and that it has formed a kind of impenetrable, watertight armour that calls out to me through them...

constructible), for the natural dualising functor that I had introduced on them (\*). This compatibility is obviously an essential ingredient of Mebkhout's duality formalism, for an understanding of the meaning of his global duality theorem. For some reason, he calls it a "local duality theorem" (\*\*). This profound theorem, just like the famous "correspondence" (known as the "Riemann-Hilbert correspondence", when one deigns to name it), is treated by "everyone" (Verdier and Deligne in the lead) as something "well known" which would go without saying, and above all without ever naming a certain unknown (of which "everyone" knows...).

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(\*) This is the duality that has become, by the general consensus of my students and former friends, the 'Verdier duality' (both in the complex analytic case and in the spread case)... (See on this subject, for example, the note "La bonne référence", n° 82.)

(\*\*) It is under this name that the result appears in chapter III of Mebkhout's thesis. He told me that he had taken inspiration for that name (as for the 'biduality theorem') from the terminology that I had introduced - yet for me the 'local duality theorem' was just another name for the 'biduality theorem' that I had worked out, of which it represents an important aspect, the 'geometric' aspect.

This compatibility result (Mebkhout explains) was an important step in his demonstration of what he calls, in this same chapter, the 'biduality theorem'. (On the subject of the latter, see the previous note "The five photos", part (b)).

Demonstration aside, from the point of view of a "philosophy" or a "yoga", it was certainly an "obvious" thing that the functor of the good God *should* commute to the dualising functors (since there is a good God!). A funny detail is that Kashiwara (whom Mebkhout had the opportunity to speak to in January 1978) did *not believe* that this theorem was true ! This shows how out of his depth he was, while his geometrical vision (in the style of the "six operations") was lacking. This did not prevent him, later, after Mebkhout had sent him his chapter III (in February 1978), from appropriating this result (without mentioning its author, of course) in his big article with Kawai already quoted (see b. de p. note (\*) page 1005) (prop. 1.4.6 of par. 4 of loc. cit.). This is the work in which the "biduality theorem" (loc. cit. 1.4.9 of par. 4) is also appropriated without further ado (under the name "reconstruction theorem"). This just goes to show the extent to which the emulators across the Pacific of the great masters of the 'new style' born in Paris (in place of a 'Grothendieck school' that vanished without a trace...), are not to be outdone by the 'new style'. ), are not to be outdone by their French colleagues.

My biduality theorem (for discrete coefficients) also appears in the same inexhaustible par. 4 of Kashiwara-Kawai's work (prop. 1.4.2) But while we shamelessly plunder the posthumous and unknown pupil, notoriously left out by the bosses, without thinking twice, we give the de rigueur tip of the hat to the illustrious colleague opposite, quoting as we should 'the good reference' provided by Verdier (himself plundering a dead man never named...).

These deceptions are well known among well-informed people, and Mebkhout has heard several echoes of them. But clearly, they are considered appropriate and welcome in the circumstances, as long as the aim is to eliminate the unfit ancestor and his unfortunate successor.

although it is important not to quote it). . .

Finally, I come to the third major milestone in Mebkhout's work. Technically speaking, it can be said to consist of three (or at least two) distinct theorems, but so intimately linked that in Mebkhout's mind they appear inseparable. As early as January 1978, he proved the " $\mathbb{D}^\infty$ -Modules" aspect: the fact that the restriction  $m_\infty$  (where "Mebkhout functor") of the "associated De Rham complex" functor to *holonomic*  $\mathbb{D}^\infty$ -Modules complexes is a category equivalence (with complexes of C-vector bundles with constructible cohomology). Knowing already that this functor commutes to dualising functors, it is natural to reformulate this theorem by passing to the associated contravariant functor  $\delta_\infty$  given by

$$(3) \quad C \mapsto {}_{R\text{Hom}}(\mathbb{D}, C),$$

and it amounts to the same thing to assert that this functor is an (anti)equivalence. This theorem can then be specified by Mebkhout's magnificent *inversion* (or "reconstitution", or "biduality") *formula*, giving the expression of the quasi-inverse functor as

$$(4) \quad F \mapsto {}_{R\text{Hom}_{CY}}(F, \mathbb{D}).$$

Following on from this, Mebkhout also proves a *reciprocal* of Kashiwara's constructibility theorem, namely this: if a complex of  $\mathbb{D}^\infty$ -Modules (or  $\mathbb{D}$ -Modules) with coherent cohomology is such that the associated De Rham complex (as a bundle complex of C-vectorials) has constructible cohomology, then it is holonomic (*cohomological criterion of holonomy*). In the case of  $\mathbb{D}$  complexes $^\infty$ -Modules, where there is no question of regularity, this implies that in the derived category (in which nobody had been working for a long time in 1978 and until 1981...), the complex (or rather its dual) can be "reconstituted", to within a single isomorphism, by the inversion formula.

As I have explained elsewhere (\*), from this moment Mebkhout has in hand everything he needs to prove the Good God's theorem also for  $\square$ -Modules: the fact that the functor  $m$ , restriction of De Rham's functor to complexes of regular holonomic  $\square$ -Modules, is a category equivalence. The result inspires him less, since there is, to all appearances, no inversion formula to the key (\*\*). In any case, even his magnificent inversion formula doesn't make anyone hot or cold - starting with his quasi-director

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(\*) , See the b. de p. note (\*) p. 952 at the note "L'œuvre. . ." (n° 171 (ii)).

(\*\*) As we saw earlier, there is one - and I'll come back to this point below.

Verdier (who did him the honour of chairing the jury). It wasn't exactly a very encouraging atmosphere for him to redouble his technical efforts to prove something that he felt sure of anyway, and that he felt he had everything he needed to demonstrate. He won't worry about it until the rush to prove the conjecture (not Weil's this time, but Kazhdan-Lusztig's) has started.

It was, as if by design, just the other side that people suddenly needed urgently. In any case, 'everyone' was in such a hurry to use the brand-new 'fracturing iron' that had just appeared on the market, and it was so widely understood that the question of a demonstration should not be raised - since it would appear that the work had already been done by an unqualified person - that no one, it seems, had the idea, apart from the person himself, to copy and paste together the pieces of  $\mathbb{D}^\infty$ -theory already written, in order to prove the theorem needed in  $\mathbb{D}$ -theory. It would appear that the one and only demonstration published to date (\*\*\*) is indeed Mebkhout's, published last year (and received in June 1981, the very month of the memorable Colloque Pervers...).

I explained in the previous note (part (b)) a simple principle, inspired by Deligne's approach to De Rham coefficients, to recover an "inversion formula" (or "biduality", to use Mebkhout's expression) in the context of  $\mathbb{D}$ -Modules (regular holonomies). I don't know, since seminars have been held all over the world on the new 'cream pie' of  $\mathbb{D}$ -Modules, whether this very natural approach has been cleared up - Mebkhout was not aware of it in any case. What is certain is that if Deligne had had reflexes that 'in my day' were taken for granted, it would have been he himself, as soon as he became aware of the beautiful ideas of an unknown man, in June 1979, who would have encouraged him to also write the proof of the  $\square$ -Modules side (closer to the algebraic) of his crucial result, and would have suggested to him this 'pro' variant, all in all quite obvious, of his beautiful inversion formula. Also, from that moment on, for Deligne, who had paid for the knowledge, it was obvious that Mebkhout's ideas were going to give De Rham's coefficients, which were missing at least in algebraic geometry over a body of zero characteristic; the obvious thing was to encourage him to make the 3 adjustments that were necessary, in order to state a theorem from the good Lord (or rather, from Mebkhout).

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(\*\*\*) Reference: Another equivalence of categories, Compositio Mathematicae 51 (1984), 63-88.

for complex algebraic varieties (\*).

But other times, other customs. It will not be said that a new departure in the cohomology of algebraic varieties has been accomplished by the solitary and obstinate efforts of a vague stranger, claiming to be the son of a deceased man whose name no one in the "beau monde" has dared to mention for a long time (\*\*). It will not be said that the revival will come from precisely the kind of mathematics that for the last ten years the heirs of the deceased have buried, while dividing up the gold. If Mebkhout the innocent wanted to 'survive' and 'break through', all he had to do was follow the ready-made path of the 'new style' (\*), as other brilliant young people (and even some not so young) have hastened to do. What a way to quote the (unspeakable) source of one's ideas, when it is so easy to drown a fish and quote only those who *need to* be quoted. Mebkhout, I think you're in the clear!

You've landed in a world you're not cut out for - and I'm happy for you that you're not cut out for *that world*. You did the work you felt you had to do, without worrying about fashion, without calculating returns, simply trusting your own instincts - even if it meant making your way in solitude. You did *your* job, rather than watching for the discreet (and not so discreet) signs of those who decide what is good and decent and what is not. You didn't weave in and out to please, you didn't say 'white' when you saw 'black', or vice versa - and it's with *your* eyes that you look.

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(\*) As I have already had occasion to point out, in the algebraic framework, when one wishes to paraphrase *algebraically* constructible discrete coefficients, it is necessary to impose on the complexes of  $\mathbb{Q}$ -Modules under consideration, in addition to the condition of local holonomy and regularity, a condition of regularity "à la Deligne - Mebkhout" at infinity.

(\*\*) It is true that we have not yet found a way of finding substitute references for the EGA and SGA - But these providential acronyms contain no allusion to a name that must remain silent. As we all know, the acronym SGA refers to a seminar on algebraic geometry run by Le Bois Marie, under the impetus of a number of perfectly good mathematicians, such as M. Artin, J. L. Verdier, P. Deligne, L. Illusie, P. Berthelot, N. Katz, P. Jouanolou, and even others who are less well known but just as worthy of mention. Clearly there was a flourishing school of algebraic geometry there, known as the "Bois Marie" school, whose heart and soul was the brightest among the names mentioned. For further details on this "*Bois-Marie school*" and on the APG acronym which expresses it, see in particular the notes "L'éviction (2)" and "Les pompes funèbres - "Im Dienste der Wissenschaft" (n° s 169<sub>1</sub> and 175). (See also p. 899, paragraph 3, in the note "Les double-sens - ou l'art de l'arnaque", n° 169<sub>7</sub>.)

(\*) See, on the subject of this style (which has taken the place of a "Grothendieck school" which disappeared without a trace . . . ), at the end of the note "Les félicitations - ou le. nouveau style" / n° 169<sub>9</sub>.

I don't have to congratulate you - you weren't looking for congratulations, from me or anyone else. And for all that, I'm happy, for you and for everyone.

<sup>(<sup>171(xi)</sup>)</sup> (5 May) (\*\*\*) The natural question here, of course, is whether there exists in algebraic geometry a formalism of the "six operations" for  $\square$ -Modules (or "crystals") not necessarily of the DRM type, which would "cap" those I had introduced in the coherent and discrete cases - assuming first of all, to fix ideas, that we are on the body  $C$ . A first difficulty arises from the fact that the notion of  $\square$ -coherence is not stable by the natural notion of tensor product of crystals, nor by the analogous inverse image operation (\*\*\*). To hope to have a formalism of the six operations, we therefore have to work with a category even larger than  $\text{Cris}^*(X)$ , perhaps that of "quasi-coherent" crystals (in an obvious sense) - but as a result there is little hope of recovering a biduality theorem! Moreover, the natural functor for the extension of scalars by  $o_X \rightarrow \square_X$  obviously does not commute to the tensor product - so even if there were a theory of six

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(\*\*) This sub-note is taken from a footnote to the note "The work. . ." (n° 171 (ii)). See the reference to this sub-note, placed towards the end of the cited note (p. 956).

(\*\*\*) (22 May) Mebkhout has informed me that he has proved that the holonomy and regularity condition is stable.  
by total tensor product operations (on  $\underline{O}_X$ ) and by the notion of inverse image, and that the *contravariant* Good God functor  $\delta$  commutes there. (On the other hand, the covariant God's functor  $m$  does not, and it transforms ordinary inverse image into extraordinary inverse image). Using this result, it can be shown that there is *no* six-operation formalism for De Rham - Mebkhout coefficients that "prolongs" the two already known fundamental operations of tensor product and inverse image. In particular, the DRM category<sup>b</sup> ( $X$ ) does not admit an "internal Hom" operation (playing the role of  $\underline{R}\text{Hom}$ ), and for  $f: X \rightarrow Y$ , the functor  $f^*$  does not in general admit a right adjoint  ${}_{Rf^*}$ . The functor  $Rf_!$  introduced by Mebkhout for  $X, Y$  smooth and for  $f$  proper) is a *left* adjoint of  $f^*$ . (NB The operation  $Rf_!$  on the coefficients of De Rham - Mebkhout has been defined in such a way that the *covariant* God's functor commutes to it, and likewise for  ${}_{Rf^*}$  - rightly or wrongly...)

We can therefore see that in terms of the "natural" operations available in the De Rham - Mebkhout context, these do *not* as such form a "theory of the six operations", but a kind of dual theory. The question that arises, then, is to see to what extent this extends to  $\square$ -Modules (quasi-coherent let us say) that are no longer assumed to be holonomic and regular (for example, holonomic without more - a condition that is preserved by tensor product and inverse image). It would seem well, in particular, that the global duality formula can be written for complexes of  $\square$ -Modules has coherent (or even just quasi-coherent) cohomology, and any morphism  $f: X \rightarrow Y$  of separate schemes of finite type over a field  $K$  of car. null (let us say), so as to cap both the consistent duality theorem, and the discrete duality theorem, at least in the following form i the dualising functor "exchanges" the functors  ${}_{Rf^*}$  and  $Rf_!$

However, while the theory of operations for crystals would extend that (morally known from now on, thanks to Mebkhout) of De Rham - Mebkhout crystals (obtained by "structure transport" from the "discrete" theory, via the functors of the good God), it would not extend that of coherent  $\mathcal{O}_X$ -Modules (\*). However, this may not rule out the existence of a "global duality theorem", in the quasi-coherent crystals version, for a pro- pre morphism (let's say) of schemes of finite type over a field of zero characteristic, which "caps" (in an obvious sense) the "known" duality theorem (morally, by transport of structure en- cor) for De Rham - Mebkhout crystals, and the known (without inverted commas) analogous duality theorem in the coherent case (\*\*). I was quite amazed that Mebkhout himself had not asked himself at least this last question, from the very moment he had arrived at the formulation of his "absolute" duality theorem (corresponding to the case where the goal variety is reduced to a point) - until recently he didn't seem to "feel" it very much (\*\*\*)�. This makes it striking for me to what extent a certain 'philosophy', which by the first half of the sixties had become second nature to me, and (it seemed to me...) to my students too - to what extent this philosophy has been forgotten by everyone, starting with those who have taken it upon themselves to be its gravediggers rather than to transpose it. And I can see that this is also the main cause of the stupefying stagnation after my departure of a theory (that of the cohomology of patterns) that I had left in full bloom.

It has to be said that Mebkhout placed himself in a transcendent, complex analytical context, rather than a schematic one. This introduced considerable technical difficulties, in a way 'parasitic', when it came to understanding phenomena.

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(\*) This assertion should be rephrased in terms of a "dual theory with six operations", see the previous footnote.

(\*\*) Such a duality theorem can be considered in three different forms, either by saying that the dualising functors at the top and bottom "exchange" the functors  $Rf_!$  and  $_{Rf^*}$ , either by saying that two suitably defined functors  $Rf_!$  and  $Rf_!$  are adjoint to each other, or by writing a "projection formula" (which covers both statements):

$${}_{Rf^*}(\underline{\text{RHom}}(F, Rf^!(G))) \dashv \underline{\text{RHom}}(Rf_!(F), G).$$

(\*\*\*) (8 June) Mebkhout assures me that he had indeed been asking himself the question for a long time. If I got the impression that he hadn't, it must be because the question had remained entirely platonic for him.

of essential variance. Here again, his elders have failed in their task, which would have been to make their experience, gained through contact with me, available to the newcomer (just as I had made mine available to them . . . ), and thus guide him (or at least enlighten him) in his choice of investments, in particular.

But to enlighten and guide is also to *serve*, even though they had long and undividedly opted for the role of master.

(<sup>171(xii)</sup>) (5 May) (\*) Mebkhout told me that until I mentioned it to him when we met two years ago (\*\*), he had never heard the word 'six operations' - he wondered what 'operations' I meant! Clearly, it had never occurred to him (or to anyone else, it seems, apart from me) to go through the main ingredients of a certain very simple cohomological formalism, to note that there were six fundamental functors or bifunctors, grouped into three pairs of ad-join functors, with such arrows and compatibilities etc. These were things that seemed to me to be very important. These were things that seemed so obvious to me that I imagined that any reader of either 'Residues and Duality' exposing the elements of coherent duality, or of SGA 4 or SGA 5 exposing the elements of dis- cogent duality, with essentially the same form, would have had fun (as I had done in the fifties, without going all the way, I admit...) in setting up for his own use a set of basic functors or bifunctors.) to set up, for his own use, a more or less systematic and more or less complete form of the main isomorphisms and compatibilities - for it is only in this way, and in no other way, that one manages to get into the spirit of a new language, to assimilate it intimately, It is in this way and in no other that the pioneers of infinitesimal calculus arrived at a delicate and sure intuition of the infinitesimally small at a time when they lacked the conceptual tools to apprehend them according to the canons of rigour that subsequently appeared (or reappeared)...

With the benefit of twenty years' hindsight, I realise that in the 'reference texts' cited, which were done with the greatest care, even brilliance - while all the 'real work' (according to current desiderata) is done, culminating in 'the' main duality formula, the adjunction formula between  $Rf_!$  and  $Rf^!$  (the only one deemed worthy of attention and effort, even if it means forgetting about it on the day of the event), there is no such thing as a 'real' duality formula.

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(\*) (22 May) This sub-note, like the previous one, is taken from a b. de p. note on the page "The work. . ." "(n° 171 (ii)). See the cross-reference towards the end of this note, p. 957.

(\*\*) This meeting is mentioned in the note "Rencontres d'outre-tombe" (n° 78).

tomorrow, just as we forget the trees when we haven't seen the forest... .) - a n d yet in all these texts the *main thing* has *not been* said and has *not* passed from the author to the reader (assuming that it is seen and felt by the author himself). The "main thing" is a "yoga", a "philosophy", a foolproof guideline through (in this case) the cohomological jungle of algebraic geometry (and elsewhere). It can be developed at length over fifty pages, or over a hundred, once 'everything is done' (so they say); or it can simply be mentioned in a few pages, and left to the reader to develop it for his own guidance as far as he deems useful for his own needs, or for his own satisfaction.

It's these few pages, whether on the 'six operations', or on the motifs, or on many other things (\*), pages that I felt strongly about but which I didn't know how important it was for me to write - it's these that have been missing, above all, from my written work. Absorbed as I was in the meticulous and interminable tasks, in the service of everyone, of the big 'work on parts', the only one that was supposed to get published - I didn't know how to feel that there were more essential pages, that *only* I could write. *The essential* things I had to say didn't get across in the written pages, but only by word of mouth - when it was convenient to do so! Or, at a pinch, it was in between the lines, perhaps, of interminable volumes of foundations - but is there anyone these days who knows how to read between the lines?

What was essential, then, was what was entrusted on a day-to-day basis to those who, in my life as a mathematician, were 'close to me', and first and foremost to my students. It was a matter of course, nothing deliberate. It would never have occurred to me that in some way I was investing them with considerable *power*. It's not that I didn't feel the force of what I was conceiving and transmitting, but that force was also self-evident. For me, surely, in mathematics at least, 'strength' and 'beauty' were and remain one and the same thing. It would never have occurred to me that they could be abused, these things filled for me with peaceful and intense life, made to live and to engender. When I left, in a way that could not have been more unexpected, I had no worries about them. These pages that I had never thought of writing - there was no doubt in my mind that their mes-

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(\*) After these lines were written, I realised that I was mistaken about the six operations - in fact, I was misled by the massacre edition of SGA 5, in which Illusie took care to eradicate all trace of a 'yoga of the six operations', which I had developed at length in the oral seminar, with a complete form copiously commented on.

These 'loved ones' were going to be so many living pages, telling the message and enriching it with the best they had to contribute.

Those to whom I had spoken with trust and respect, as to younger brothers in whom I recognised myself, chose to bury and keep silent. And when the one came, true to himself, in whom they recognised me, they, filled with everything, chose to leave him outside their closed doors - a stranger and an intruder. I don't know you *i* And these unwritten pages, these pages said in vain, now dead pages in these posh houses with their haughty, closed doors, the brother who had been rejected had to find them within himself, through long, groping efforts. Alone, he had to make his way through the inextricable jungle of a thousand and a hundred thousand volumes. Anyone who has been through this, even if, like me, they have been lucky enough to have the fraternal help of experienced and benevolent guides, knows what I'm talking about...

He made his way, painstakingly, over the days and years - a bumpy road, without a compass, it sometimes seemed to me afterwards, or at least without any compass other than a flair that was still searching for itself, through a painfully and hard-won experience. He did not rewrite for his own use those ready-made pages, those pages that had become dead pages in haughty houses - except in scattered snatches. He wrote *other* pages, *his* pages, painfully his own. He wrote them haphazardly, stubbornly, indifferently. And yet, these pages, often clumsy and worthy of a cad, which my brilliant and wealthy students of yesteryear (if they had bothered to read them) would certainly have looked on with commiseration and without seeing anything in them - these are pages that *had to* be written, like a natural, 'obvious' continuation of those pages that I had never even thought of writing, so much did they seem to me to go without saying... .

(<sup>171</sup> 1) (15 April) (\*) Taking advantage of the recent visit to my home of my co-centerer

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(\*) (30 May) The three notes that follow (n° s 171<sub>1</sub> to 171<sub>3</sub>) were written between 15 and 18 April (1985), at a time when 'L'Apothéose' was still reduced to a note of about ten pages. They expanded considerably during the month of May, after Zoghman Mebkhou's visit to my home gave new impetus to my thinking on the Four Operations. The ten pages have become more than a hundred, almost all of which are of a later vintage than the three notes that follow. This has resulted in some partial repetition, with certain facts or episodes being mentioned or described, in different lights, in the earlier notes and in those that follow. In order to preserve the spontaneity of the writing, I did not want to make any changes.

Zoghman Mebkhout in person, I'd like to give a few warm details of his strange misadventures, as he told me himself, in bits and pieces here and there, in the course of our conversations.

Zoghman had the honour of an "interview" with his "boss" (\*\*) J. L. Verdier on three occasions. The first was in 1975 - he needed a technical result, which was contained (as it later turned out) in the biduality theorem for analytically constructible discrete coefficients - at a time when Zoghman did not even know the notion of constructibility. (This was a notion that I had introduced as early as the 1950s, and which had been taken up again, in the context of stale topology, in SGA 4). At that time this notion was by no means 'well known' in analysis, as it is today. As it happened, it was exactly the notion he needed for his work. Houzel (who had followed SGA 5 at the same time as Verdier, but who must have forgotten a little about what I had said there), advised him to go and see Verdier. That was the first 'interview' with the great man. Verdier taught him that what he was asking (that two discrete complexes that had isomorphic 'duals' were isomorphic) was true under certain technical conditions (the "; constructibility", in fact), which he would find set out in the manuscript he was going to give him, that of the 'good reference' (\*), where (among other feats of the same kind) he pretended to invent constructible bundles and to discover the biduality theorem (and its proof), things he had learned from me twelve years earlier (in 1963) (\*\*). He says nothing about me in this interview or in the manuscript.

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adjustments to eliminate these repetitions.

(\*\*) (24 May) Mebkhout insists that the term 'boss' (even with inverted commas) is misplaced here. From his beginnings in 1972 to the present day, he has done his work without a boss, managing on his own. Verdier was simply chairman of his thesis jury. Apart from that, his role was limited to providing Mebkhout with 'the right reference', which was very useful at a time when SGA 5 was still being sequestered by the combined efforts of my cohomology students (and precisely for the purposes of operations such as the 'right reference'...).

(\*) This is the article by J. L. Verdier, Classe d'homologie associée à un cycle. Asterisk n° 36 (SMF), p. 101-151 (1976). It is discussed in detail in the two consecutive notes "The right reference" and "The joke - or 'weight complexes'" (n° s 82, 83), and more briefly, in the note "Episodes of an escalation" (n° 169 (iii)), with episode 3.

(\*\*) In the second half of the 1950s I became interested in the notions of "constructability" in of all kinds for discrete bundles (in the algebraic sense, complex analytic, real analytic, piecewise linear - pending the context of moderate topology...), in addition to notions of coherence, such as

which was to appear the following year. In any case, Zoghman went home fulfilled, and full of gratitude to the great man who had provided him with exactly what he needed at that time, and in the years that followed, when the notion of constructability was to play a crucial role in all his work.

It was at the beginning of 1976 that he began to take an interest in duality, and to be intrigued by the analogy of the duality formalisms that I had developed in the coherent case and the 'spread' discrete case, and which had been taken up by Verdier in the topological discrete case. This was at a time when, for years, this formalism had fallen into disuse, and when my students had instituted a tacit and rigorous boycott of the derived categories that constitute its natural language. The notion and the very word 'formalism of the six operations', which had been one of my main ideas since the fifties and throughout the sixties, became (and has remained to this day) rigorously taboo ever since I left. (When Zoghman came to see me two years ago (\*), he had not yet heard the word 'six operations', and did not at first know what 'operations' I meant by it - although I thought that it had been a familiar concept to everyone for twenty years. In other words, the conditions were unfavourable for him to embark on this direction, where he was condemned to work in complete solitude. This did not prevent him, as early as 1976, from deriving a duality theorem, on non-singular complex varieties, which "covers" both Serre's duality theorem, and discrete duality (which he called "Poincaré-Verdier duality"), in terms of a duality statement for complexes of  $\square$ -modules (which also contains a global duality statement for complexes of differential operators). The "coefficients" he takes are, moreover, of a generality that went far beyond the cases of Serre (restricting himself to locally free bundles) and Poincaré (restricting himself to bundles

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being the natural notions for expressing finiteness conditions in the beamtic framework, and I had raised the question of the stability of these notions by the "six operations". It was the subsequent development (in 1963 and the years that followed) of stellar cohomology that led me to return to these questions in the stellar framework, and to develop the techniques (unscrewing and resolution) that allow them to be treated by a uniform method, which also applies to the transcendental context of complex algebraic and complex analytic varieties. The biduality theorem, valid (and with the same proof) in the stale framework (subject to purity and resolution) and in the transcendental context, had been identified by me as early as 1963. It appeared in the very first presentation of SGA 5 (in 1965), where it survived the massacre of the 1977 Allusie edition.

(\*) This visit is mentioned in the note "Rencontres d'outre-tombe", n° 78. For comments  
On the boycott instituted on the "six operations", see also the note "The dead pages", n° 171 (xii).

discrete locally constant), in keeping with the spirit that I had introduced into these themes with the then generally repudiated formalism of the 'six operations'.

When Zoghman explained this theorem to me two years ago, I felt both its interest, which was obvious to me, and its limitation, because in the spirit of the "six operations" it was also obvious to me that "the right" statement had to be a statement about a morphism of analytic spaces  $f: X \rightarrow Y$ , in the form (for example) of an adjunction statement between two functions  $Rf_!$  and  $Rf^*$ . It is true that placing oneself in a trans-scendant introduces considerable additional difficulties, which have had a major impact (it I think) to obscure for Mebkhout the simplicity of the algebraic mechanisms essential in duality - whereas nobody around him, and especially not among those who were my students, would have known (or deigned...) to make him feel it. The fact remained that he had put his finger on an important 'principle' - that the theory of  $\mathbb{Q}$ -modules (which I myself prefer to call 'crystalline modules' (\*\*)) provides a 'common denominator' for 'capping' phenomena (of duality, in particular) in discrete cohomology and coherent cohomology. With this momentum, encouraged by someone who was 'in the know' and equipped with a modicum of mathematical instinct (\*) and benevolence, there is no doubt that in the space of the next three or four years he would have developed a complete formalism of the six operations within the framework of algebraic geometry of zero characteristic (at least), providing a faithful purely algebraic 'paradigm' of the same (admittedly repudiated) formalism in the transcendental framework, for algebraically constructible  $\mathbb{C}$ -vector bundles.

Sensing that he had just discovered something important, Zoghman was delighted to ask for and obtain an interview with his benefactor to explain his findings. It was 1 he answer, very exactly, to the question I had put to Verdier ten or twelve years before-

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(\*\*) For the (obvious) reason for this "crystalline" terminology, reflecting a more intrinsic vision of the  $\mathbb{Q}$ -modules (which my students had learned from me and which they have long since forgotten). see the comments in the note "My orphans" (n° 46) (especially p. 179) and in the sub-note n° 464 (p. 188) (x). On the subject of the 'blocking of the healthy faculties' against the obvious links of Mebkhout's philosophy with crystalline yoga that I had identified towards the end of the sixties, see the note 'La mystification' (n° 85<sup>□</sup> , p. 350-351).

(x) (24 May) See also the note "The five photos (crystals and (n° 171 (ix)).

(\*) It's not that my former cohomology students lack a 'modicum of mathematical instinct'.

- Otherwise none of them would have been able to do the good work with me that they did. But this instinct is derailed or blocked by the master's burial syndrome.

(\*\*) - chances are he'd forgotten all about it. Be that as it may, his benevolence towards this young man who had come from nowhere and was doing things that he, Verdier, had drawn a long line over a long time ago, was exhausted. He didn't even want to listen to Zoghman's explanations of the ins and outs and the proof of the theorem. He told him in essence (and politely) that he, Verdier, no longer believed in Father Christmas and that the young man had better pack it in.

Extraordinarily, *no one* around Zoghman is 'hooked' on this result (\*\*\*) - no doubt it sounded too much like the 'grothendieckerie' of the sixties, but we've got past that nowadays, fortunately! Perhaps I was, two years ago, the first person he met, who felt the importance of the result and of the new 'philosophy' that it bears - that of a vast synthesis between 'discrete' and 'differential' (or 'ana- lytic') aspects in the cohomology of varieties of all kinds (algebraic and analytic to begin with). This theorem, which constitutes one of the chapters of his thesis, was finally published in *Mathématica Scandinavica* in 1982 (t. 50, pp. 25-43). The same article had been submitted to the *Annals of Mathematics*, which made the presumptuous young man understand that it was not of the standard required for publication in this standing periodical.

Even today, this theorem is generally ignored or despised in the 'beau monde', even though it already contains the seeds of that new philosophy which, via the theorem of the good God (alias Mebkhout), provided the means for a spectacular renewal in the cohomology of algebraic varieties. But 'everyone', including my ex-students, the cohomologists (whom I once knew to be gifted with a healthy mathematical instinct), rushed en masse to the new 'cream pie', namely a certain powerful tool (that

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(\*\*) (5 June) On this subject, see the note 'L'ancêtre' (n° 171 (i)), particularly the footnote (\*) on page 946.

(\*\*\*) (3 June) There has been a misunderstanding here. As was said in the note "Three milestones - or innocence".

(n° 171 (x), page 1026), this theorem often had the ability to amaze a casual interlocutor. But it would seem that so far this has remained platonic - the theorem has not become a tool, something you know and use without even thinking about it. This surely has something to do with the fact that the person who rejoiced in the obvious beauty of the result was never one of those who 'set the tone' and decide what is 'important' and what is 'bombast' (and it is not uncommon, these days, for yesterday's 'bombast' to become today's 'cream pie'...). In his comments of 22 April, Zoghman wrote to me: ". . there was some embarrassment about this theorem. Some people secretly envied it. But very few encouraged it, quite the contrary."

... "everyone" affects to name only by allusion or by periphrase, as "the relation between constructible bundles and holonomic differential systems", or as "what would normally have found its place in these notes" (\*). .... .), and on the "latest cry" (intersection cohomology), while the innovative *vision that made it possible to* develop the tool remains ignored just as much as before, and the father of both is treated as a stooge.

The situation here is the same as it was for my vast unifying vision of topos, derived categories, the six operations, cohomological coefficients and, beyond that, motifs. It was from this vision that tools such as stale cohomology and crystalline cohomology emerged, tools that the same 'everybody' uses today as if they were turning a crank, whereas the vision itself, powerfully alive on the day I left, was buried the very next day. And I can see clearly that the astonishing stagnation I see in a splendid subject (\*), fifteen years after I left it in full bloom, is not due to a lack of intellectual means or gifts (which are brilliant in more than one of those I have known so well and so poorly), but to a gravedigger's disposition, or unscrupulous nepotism, or both - dispositions that are the antithesis of the innocence that makes people recognise, and find, simple and essential things.

To develop his new philosophy, Mebkhout drew inspiration from the spirit of the categories

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(\*) This is a quotation (from memory) from the 'memorable article' by Beilinson-Bernstein-Deligne (written by Deligne) referred to in the note 'Le jour de gloire' (n° 171 (iv)). For details of this periphrase, worthy of posterity (as a reminder and as a warning...), and for the ins and outs of the context, see the note 'Le prestidigitateur' (no.° 75<sup>✉</sup> ). The quotation that preceded it ("the relation between constructible features and holonomic differential systems") is taken from the article by Beilinson-Bernstein (from the same year, 1981) which will be discussed in the following sub-note ("The mafia", n° 171<sub>2</sub> ), where we will also have the advantage of learning about Brylinski-Kashiwara's contribution to the flowering of this kind of style, in the service of the same swindle.

(\*) I first spoke of this impression of 'gloomy stagnation' at the end of the note 'Refusal of a héritage - ou le prix d'une contradiction" (following on from "Mes orphelins") n° 47 (p. 195). This impression has only been confirmed in the year that has elapsed since I wrote this note, with the same restriction, essentially, that I expressed in sub-note n° 47<sub>3</sub> to the note cited: Deligne's work on Weil's conjectures (Weil I and II), and the new start that followed the "rush" on the good God theorem (eliminating both the good God and his servant Zoghman), and on intersection cohomology. But these localised successes seem to me to be out of all proportion to the brilliant, even exceptional resources of those I know who have since 'settled' in this 'splendid subject' - even though fifteen years have gone by since I left; and also out of all proportion to the richness and vigour of the key ideas that I had bequeathed, and which I now find exsanguinated...

derived categories and the six operations, at a time when derived categories were treated as Grothendieckian fu-mystery, and when he had never even heard the name 'six operations' pronounced. Today, with the rush on the new tool that has appeared, inseparable from the derived categories, the latter have been exhumed with great fanfare, while keeping quiet about the name of both the man who brought them out of the void during years of solitary work, and the man who drew inspiration from them, also solitary, to finally give birth to a new theory of coefficients linking topology, complex analysis and algebraic geometry.

Deligne, Verdier and their ilk are rushing to buy brand new products, shouting (with all due discretion and good manners, of course) "it's me, it's me! None of them has yet found the courage and loyalty within themselves to mature a vision in solitude, to carry it heavily for months and years on end, far from the applause, when they would be alone in seeing and unable to share what they see with anyone else in the world.

But I digress, it's time I returned to my account of *the birth of a vision*. It was in 1976, when Mebkhout demonstrated the duality theorem that 'covers' Poincaré's duality and Serre's duality, that he arrived at the idea of the equivalence of three categories, which respectively embody the 'topological' aspect<sup>1</sup>, the 'algebraic' aspect and the 'analytic' (transcendental) aspect of the same reality, the same type of object. From the point of view of a general theory of "cohomological coefficients" (\*), I will call these objects "De Rham - Mebkhout coefficients" (\*). If  $X$  is a smooth analytic space (\*\*), there are on the one hand

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(\*) This idea of various '*types of coefficients*', each of which presented itself to me as a particular incarnation of the formalism of the six operations (and of biduality), more or less encircling the finest 'type of coefficients' of all, the 'absolute', or 'universal', or '*motif*' type - this idea was perhaps the main force guiding me throughout the 1960s, and especially from 1963 onwards, in the development of my cohomological vision of algebraic and other varieties. The force of this idea in me is clearly visible from the very first note I devote to a retrospective on my work, and on its vicissitudes at the hands of fashion: "Les orphelins" (n° 46). I return to it insistently in several places in the reflection on Burial, and more particularly in "La mélodie au tombeau - ou la suffisance" and "Le tour des chantiers - ou outils et vision" (n° s 167, 178). It is also the very first mathematical theme, among those buried by my former cohomology students and by those of a fashion, that I plan to develop following Harvest and Sowing, to give it the place it deserves in my mathematical thinking.

Strangely enough, this central idea of my cohomological work, and the algebraic-categorical structure (very simple in fact) that expresses it, has never been explained in the literature, not even by myself in the course of my work.

the ("derived") category of "constructible"  $\mathbf{C}$ -vector complexes on  $X$ ,  $\underline{\text{Cons}}^*(X, \mathbf{C})$

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of the sixties (x). It appears between the lines in my written work, and was conveyed above all in oral communication. In my mind, it went without saying that one of my students would not fail to devote the few days or weeks it took to present this set of ideas in systematic form, while I myself was fully occupied with the basic tasks of EGA and SGA.

With hindsight, - I realise better how important non-formal texts are (even if they are only a few pages long, in this case, and without any effort at exact and systematic formulations), giving just a sense of those rarely named 'forceful ideas' that lie hidden behind texts that often appear to be technical - how important such texts are for guiding researchers, and for bringing a breath of air from time to time into a literature that tends to suffocate by its technicality. On this subject, Zoghman told me that the few passages of this kind that he found in my texts were a great help to him. Among these, he recently pointed out to me the few words of introduction that I had attached to Hartshorne's volume "Residues and duality" (a volume essentially setting out the formalism of the six operations that I had developed in the second half of the fifties, within the coherent framework). I now realise how much more useful that introduction would have been, if I had taken the trouble to include even a non-formal page or two explaining the 'yoga of the six operations' and emphasising its importance as an omnipresent thread in the construction of the cohomological theories that were still waiting to be born. ...

(x) (24 May and 1 June) After these lines were written, it became clear that from the very beginning of the SGA 5 oral seminar (in my second presentation), I had taken great care to develop at length the 'abstract' form of the six operations, which was to dominate the whole of the seminar to come. (On this subject, see the b. de p. note (\*) of 8 May in the note 'L'ancêtre' n° 171 (i), page 942). Moreover, throughout the oral seminar, I constantly referred to the ubiquity of the cohomological formalism I was developing, valid in principle for all kinds of "coefficients" other than " $A$ -adic coefficients". Illusie took care to remove from the massacre edition both the detailed presentation devoted to the formalism of the six operations, and any allusion to a vision of 'cohomological coefficients' that went beyond the particular context that was the main subject of the seminar.

On this subject, see also the note "Dead pages" (n° 171 (xii)), and also "Useless details" (n° 171 (v)), part b) ("Machines for doing nothing. . .").

(\*) (30 May) In the note (written later) "The five pictures (crystals and  $\mathbb{Q}$ -Modules)" (n° 171 (ix)), I have adopted a slightly different terminology, using the term "De Rham coefficients" (for short) to describe this "same type of object", of which we will give three *different descriptions* (or three *different "photos"*). Two of these will be called "De Rham - Mebkhout coefficients" (or simply, "Mebkhout coefficients"), "of infinite order" and "of finite order" respectively.

(\*\*) (30 May) In the initial version of these notes, getting carried away by my predilection for the point of view of the

From the 'algebraic geometry' point of view, I had assumed that  $X$  is an *algebraic* variety over  $\mathbf{C}$ . This did not correspond to the framework in which Mebkhout had initially placed himself, not to mention that it made me state a variant of the 'good God theorem', for  $\mathbb{Q}$  complexes $^\infty$  -Modules, which is true as such only when we assume

or simply  $\underline{\text{Cons}}^*(X)$  ("topological" aspect), that of  $\mathbb{D}$  complexes $^\infty$ -Modules with coherent cohomology faisceaux (\*\*), generalising complexes of differential operators of infinite order, which I note  $\text{DRM}^*(X)$  (transcendent "analytic" aspect), and finally the category

complexes of  $\square_X$ -Modules with coherent cohomology bundles, generalising complexes of ordinary (finite order) differential operators, which I note  $\text{DRM}_\infty^*(X)$  ("algebraic" aspect). There is a tautological functor extending scalars from the coherent Ring  $\square_X$  to the Ring  $\mathbb{D}^\infty$

$$_X \quad i : \text{DRM}^*(X) \rightarrow \text{DRM}_\infty^*(X),$$

inserted in a functor diagram (essentially commutative) :

$$(1) \quad \begin{array}{ccc} \text{DRM}^*(X) & \xrightarrow{i} & \text{DRM}_\infty^*(X) \\ & \searrow m & \swarrow m^\infty \\ & \underline{\text{Cons}}^*(X) & \end{array},$$

where the oblique arrows are the "associated De Rham complex" arrows (\*), which is none other than

that  $R\text{Hom}_D(Sp^*, .)$ , where  $D = {}_{DX}$  or  $D^\infty_X$ , and where  $Sp^*$  is the Spencer resolution<sup>(\*)</sup> of  ${}_{OX}$  by locally free D-modules (\*).

The existence of vertical arrows comes from the "Kashiwara constructibility theorem", which implies that the De Rham complex associated with a holonomic *D-module* complex has analytically constructible cohomology bundles. Kashiwara had proved this important theorem in 1975 (\*\*), albeit from a completely different angle. He worked with a single holonomic D-module, of which he took the De Rham complex and proved that its cohomology is constructible. Until September 1979 and the subsequent 'rush' triggered by the Good God Theorem, he and nobody else in the beautiful world was working in the spirit of derived categories, and the very idea of writing the vertical arrows in (1) had never occurred to anyone!

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X clean. So there were some misunderstandings in my mind, and Mebkhout had to kindly call me to order.

When I put these few pages back on the net, I made the necessary corrections.

(\*\*\*) About the definition and the first sorital facts concerning the theory of Modules and  $\square$ -Modules, the reader may wish to refer to the note "The five photos (crystals and  $\mathbb{D}$ -Modules" (n° 171 (ix)), and more particularly parts (a) and (b) ("De Rham's coefficients album", and "La formule du bon Dieu").

(\*) (24 May) See the note already quoted "The five photos...". (n° 171 (xi), part (ai).

(\*\*) Masaki Kashiwara, On the maximally overdetermined System of linear differential equations, I Publ.

RIMS, Kyoto university 10 (1975), 563-579.

Once the three arrows (1) have been written as arrows between derived categories (\*\*\*)<sup>1</sup>, the question arises as to whether they are indeed category equivalences. Mebkhout was convinced of this as early as 1976. He became convinced when he drew up a table of about ten typical examples (reproduced in his expository article with Lê Dung Trang (\*)) of constructible vector bundles that can be called "elementary", which are also of the type that constantly occur in the "unscrewing" of bundles familiar from the theory of stale cohomology. From that crucial year 1976, for each of these bundles, he succeeded in constructing a remarkable holonomic complex, both on  $D_X$  ("algebra") and on  $D^\infty_X$  ("analysis"), having (from the point of view of the six operations) a very simple algebraic or analytic cohomological meaning, and whose De Rham complex is the bundle in question.

Remarkably, while he started with a constructible bundle and not a complex of bundles, in a number of cases the holonomy complex that gives rise to it is in no way reduced to a single cohomology bundle. This clearly showed him that, in accordance with the spirit of the "six operations" (whose name he did not know...), if there was any equivalence, it could not be deduced from an equivalence between the categories of moduli bundles (on  $C$ , or on  $D$ ) themselves, but only made sense by passing on to derived categories.

For me, it is quite clear that *the act of creation*, in this case, consisted in seeing and writing down the two *obvious* arrows  $m$  and  $m$ , which nobody had deigned to write down - in asking the 'very simple' question whether they might not be, at times, equivalences of categories, thus providing a differential algebraic interpretation, and another differential analytic one, of the topological notion of constructible  $C$ -vector bundle (or complex of bundles). There was the *question*, and a *clear awareness of the crucial nature of this question*, of its scope - and by the same token, and as a matter of course, an inner attitude that *assumed* this question, that was going to see it through to the end. Preliminary 'experimentation' with examples

(\*\*\*) Strictly speaking, it would probably be more correct to say that these are full sub-categories (defined by conditions of "constructibility", or coherence, holonomy and regularity) of derived categories in the ordinary sense.

(\*) Lê Dung Trang and Zoghman Mebkhout, Introduction to linear differential systems, Proc. of Symposia in Pure Mathematics, Vol. 40 (1983), part 2, p.31-63. Zoghman recommended this short article to me as the best introduction in the literature to the philosophy he has been developing since 1976. The bibliography also contains a (complete?) list of Mebkhout's publications on this theme, at least up to 1983.

"typical" or "elementary" was a first step in this direction.

That was the childish and essential step, the one that can only be taken by those who know how to be alone. Once that step had been taken, the first of my cohomology students to come along, using the unscrewing and solving techniques he had learned from me in SGA 4 and SGA 5, was capable of proving it in a matter of days, or even weeks - provided, of course, that he got the hang of it, that he felt (as Mebkhout had felt and through his gut) the *meaning*, the *substance* of the question. But there was not a single one of them, not even Deligne, who had given up trying to find the unifying vision that would go *beyond* the key idea of the 'six operations' (\*), and who was still lacking in linking continuous coefficients and discrete coefficients - not a single one who could see the scope, obvious though it was, of Mebkhout's ideas, of this vague unknown who still came across as the spitting image of Grothendieck...

As for the 'vague unknown', reduced to his own resources and reading, asking himself about the equivalence of categories must have seemed to him (with good reason) the most obvious and childish thing in the world, or to come to the conviction that these were indeed equivalences. On the other hand, lacking experience and encouragement from more experienced elders, he developed a world of demonstration that for a long time seemed entirely out of his reach.

However, he managed to find a demonstration after a year and a half already, first of all for the arrow  $m$ , in March 1978. He told me that, psychologically, my comparison theorem for De Rham's algebraic and transcendental cohomology had been a great help in putting him on the road to a demonstration. For some reason that I didn't quite grasp, he also considered his theorem (namely that the functor  $m$  says "of the good Lord",

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(\*) (5 June) On rereading, this formulation seems hasty and a little 'out of touch' with reality. In fact my "key idea of the six operations" was inseparable from a "philosophy of coefficients", which provided (and very clearly at least since 1966) for a "theory of De Rham coefficients" (intimately linked to my crystalline ideas), having the same essential formal properties as the theory of  $A$ -adic coefficients, and forming with the latter (for a variable  $A$ ) as many different "realisations" of the same type of ultimate object, the "motif". Mebkhout's work, carried out between 1972 and 1980, seems to me to be a first major step towards the realisation of this intuition - a step for which everything was ripe, practically speaking, at least as early as 1966 with the start of crystalline yoga, when the problem of a theory of De Rham coefficients was clearly posed, in my mind at least. If this step was not taken by any of my cohomology students from the 1960s onwards, this seems to me to be mainly due to mechanisms blocking spontaneous creativity, which was not lacking in any of them. On this subject, see the note "... and hindrance" (n° 171 (viii)).

to avoid saying Mebkhout..., is an equivalence), as being a "generalisation" of my comparison theorem. At that moment, he also knew that he had the necessary tools (with Hironaka's solving technique) to deal with the case of  $m$ , by far the most interesting for an algebraic geometer like me. He, as an analyst, had first focused on the case of the  $m_\infty$  functor, which was his preference (\*). He did not return to the question, which seemed to him to be rather secondary, until after the defence of his thesis, and demonstrated the following month (in March 1979) that the functor  $m$  (the one that everyone today uses in periphrasis without ever writing it down, so as not to have to name an unnameable author...) is indeed an equivalence of categories (\*\*). As a result, the functor "change

ring"  $i$ , from "algebraic" (in which he was still only remotely interested) to

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(\*) (24 May) Another reason, perhaps a stronger one, is that in the case of the  $\mathbb{Q}^\infty$ -modules he had a magnificent inversion formula at his disposal - see on this subject the note "The five photos" (n° 171 (ix)), part (b), "The good Lord's formula".

(\*\*) Mebkhout did not write the formal demonstration of the fact that  $m$  is an equivalence (demonstration on the same principle as for the functor of the "analytic" God  $m$ ) only two years later, at the end of 1980. This demonstration is set out in the second of two consecutive articles (the first of which deals with the analytic God functor  $m$  and takes up his thesis), "Une équivalence de catégories" and "Une autre équivalence de catégories", in Compositio Mathematica 51 (1984), pp. 51-62 and 63-88. (Manuscripts received on 10.6.1981.) But from March 1969 onwards, and throughout the following years, he communicated this result (together with the one concerning the functor  $m$ ) wherever the opportunity arose, and in particular to Deligne in June of the same year.

I think that because of his extreme isolation, and because of his analyst's 'glasses', he didn't realise that it was above all the functor of the good *algebraic* God that was going to interest people like Deligne and others, because it forms a 'bridge' between topology and algebraic geometry (while waiting for arithmetic, which I seem to be the first and only one to glimpse...), of a scope comparable to that provided by the stale cohomological tool. Otherwise he would have written it up immediately and published it immediately - especially given the mores (of which he was still ignorant...) of the strange milieu into which he had strayed. Yet his first misadventure (with Kashiwara), in March 1980, should have tipped him off (x).

It was in this same month of March that a note appeared in Mebkhout's GRAS "sur le problème de Riemann-Hilbert" (t. 290, 3 March 1980, series A - 415), in which he states the equivalence theorem of his thesis (for  $m_\infty$ ), and cautiously asserts that "one hopes to show, using the method of cohomological descent as for, 1e duality theorem [7] that the functors  $S$  [which I have called  $m$ ] and therefore  $T$  [which I have called  $i$ ] are also equivalences of categories". In fact, his demonstrations showed that these are equivalences "locally on  $X$ ", which already implied, in particular, the famous Kawai-Kashiwara theorem (discussed in the next sub-note), namely that the functor  $i$  (extension of scalars) induces an equivalence between

"the analytic" (transcendent), was also an equivalence.

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It was in March 1978 that Mebkhout had his third meeting with his 'benefactor' Verdier, whom he had not seen for two years. He explained the ins and outs of the (future) 'God's theorem', which he modestly called the 'Riemann-Hilbert equivalence'. With hindsight, Mebkhout is convinced that his explanations must have gone right over Verdier's head. What is certain is that Verdier was completely unaware that his 'protégé' had just presented him with ideas that deserved to be considered. He didn't mention it to anyone around him, not even to Deligne, who learnt the theorem of the good God (at the same time as the duality theorem known as "Poincaré-Serre-Verdier", which the same Verdier absolutely did not want to believe in three years earlier... ), from Mebkhout more than a year later, at the Bourbaki seminar in June 1979 (four months after the viva). In any case, Verdier gave the go-ahead for Mebkhout to present his results as a state doctorate thesis, for which he agreed to form and chair the jury. The fact that the thesis was not defended until a year later was due to the administrative delays imposed by the notorious. If it took a year for the thesis to be defended, it was because of the administrative delays imposed by the famous "Commission des thèses des Universités de la région parisienne" (an institution that Verdier held dear as the apple of his eye...).

As I said in a previous note (\*), the defence took place in an atmosphere of general indifference. Mebkhout may have sent his thesis out left and right, but it continued to go unnoticed - nobody even deigned to acknowledge receipt of the pamphlet.

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the category of regular holonomic  $\square$ -modules, and that of holonomic  $\mathbb{D}^\infty$  -modules. I should point out in passing that Mebkhout's final result is considerably stronger, even when applied to *modules* (instead of complexes of modules), owing to the fact that he asserts at the same time that canonical arrows

$$\mathrm{Ext}_{\mathbb{D}_X}^n(M, N) \rightarrow \mathrm{Ext}_{\mathbb{D}^\infty}^n(M_\infty, N)_\infty$$

from the "scalar extension" functor, are also isomorphisms (and not only for  $n = 0$ ).

(x) (25 May) In a letter dated 24 April, Mebkhout wrote: "I have to tell you that after my thesis I took a breather. I'd been under a lot of stress for four years.

(\*) See the note "... and the windfall" (n° 171 (iii)).

But Mebkhout is not giving up. Despite the evidence to the contrary, he feels part of a 'family' - people, after all, who do the same kind of maths - the kind of maths he learnt, in large part, by following my writings, and even more, by being open to a certain *spirit* in these writings (\*). Apparently he doesn't yet realise, at least not on a conscious level, that this spirit has long since been repudiated by the very people who make up the 'family' he believes he has joined, and that for these fine gentlemen who entered mathematics on high-wool carpets, he is a laggard and an intruder.

(<sup>171</sup> 2) (15-17 April)

(a) But our friend Zoghman, unsuspecting as yet and isolated as he is, is not unhappy. Since 1973 he has been lucky enough to have an assistant post in Orléans, which gives him the freedom to do the maths that interests him, and so much the worse if for the moment it only interests him. He continued to live in the Paris region, attending seminars and keeping abreast of the literature...

If he had stopped to think about it, he would have realised that all was not for the best in this 'family' that pretended to ignore him, even though he felt part of it. He had come to realise, by consulting my writings, that at least a good part of the 'good reference' that had been like manna from heaven for him, was by no means the work of his 'benefactor' Verdier. The notion of constructability was developed at length

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(\*) One may wonder (or ask me) what is this famous 'spirit' so particular to my writings, which inspired my 'posthumous pupil' Zoghman Mebkhout, and which was 'repudiated' by all my other pupils, led by Deligne, and by a fashion that followed in his footsteps. If I try to find a filiation for this spirit (to the extent that my more than fragmentary knowledge of the history of mathematics allows me to do so), I would say that it is in the line of *Galois*, *Riemann* and *Hilbert*. If I try to define it in terms of a dynamic of forces at work in the psyche, I'd say it's a mind that manifests itself through a harmonious balance of 'yin' and 'yang' creative forces, with a 'base note' or 'dominant' that is y i n, 'feminine'. A more detailed description of this approach to mathematics, and to the discovery of the world in general, emerges in the course of the reflection in the notes "The rising sea", "The nine months and the five minutes", "The funeral of yin (yang buries yin (4))" (n° 122, 123, 124), which is taken up again in the notes "Brothers and spouses - or the double signature", "Yin the Servant, and the new masters", "Yin the Servant (2) - or generosity" (n° s 134, 135, 136). For a reflection on certain mechanisms of 'visceral' rejection of this 'spirit' in the contemporary world, see the two notes "La circonstance providentielle - ou l'Apothéose" and "Le désaveu

(1) - or recall" (n° s 151, 152).

and at length in SGA 4 as early as 1963, twelve years before Verdier pretended to invent it in this article. With the publication of SGA 5 in 1977, even in the form of the Illusie murder-edition, it appeared that this famous "Verdier biduality" for complexes of analytically or algebraically constructible -vector bundles had been copied purely and simply from the first paper in SGA 5 (the very one referred to in a volume with the strange name "SGA 4S" by: "various supplements are given in SGA 5 I" (\*)!). In this same strange volume, the author of which likes to express himself with superb disdain about the satellite volumes SGA 4 and SGA 5 which surround it, he was able to see an exposé on the cohomology class associated with a cycle, from which the volume of "technical digressions" SGA 5 (supposedly later) had been relieved (we did not really know why). . ); at the same time, he realised that the cohomological aspect (dual of the homological aspect) of the theme which gave its name to his benefactor's article, had also been copied from SGA 5. for none of these three themes (\*\*\*) in "the good reference", was there any allusion to me or to SGA 5. ...

He could not yet know, of course, that what remained of Verdier's article (apart from three pages out of fifty) had been 'pumped' from my lectures on the formalism of stale homology and homology classes associated with algebraic cycles, lectures which had disappeared (as if by chance), and without the slightest hint of their existence, from the Illusie edition of recent memory. But the few facts at his disposal were certainly more than enough to alert a well-informed and alert person to the fact that this was, in short, a situation very similar to the one I had found myself in ten years earlier, flipping through Deligne's article on the degeneracy of spectral sequences, in which he glossed over both the initial motivation and the whole yoga of weights (as well as the role of my modest self), and the contribution of Blanchard's ideas, using precisely Lefschetz's 'cow' theorem for fibres (\*\*\*\*). Like me once, Zoghman then had to silence his lucid perception of an unpleasant reality, telling himself (in this case) that it must be a customary 'connivance'.

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(\*) For this priceless euphemism, aimed at the appropriation (by him, Deligne, this time) of the same ill-fated theorem of biduality, see the b. de p. note (\*\*) on page 872 to the sub-note 'Le cheval de Troie' (n° 1693).

(\*\*) These are the "three themes": constructibility, biduality for constructible bundles, and the cohomology (and homology) class associated with a cycle.

(\*\*\*) For details, see the beginning of the note on "Eviction" (n° 63), and the b. de p. note (\*\*) on page 233. of this note.

between master and pupils, that the master closes one eye when his pupils present as their own ideas, techniques or results that they have taken directly from him (\*\*\*\*). As is often the case in such cases, this interpretation (which suited Zoghman well) did not lack an element of reality. On more than one occasion, I had indeed been a party to such ambiguous situations (but it is also true that before I left, things had never yet reached this point, where the master's work becomes a corpse whose pieces are shamelessly shared...).

Moreover, in the wider family made up of all those interested in the cohomology of varieties, including the Japanese of the Sato school, all was not so much for the best either.

This same Kashiwara, whose 1975 constructibility theorem had been providential in defining the "good God's functor", had also pretended to claim authorship of these unfortunate constructible bundles, which suddenly everyone was practically snatching up! He had renamed them "finitistic sheaves" for the purpose, in par. 2 of his quoted article, where he repeats more or less verbatim the developments of SGA 4 on this subject. From what I have heard from various quarters, Sato's school is familiar with my cohomological work, even though they quote me only sparingly (\*), and it is hard to believe that Kashiwara was not aware of the notion of constructibility, at least in the étale context, where it is the notion of finiteness central to the whole theory. It goes without saying that Verdier the following year no more cited Kashiwara for the 'finitist' (sic) notion than he breathed a word about a certain deceased person or a certain seminar (\*\*). It's all very well for both of us to be from the same 'family' - maybe - but when it's the beefsteak of the author's vanity, everyone grabs it for himself... . (\*\*\*)

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(\*\*\*\*) (30 May) And all the while kindly calling him a smoker on top of it all...

(\*) Mebkhout wrote to me on this subject (24 April 85): "The only references to you that I've seen in the Japanese Sato school are in Chapter 0 of EGA III, although they were shamelessly inspired by your work".

(\*\*) As chance would have it, this seminar (SGA 5) was the very one (with SGA 4) which, by common agreement

between my cohomology students and, in the words of their leader Deligne, was destined to be "forgotten" (thanks to the publication of his digest-coup-de-scie...).

(\*\*\*) (24 May) Mebkhout points out that I'm painting the picture a bit darker here. Verdier was completely unaware

Kashiwara's article and the notion of holonomy, which Mebkhout taught him during his 'interview' with Verdier in 1976. (This was before the publication of the correct reference (published at the end of 1976, it seems), but logically one cannot expect him to quote Kashiwara, when he knows that both he and his colleague are 'pumping' from the same unnamed source....) Conversely, Kashiwara was unaware of the 'correct reference' and of my biduality theorem (which appears in it under Verdier's authorship); it was Mebkhout who gave them to him.

I think it was easier for Zoghman to say to himself that a Japanese person he had never seen (\*) was definitely a 'swindler', than to have to say this about prestigious elders, one of whom was for him like a powerful and distant father and benefactor, elders whom he had the opportunity to rub shoulders with in seminars, and with whom he even had the honour of being 'yours and yours' (as has been the custom in French mathematical circles since the days of Bourbaki).

(b) Paradoxically, Zoghman's troubles began the day a certain world began to realise the power of one of the tools he had brought into the wake of a whole philosophy (of a kind that was, however, considered to be decidedly outdated...). He told Deligne about it in June 1979, and Deligne listened attentively to his explanations of the duality theorem, and even more (as you might expect) of the God theorem. He even very kindly told him that he had read the introduction to the thesis, and that he thought there must be some beautiful mathematics in it (\*\*). Life was good for Zoghman that day - but not for long.

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made known in January 1978, at the same time as the results of chapter III of his thesis. These were subsequently shamelessly appropriated (and practically without demonstration) in the aforementioned article by Kashiwara-Kawai

- See on this subject the note "The five pictures (crystals and  $\mathbb{Q}$ -Modules)" (n° 171 (ix)), especially page 1005. The fact that Kashiwara ignored the biduality theorem for discrete coefficients shows, among many other signs noted here and there, how far he was from Mebkhout's philosophy of duality, directly inspired by my work.

(\*) (24 May) He did catch a glimpse of the famous Japanese once! Mebkhout writes to me on the subject (22 April 85) :

"The Sato school came in full force in 1972 for a conference on hyperfunctions. They hid their methods well. For a long time, their results remained unobtainable. There was a certain mythology surrounding this school, which means that now Kashiwara can afford to do what he does."

(4 June) It has to be said that if it is indeed true (as Mebkhout seems to be suggesting here) that the Sato school initiated the method of surrounding oneself with obscurity in order to dominate, then this process has found emulators on this side of the Pacific, who are now not outdone by their masters! And it was they, not Kashiwara and co, who masterminded the incredible Perverse Colloquium hoax, in which Kashiwara was used as a convenient 'pawn' to prepare the ground - and then to be dropped... .

(\*\*) (3 June) Mebkhout had already received an equally gratuitous compliment the previous year from Illusie, at the Colloque d'Analyse p-adique in Rennes. See on this subject the note "Carte blanche pour le pillage" (n° 174), page 1091 (and in particular the b. de p. note (\*\*)) on the same page).

That same year, in September 1979, he took part in the Colloque des Houches (\*), where he gave a talk entitled "Sur le problème de Hilbert-Riemann", presenting his equivalence theorem. His presentation seemed to go completely unnoticed. One of the highlights of the Colloquium, on the other hand, was a talk given by Kawai a few days before, announcing a remarkable and unexpected result obtained in collaboration with M. Kashiwara. In a rather convoluted and incomprehensible form (in accordance with the particular style developed by the Sato school (\*\*)), this theorem stated that on a complex (smooth) analytic variety, the "change of scalars" functor from  $\mathbb{Q}$  to  $\mathbb{Q}^\infty$  induces an *equivalence* between the category of  $\square$ -holonomic modules "with regular singularities", and that of  $\square$ -holonomic modules. Their demonstration was to be the subject of a very long article of more than one hundred and fifty pages, which has since been published (\*\*\*)�.

Mebkhout, like all the other listeners, was a bit at a loss. This theorem, which was presented as sensational and no one really understood what it was all about, nevertheless had a familiar 'je ne sais quoi' for him. In the days that

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(\*) The Proceedings of the Les Houches Colloquium (1-13 September 1979) were published in Lecture Notes in Physics n° 126 (1980), Springer Verlag. These Proceedings include both Mebkhout's paper "Sur le problème de Hilbert - Riemann", setting out the whole of his philosophy (which I would call that of the "De Rham coefficients") perfectly clearly and with supporting references for the demonstrations, and the paper presented by Kashiwara and Kawai. Any reader of good faith will be able to verify, by comparing the two articles, that there is not the slightest hint of a philosophy of this kind, nor the slightest allusion to something like the "God's theorem", in the article by these two authors.

(4 June) In his letter of comment dated 22 April, Mebkhout expressed the same view of the International Congress of Mathematicians held in Helsinki the previous year (August 1978):

"I must say that I attended the lecture by Kashiwara who was keynote speaker at the Helsinki congress (August 1978). There was no philosophy either remotely or closely related to the comparison between discrete and continuous coefficients. I took care to write up illico my Copenhagen lecture, which had taken place a week before, and to make it available to the mathematical community, which is supposed to be the judge. The same Kashiwara's lecture is published in the Proceedings of the [Helsinki] Congress.

(\*\*\*) (4 June) See a previous footnote on this subject (note (\*) page 1052). It is especially in the wake of the Colloque Pervers, it seems to me, that the style of deliberate obscurity has been perfected, on this side of the Pacific, into a method of systematic mystification and appropriation for the purpose of befuddlement.

(\*\*\*) M. Kashiwara, T. Kawai, On holonomic Systems of microdifferential equations III, System with regular singularities. Pub. RIMS 15, 813-979 (1981).

I can imagine that in the turmoil of the Colloquium, it must have taken him a day or two just to put the theorem into a form that a non-Japanese could understand. I can imagine that in the turmoil of the Colloquium, it must have taken him a day or two just to put the theorem into a form that a non-Japanese could understand. From then on, it was a done deal!

I bet none of the Westerners present had the slightest idea what these "regular singularities" were. But Mebkhout had defined a notion of  $\square$ -Module holonomie *régulier* (\*) a few years before, for the needs of a 'philosophy of coefficients' that was still in its infancy. This one, at least, had a very precise meaning for him - and, taking the appropriate *derived category* and moreover going "through the looking glass", he knew how to interpret this category in terms of the corresponding derived category of "constructible discrete coefficients". At least, he had demonstrated at length in his thesis the analogous interpretation, in terms of this same category of discrete coefficients "on the other side", of the category of holonomic  $\square$ -Modules - and he knew well that he had in hand everything he needed to prove the analogous also in the case of "regular holonomic  $\square$ -Modules". This he had done in his thesis, practically, in the form of a *local* result on  $X$ , which was already sufficient to imply the "sensational result" of Kashiwara-Kawai. Thus, the point of view of the derived categories, and that of the interplay between continuous coefficients and discrete coefficients, gave a result of the type of Kashiwara-Kawai, but in principle much stronger still, since it gave at the same time an isomorphism between higher  $\text{Ext}^i$ , and not only at the level of  $\text{Hom}$  (which was all that was obtained by working with the "discrete coefficients").  $\square$ -Modules without more, instead of derived categories formed with such Modules). Having said that, it was a devil of a thing if this Japanese notion of "regular singularities" was not equivalent to his own - so that the prestigious result would in fact be a pure and simple corollary of his philosophy of coefficients, to which no one had hitherto deigned to take any interest.

When the entire Colloquium comes to honour with its presence the presentation of a vague stranger, scheduled on the programme for some reason, and at the end of the conference (\*\*) with arrows and diagrams (the sort of thing that was done in the sixties and which has long since been out of fashion among serious people), this fellow announces

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(\*) For Mebkhout's definition of the regularity of a holonomic complex of  $\square$ -Modules (along a divisor  $Y$ ), see the note "The work... . " (n° 171 (ii)), p. b. note (\*) page 950. "Regular" at all means. regular along *any* divisor (on any open).

(\*\*)(4 June) In fact, Mebkhout had taken care to allude to this at the start of his lecture, naively thinking

that it would have the effect of hooking his listeners.

without laughing that the famous 'nail' of the Colloquium (which no one would have been able to repeat, which only made it all the more impressive...) - that this 'nail', therefore, was an immediate corollary of a theorem of equivalence of categories (we're asking you a bit 1) that he had obtained between the corresponding *derived categories* (what is it with these animals?), and another one that didn't seem to have much to do with them, a theorem that would appear in a *thesis* (that's the last straw!) that he swears he sent a long time ago to Mr Kashiwara and many other eminent colleagues in the large audience, it all looks like a bad joke. There is an awkward silence, and a few smiles. It was (no doubt) to dispel the embarrassment caused by the young lout that Mr Kashiwara himself asked the customary question. He looks a little stunned, I have to say; he's probably wondering if he's dreaming (\*). . . As for the questioner, he doesn't let it put him off. It's just that he's not going to start a second lecture over the first one - that'll be the day!

The next minute, our quidam Zoghman found himself alone in front of the blackboard, with his beautiful diagrams in front of an empty room. . . No one that day, or in the days that followed, bothered to ask about the ins and outs of the so-called 'results' of this lout, whom we had been so wrong to invite to such a distinguished Colloquium.

(15 May 1986) In writing this account last year, from what I had learned from Mebkhout, I was of course convinced that Kashiwara, at the time of the Colloquium, was totally unaware of the double equivalence of categories, one in the  $\mathbb{Q}$ -Modules framework, the other in the  $\mathbb{Q}^\infty$ -Modules framework. Now, the mere fact that the first of these equivalences had already been made explicit nearly two years earlier by Ramis (cf. b. de p. note (\*) p. 950), in the form of a conjecture *attributed to Kashiwara*, removes the slightest credibility from Mebkhout's version of the Colloquy's events, which version is now for me akin to pure fabrication; and

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(\*) (4 June) Mebkhout writes to me along these lines (22 April):

"After the Les Houches conference, someone told me that this same Kashiwara thought his article with Kawai was empty. But he spared no effort to dishonestly catch up. It had been five years [since his 1975 paper proving his constructibility theorem] since he had touched discrete coefficients. His sudden fame [thanks to this article] due to a whole other problem allowed him to get on with more 'serious' things - especially not bombing! Between 1975 and 1980 I was *the only one*, in the midst of general hostility (something I understood afterwards) to develop this childish philosophy that I learned from your writings."

This is irrespective of whether Remis's attribution of authorship was well-founded or not (something of which I for one am convinced). Having said that, it's not out of the question, given how little attention had been paid until then to the equivalence of the two categories, that Kawai and Kashiwara didn't see the wonderfully simple geometric reason for the validity of a theorem they were attacking with analyst's glasses, and that it was indeed Mebkhout who drew their attention to this fact. I'll probably never know what really happened. Still, it seems to me that [...] Houches that both Kashiwara and Mebkhout understood for the first time the power hidden behind these 'silly' categorical statements, to which neither of them until then seemed to have paid much attention. It is not surprising, then, that Kashiwara should take the first opportunity that presents itself to assert his authorship of a statement that he had hitherto ignored.

This "first opportunity" arose on 22 April 1980, seven months after the Colloque des Houches, in an oral presentation by Kashiwara at the Goulaouic-Schwartz seminar, "*Faisceaux constructibles et systèmes holonomes d'équations aux dérivées partielles linéaires à points singuliers réguliers*". I have deleted a page and a half of comments on this episode, which I wrote in April last year (in the wake of the report on the Colloque des Houches). So it was at a time when I had no doubt, according to the version Mebkhout had given me, that it had been an act of brigandage pure and simple by Kashiwara. So my account was given with a sarcastic verve worthy of a better cause, and at Kashiwara's expense. In retrospect, however, I am convinced that Kashiwara cannot be accused of the slightest incorrectness. In his presentation, he gave the statement and a first outline of a proof of a theorem, which he had indeed been the first to conjecture back in 1975. He doesn't even bother to mention it, since it was something that must have seemed secondary to him, and moreover 'well known' among well-informed people (with the sole exception of Mebkhout, one would think). What's more, he has the good sense to specify on page 2:

"Note that the Theorem is also proved by Mebkhout, by a different route."

This was even "lending to the rich", because just the previous month, in his note to the CRAS of 3 March 1980, Mebkhout had expressed himself in hypothetical terms "we hope to show

without the slightest hint of a role for Kashiwara in the Riemann-Hilbert problem (apart from a reference to Kashiwara's perennial constructibility theorem of 1975). Clearly, Mebkhout's note, which merely reiterated some of the results of his thesis, was a way (like Kashiwara's presentation) of 'taking (or re-taking) the date' and asserting his authorship. It is fair to say that on this occasion he was less correct than Kashiwara, who (it seems) gave him more than his due, while Mebkhout pretended to ignore him outright.

This does not alter the fact that he is totally convinced [?] (it would seem) that it was he who taught Kashiwara the whole Riemann-Hilbert problem at the Colloque des Houches. It was on the strength of this unshakeable conviction that he made an 'outburst' at the end of Kashiwara's talk, which he had attended. On this subject, see my account and comments of last year, in the note of 2 June 'Carte blanche pour le pillage - ou les Hautes Oeuvres' (note written, I would remind you, at a time when Kashiwara's bad faith was beyond doubt for me).

Mebkhout's unshakeable conviction that he is in the right (vis-à-vis Kashiwara, at least), which does not seem to have changed one iota even as I write these lines, is surprising! Moreover, I don't think it's out of the question for him to have arrived at the relevant conjecture, known as the Riemann-Hilbert conjecture, as early as 1976, following his reflections on the global duality theorem. Nevertheless, in his comments on his thesis, written in his own hand on 25 October 1978 (in response to certain criticisms of the Verdier report on his thesis (\*), of which Houzel had informed him orally), Mebkhout states (top of last page):

"The author learned about the link with B. Malgrange's *Riemann-Hilbert* problem in a discussion during the November 1976 *Bourbaki* seminar session, in which *M. Kashiwara* took part."

It was a way of not saying that it was from Kashiwara himself that he learned of this 'link', which Malgrange himself attributes to Kashiwara (without in any way thinking of claiming authorship). In a 'normal' atmosphere and disposition, it would have gone without saying that Mebkhout would have admitted Kashiwara's priority for this conjecture, even if he had come across it independently a year later. But in the comment quoted he tries

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(\*) See the note "Le rapport - ou le massacre débonnaire", n° 171<sup>✉</sup>.

obviously to conceal the role of Kashiwara (who, it would seem, had merely "taken part" in a conversation between Mebkhout and Malgrange!) And a year and a half later, at Kashiwara's famous talk, he completely and 'in the best of faith' forgot that Kashiwara had anything to do with the Riemann-Hilbert problem.

It must still have been going through Mr Kashiwara's mind, once the pomp and circumstance of the occasion had passed. The fact remains that just a few months later, at the 1979-80 Goulaouic-Schwartz seminar, in an oral presentation on 22 April (\*\*), he announced *as his own* this same theorem, which had had the effect of casting a pall over a certain Colloquium

! However, he is kind enough to add, on page 2 :

"Note that the Theorem is *also proved* by Mebkhout *by a different route*" (emphasis added) (\*).

This "also demonstrates" is worth its weight in Kashiwara, even though it's a theorem that neither he nor anyone else suspected, and that he had just learned (a few months before) from the person concerned himself/having not bothered to read the thesis that the latter had sent him nearly a year before 1 If he had known about this theorem before, it's certain that he wouldn't have bothered to give a 167-page demonstration, to prove a 'cow' result of analysis which was an immediate corollary, and even the corollary of a corollary.

The phrase 'by a different route' is also priceless. Zoghman assures me that there is no demonstration of his theorem in the literature other than his own, and I doubt very much (given the kind of demonstration, which is very familiar to me, and for good reason) that one will ever be found. It's a demonstration that corresponds to a geometrical approach to things, using the resolution of singularities à la Hironaka - a tool that has become for me (and

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(\*\*) (4 June) Goulaouic-Schwartz seminar 1979-80, presentation by M. Kashiwara on 22 April 1980, "Constructible bundles and holonomic systems of linear partial differential equations with regular singular points". For details of this memorable seminar session, at which *Mebkhout was present*, see the note "Carte blanche pour le pillage", n° 1714.

(\*) I quote here the text of the written presentation, which was written by Kashiwara a year after the oral presentation. For details, see the note cited in the previous b. de p. note.

for my students) a second nature, and which the analysts (and in particular those of the Sato school) ignore. So much so, in fact, that Kashiwara clearly did not feel capable of simply *copying* Mebkhout's demonstration...

This kind of whitewash scam can work, *as long as there is a general consensus that covers it up*, at the expense (in this case) of a vague unknown. It would be wrong for all these people (\*\*) to be embarrassed, given that the said unknown person has obviously been left out in the cold by the very people who are best placed to know the facts at first hand, and who have a personal and direct responsibility towards the person concerned: J. L. Verdier (chairman of the thesis jury) and P. Deligne (the first person to realise the significance of the result he had learnt from Mebkhout the previous year).

While I'm on the subject of Kashiwara, I might as well finish this chapter with the epilogue of the total elimination of the unknown on duty, following on from the dazzling example given three years earlier at the Colloque Pervers in June 1981. This is an article by R. Hotta and M. Kashiwara "The invariant holonomic System on a semi-simple Lie algebra" (*Inventiones Mathematicae* 75, 327-358), published in 1984 (received 2.3.1983). This article, as is clear from line 6 of the introduction, is one of the many applications of the semipitrary 'Riemann-Hilbert correspondence', known as the 'good God' (or the 'service unknown'). In this article, *the name of the stranger is not mentioned, nor does it appear in the bibliography*. Already aware of the mentality of the second author, but unable to prejudge the bad faith of the first, Zoghman wrote to him to inform him that he was the author of the theorem crucially used there, and to object to the fact that he had not been cited as such. Instead, the reference was to the paper already cited by Kawai-Kashiwara (167 pages long), in which the said theorem does not appear at all (\*). Hotta replied that he had not

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(\*\*) (4 June) For a 'parade' of the actors who played a direct and active part in the mystification-scam surrounding Zoghman Mebkhout's work (or at least those of whom I was aware), see the note 'The mafia' (n° 171), part (f) 'The parade of actors - or the mafia'. By the way, this parade is not complete

- For a more complete list (listing the names of *thirteen* mathematicians of international renown), see the note "Le jour de gloire" (n° 171 (iv)), b. de p. note (\*) page 962. Still missing is the name of R. Remmert, who has appeared in the meantime (see the aforementioned note "La maffia", part (c<sub>1</sub>) "Les mémoires défaillantes - ou la Nouvelle Histoire") - and fourteen others! (Not counting an anonymous referee - and fifteen...)

(\*) (25 May) As already explained elsewhere (in "The five photos (crystals and  $\mathbb{Q}$ -Modules)" note n° 171 (ix), see in particular page 1005), the work in question contains only "half" of the theorem of the good God, half plundered from chap. III of Mebkhout's thesis.

appeared necessary to quote him, since in any case *it was well known that the correspondence in question was due to Kashiwara and Mebkhout*. Curtain...

(c) But Japan is far away, and if my friend Zoghman toiled for years breaking spears against distant Japanese, it's no doubt because it was far more painful for him to face up to the reality of a mafia that is by no means confined to continents on the other side of the world, but which is just as much at the top of the game in the posh seminars of Paris as it is in Moscow or Tokyo. It's time to return to the sweet country of France, and to the 'little family' formed by my dear ex-students in cohomology, and (the slightly larger one) that has formed around them since the distant days of my 'death'.

News travels fast sometimes. During 1979 and 1980, with the help of Deligne and the Colloque des Houches, 'they' must have realised that a promising theorem had just appeared on the mathematical market, due, alas, to a vague and retarded Grothendieckian.

but that there was a ready-made substitute for this uninspiring paternity in the person of the well-known Japanese analyst Kashiwara, who was only too happy to play the father of the famous 'Riemann-Hilbert correspondence'.

In January 1980, Mebkhout gave a talk on his unfortunate theorem at Le Dung Trang's "seminar on singularities" at Paris VII. Jean-Louis Brylinski did not attend the talk, but Le Dung Trang spoke to him about it and had him read his notes. According to what he himself told Mebkhout, as soon as Brylinski heard Mebkhout's theorem, he exclaimed: "But with this, we'll prove the Kazhdan-Lusztig conjecture! (A conjecture that was considered 'unapproachable', as it were, by the augurs).

One might think that Brylinski would go to him, to have him explain in more detail the mysteries of the conditions of holonomy and regularity, giving a precise meaning to the theorem he needed. But according to what he himself candidly explained to Mebkhout, he had been advised not to turn to him, but to the eminent Kashiwara. He did not specify who this 'someone' was. But he obviously had a keen ear (as well as a sharp mind), and was as unknown at the time as Mebkhout still is today. He wasn't told twice, and went to ask Kashiwara, who must still be around, as was his right. The result was a joint paper with Kashiwara, published in *Inventiones Mathematicae* (64, 387-410) in 1981 (received on 19 December 1980), with the title "Kazhdan-Lusztig conjecture and holonomic

Systems". Brylinski found himself an overnight star, and deservedly so, while Kashiwara added another jewel to an already impressive list of achievements (\*).

Everything would be for the best in the best of worlds, but... The same 'we' must also have suggested that the less said about a certain vague unknown, the better. In any case, in the manuscript sent to *Inventiones*, *Mebkhout's name did not appear*, either in the text or in the bibliography.

Mebkhout was aware of the preprint of the article, and complained to Brylinski about the procedure, writing to R. Remmert, editor of *Les Inventiones*. Brylinski reacted 'flexibly' (in a style with which I am now quite familiar. . . ), by adding on proofs at the end of the bibliography (out of alphabetical order) *three* thumbnail references to Mebkhout (while we're at it I), without making the slightest allusion in the text to the denounced Mebkhout (\*). A reader of this article, if by any chance he sees the name of an illustrious unknown added at the end of the bibliography for God knows what reason, will say to himself that it must have been put there to please a friend...

*Brylinski's rise to fame was a swindle.* The truth is that the conjecture he demonstrates was unaffordable until a new tool appeared. Regardless of the *authorship* of this tool, nothing in this article highlights this new tool, whose role is concealed from the outset (lines 6 to 8) by the 'explanation' (sic) neither flesh nor fish :

"The method employed here is to associate holonomic Systems of linear differential equations with R. s. on the flag manifold with Verma modules, and *to*

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(\*) To associate the celebrity Kashiwara with the demonstration he had just found, and in which Kashiwara had had no part, while passing over in silence the crucial role played by his unknown young colleague, was the 'entry price' that Brylinski paid, without being asked, for his entry into a certain 'milieu' of famous people - the milieu which gives its name to the present note 'The Mafia'...

(\*) The introduction to Brylinski-Kashiwara's article concludes with thanks to various contributors, including authors, including Jean-Louis Verdier and, needless to say, without any mention of the stranger on duty). It continues with a par. 1 devoted to a summary of "holonomic differential systems with regular singularities" (this is the name in Japanese, for  $\square$ -regular holonomic moduli). In the opening lines of the said paragraph, we read, "For the détails and proofs, we refer the reader to 6, 15-173." Reference [6] is Kashiwara's 1975 paper establishing his constructibility theorem, while [15- 17] (added on proofs) is the "thumb reference" to Mebkhout. The honour is safe, whatever happens, for the 'young man of the future' Jean-Louis Brylinski. ...

*use thé correspondance of holonomic Systems and constructible sheaves".*

(emphasis added). There is not the slightest reference or explanation about this famous unspecified "correspondence". "The young first must have been told that this "correspondence" was now supposed to be a matter of common knowledge, for which there was no need to invoke a particular theorem, and thus to raise incidental and (above all) premature questions of authorship. And Brylinski, who is an up-and-coming young man, was not told this twice... .

As for Remmert, he forwarded the letter from the unknown complainant to the referee of the Brylinski-Kashiwara article. The referee rejected the complaint, expressing the opinion that "the result *was known independently, and probably earlier, by Kawai and Kashiwara*", referring to the "Reconstruction theorem" that he attributed to these authors (referring to p. 116 in the article by the authors cited, in the "Seminar on Micro-local Analysis" Guillemin, Annals of Math; Studies, n° 93).

This assessment by the referee, who is supposed to know what he is talking about, is scandalous on two counts, and shows that he is a party to the same swindle, in collusion with (for the time being) Kashiwara and Brylinski. It would already be scandalous, on the simple *presumption* (\*) of anteriority of results obtained independently (according to the very opinion expressed

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(\*) (4 June) I am even disregarding the fact that this presumption was unfounded. Remmert's letter (dated 26.1.1981) transmitting the referee's reply does not, moreover, mention the date of the Guillemin seminar (quoted in the letter) and of Kashiwara's talk. At the last minute I contacted Mebkhout in Italy again (by telephone...) to ask him for details of this reference and its date. I learnt that Kashiwara's presentation took place in 1978, a few months after Mebkhout had sent him Chap. III of his thesis (in January 1978) - Mr Kashiwara didn't waste any time ! As the thesis was not defended until February 1979 (due to the slowness of the apparatus represented by the Commission des Thèses des Universités Parisiennes, so dear to J. L. Verdier...), this could give a plausible basis to the 'presumption' of anteriority of the referent, at least as far as the 'Reconstruction Theorem' is concerned. But if the referee (in addition to being in good faith, which is already obviously not the case) had done his job conscientiously, he would have noticed that there is nothing resembling a *demonstration* of the "Reconstruction Theorem" in Kashiwara's quoted paper.

Mebkhout moreover returned to the charge, in a letter dated 25.3.1981 in which he stressed 1° ) that the theorem invoked by the referee was "one of the most important results of his doctoral thesis" and that he had communicated this result, with its proof, to Kashiwara (but he forgot to say *when* - Zoghman never does others!), and 2° ) that this theorem was "largely insufficient to establish the equivalence of categories".

Such practices obviously open the door (and have long opened the door...) to the most serious abuses (\*). But there are

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in question". R. Remmert did not deign to reply to this letter, which came from a complainant with no name and no support.

Zoghman told me earlier (I'll end up knowing everything, by dint of insisting. . . ) that he learned about the Kashiwara swindle at the Guillemin seminar the following year, in 1979, the year he defended his thesis. This was his very first encounter with the kind of methods used in the mafia. By the time of the Colloque des Houches, in September of that year, he already knew what to make of the great star Kashiwara. But as his philosophy and his results were written down in black and white and published, demonstration and all, he would never have imagined that there could ever be any question of purely and simply disregarding his work, once its importance had been recognised. And the first sign of the power of his approach came precisely at the Colloque des Houches, in connection with the Kashiwara-Kawai theorem.

Of course, in January 1978, Mebkhout (who still had no reason to be suspicious at the time) had spoken to Kashiwara not only about what he called the 'biduality theorem' (later renamed the 'reconstruction theorem' for the purposes of a scam), but also about the complete God theorem, of which it was in fact one 'half' (the shallower 'half' of the two). He told me that for the biduality theorem, Kashiwara had 'got the hang of it', it seemed as if he'd already been asking himself questions like that; but obviously he hadn't the faintest idea how to prove it (although Mebkhout's proof doesn't use singularity resolution). As for the theorem of the good God, it went completely over his head - so much so that he had completely forgotten it by the time of the Colloque des Houches. And yet Mebkhout had sent him, like everyone else, his complete thesis at the beginning of the same year (1979) (at a time when he hadn't yet realised the fraud of the Guillemin seminar, the year before). Another thing that shows that the theorem of the good God had completely escaped the kingpin is that he didn't even think of pocketing it as well, out of a clear conscience so to speak (even if he didn't understand what it was all about...), in that same talk at the Guillemin seminar.

Not having had the advantage until now of holding Kashiwara's paper in my hands, I wondered whether it might not give the impression, to an uninformed reader, that the philosophy developed by Mebkhout would have been known to Kashiwara (and by his own means, as he says) from 1978 at least. Zoghman has promised to send me a copy of the paper in question, which, he assures me, will enable me to disabuse myself. There is (he says) an accumulation of technical statements, more or less (in)comprehensible (Kashiwara could do no less. . . ), without demonstration and without any apparent central thread, nor anything (any more than in his lecture in Helsinki the same year, or in that of the Colloque des Houches the following year) resembling a 'philosophy of coefficients' linking continuous coefficients and discrete coefficients.

(x) (16 June) Mebkhout tells me that the presentation was in fact given by *Kawai*, as a joint project with Kashiwara.

more. The "reconstruction theorem" that he cites (and which is also plundered in Mebkhout's thesis (\*), where it appears under the (improper) name of "biduality theorem") is still far from the equivalence of categories (known as "Riemann-Hilbert") used in the proof of the incriminated Brylinski-Kashiwara article, an equivalence due to Mebkhout alone, and which he in no way implies (\*\*).

As far as I'm concerned, there can be no doubt about the bad faith of the referee, relying on the connivance of the co-homologist establishment to boycott the name and work of a vague unknown for the 'benefit' of famous people. Anyone with a modicum of cohomological-analytical culture, and a modicum of interest in a fascinating subject, can see for themselves the reality of the facts, and see the crude deception to which the anonymous referee contributes (\*\*\*)�.

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(\*) This is exactly the same attitude as that expressed three years later with the same cynicism by R. Hotta (in the reply to Mebkhout quoted above): the new 'rule', or to put it better 'the law of the middle', is to quote people in positions of power (even out of place) and not to quote unknown people (even though their contributions are decisive and attested by indisputable publications).

I do not question R. Remmert's good faith on this occasion. I do note, however, that as the publisher of *Les Inventiones*, he is directly responsible for this swindle, independently even of the fact (which he could not have suspected) that he was misled by a dishonest referee. The referee had expressed the (cynical, given the circumstances) 'hope' *'that, as a courtesy, Brylinski and Kashiwara would mention Mebkhout's result'*. It was R. Remmert's role, as publisher, to ensure that Mebkhout's result was duly mentioned in the text, not as a 'courtesy', but *out of respect for the elementary rules of ethics of the mathematical profession*.

(30 May) Since these lines were written, I have become aware of a new fact, which throws unexpected light on R. Remmert's role in the swindle surrounding Zoghman Mebkhout's work, by showing his active participation in the swindle surrounding mine. As a result, the presumption of good faith that I had retained in his regard (out of old habit, and in the absence of irrefutable signs to the contrary) vanished for me. Interested readers will find details of this 'new fact' in part ( $c_1$ ) (of the note 'The mafia') that follows, under the heading 'Failing memories - or the New History'.

(\*) On the subject of this pillage, see the note "The five photos (crystals and  $\mathbb{Q}$ -Modules" (n° 171 (ix)), end of part

(b) ("La formule du bon Dieu"), p. 1005.

(\*\*) See the note already quoted (also part (b)) for the relationship between Mebkhout's "biduality theorem" and the "God's theorem", of which it is one half - the shallower of the two. It makes no use of resolution, whereas the complete theorem uses the full force of Hironaka's resolution of singularities (which is a typically "geometric" tool that was ignored by the Japanese school at least until the early 1980s).

(\*\*\*) (30 May) And to which R. Remmert, in his capacity as publisher of *Inventions*, is giving his unstinting support.

The situation is all the more ambiguous in that neither Kashiwara nor any other Japanese or other specialist in differential systems uttered the word "derived category" until 1981 (\*\*\*\*), and even less is there the slightest reflection in the sense of a "philosophy" linking discrete and continuous coefficients - which philosophy is quite absent, to tell the truth, from the vague references to a certain "cor- respondance (sic) between holonomic systems (resic) and constructible bundles (reresic)". To this day, none of these fine gentlemen has had the honesty *simply to spell out in black and white* (as I did earlier) *the categories involved*, and the arrows from one to the other which establish their equivalence - On the other hand, a whole series of seminar papers, notes and articles by Mebkhout since 1977 attest to his pioneering work, carried out since 1972 in complete solitude (\*).

I must confess that until I came face to face with the thing, and looked at it and examined it at length and from every angle (\*\*), I would never have suspected, even in a dream, that such shameless collective despoilment could ever take place in the world of scientists.

- And it's a strange thing to have to tell myself that this iniquitous mystification was staged above all by the combined efforts of two of my closest former pupils; and what's more, that the signal was given by the *appearance of a continuator of my work* - a work in which I had invested myself passionately, giving it the best I had to give (\*\*\*) After I left, this work became the target and prey of covetousness

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reserve .

(\*\*\*\*) (25 May) Mebkhout points out to me that this sweeping statement needs to be qualified somewhat. While derived categories were practically taboo in France after my departure, the Japanese school continued to use them sparingly. This was a convenient technical means (to avoid having to use spectral sequences, in particular), but it was by no means the 'tailor-made' language for an intrinsic geometric vision of 'coefficients', in the cohomology of varieties and spaces of all kinds.

(\*) For a list of these articles, which I won't go into here or even enumerate, I refer you to the aforementioned article by Mebkhout and Le Dung Trang (in Proceedings of Symposia in Pure Mathematics, 40 (1983) part 2).

(25 May) See also the bibliographical references given throughout the pages in the note "Three milestones - or innocence" (n° 171 (x)).

(\*\*) (1 June) I first did this last year, in the week from 2 to 9 May (when I wrote "Cortège VII", called "Le Colloque - ou faisceaux de Mebkhout et Perversité"), and again almost two months ago, writing "L'Apothéose

(\*\*\*) As I was typing up this (rather badly scratched) page, it occurred to me that if my investment in the in this work has borne (among others) such unforeseen and unwelcome fruit, it is undoubtedly because in

from those who were closest to me, and from a secret violence which, beyond my person and my work, strikes those who openly drew inspiration from it... .

(c<sub>1</sub>) (30 May) six weeks after writing the preceding pages, I am taking a break from the account of my friend Zoghman's misadventures to dwell a little on the 'new development' alluded to in a previous footnote (note (\*) on page 1061). The pages that follow can be read as an interesting complement to the flowering of the 'new style' mentioned elsewhere (\*), which excels in the art of writing (to everyone's satisfaction...) a 'New History' (of a certain theme in contemporary mathematics, in this case...). Readers in a hurry to find out more about the misadventures of my friend Zoghman (lost in a circus he could not have foreseen) can continue directly with 'La Répétition Générale (avant Apothéose)' (part (d) which follows, dated 16 April).

I have read the introduction and bibliography of the book "Non Archimedian Analysis" by S. Bosch, U. Guntzer and R. Remmert (\*\*). This book sets out the theory of rigid-analytic spaces, rightly presenting J. Tate's 1962 ("private") notes, "Rigid- analytic spaces", as the starting point for the theory. It is stated in the introduction that R. Remmert "had been able to obtain a copy" of this rare document, which had represented

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In this investment itself and in the spirit that animated me, there was not only this 'best of myself' that I like to underline here, but there was also the 'worst'. This is something that had become quite clear in Fatuity and Renewal (the first part of Harvest and Sowing), but it's also something that powerful egotistical mechanisms keep pushing me to forget! I'm beginning to realise that this 'worst' was only *glimpsed* in the course of last year's reflection, that I haven't really examined it in depth, or taken a 'tour' that reveals its various facets in any real detail. That's why my knowledge of it remains superficial, as does the action of that knowledge (in my relationship to the Burial, in particular).

This fourth part, "The Four Operations" of Harvesting Seeds, is above all a meticulous recounting of rough *facts* relating to the Burial. This 'stewardship' work has, however, helped me to feel that a deeper understanding of the Burial will come not so much from the kind of work I've been doing for nearly three months, but from a deepening of the work done in Fatuity and Renewal, that is to say also from a deepening of my knowledge of who I was, in those distant days 'before my departure'...

(\*) See the note "Les félicitations - ou le nouveau style", n° 169.

(\*\*) Grundlehren der Mathematik, n° 261 (1984).

in a way, the Birth Act of a newcomer in the aeropage of notions of 'varieties' (analytical, in this case).

Remmert must have forgotten that it was I who had taken care to have this document multigraphed by the IHES (which was just starting up) and to send a copy to him and to other specialists in complex analytic spaces - just to draw their attention to this unexpected extension of their favourite theme. This was at a time when none of them was even pretending to be interested in basic bodies other than the real or complex ones - but you never knew... .

Remmert must also have forgotten that if I was then so interested in circulating among my friends this text attesting to the birth of a new geometrical 'universe', it was (among other things) because I had been closely associated with this birth. The very name of rigid-analytic space had been coined by me, before Remmert or anyone else (not even Tate!) had heard the name or even dreamt of the *thing* it was supposed to express. I was the first to see Tate's "loxodromic" theory of elliptic curves as having to be a "quotient passage" for a kind of "analytic" varieties which did not yet exist, and which should give rise to algebraic-analytic comparison theorems of the "GAGA" type of Serre. There was another motivation that showed me the way to this same type of new object

the need to be able to define a "generic fibre" for formal schemes of finite type over a ring of discrete valuation. As a third indication along the same lines, I had heard that Krasner (well known in Parisian mathematical circles in the fifties and sixties as an original who had an army of cats living in his house, and who went round all the seminars wearing his big Russian-style coat and looking hilarious all the time... . ) - that this Krasner was therefore 'doing analytical extension' on non-archimedean value bodies. I didn't know any more than that, and I'm not sure I'd ever met anyone who had read Krasner's work on the subject - but it was intriguing. It has to be said that the term 'analytic continuation' didn't in itself have the virtue of making my heart beat faster (on the contrary, it brought back rather unstimulating memories of my student days...); but once I saw the need for a new type of geometric object, it was bound to click... .

To return to Remmert - if his memory is so faulty, Tate's original text (which he prides himself on possessing) might refresh it. In his notes, Tate makes no secret of the role I had played in the conception of the theory (\*), writing between

others (I'm quoting here from memory) that he was following "in a fully faithful way" a master-builder (for a process of constructing the notion by "putting pieces back together") that he got from me. I had also provided him with a certain type of 'building blocks' (or 'localisation procedure' in algebras of restricted formal series), for the needs of the fibres of formal diagrams. He had supplemented these first 'pieces' (or 'procedures') with those of a second type, in a way complementary.

This new notion would probably never have seen the light of day (nor would stellar cohomology, nor crystalline cohomology, nor many other things that followed in its wake, including even the latest 'pie in the sky', the famous  $\mathbb{Z}$ -Modules...) if I hadn't had the guiding thread of 'generalised spaces' (*which* later became *topos*), the theory of which remained to be done, but had already been foreshadowed for four years. It was this intuition that showed me the way to a type of 'variety' which, it was true, *went beyond* the context of ordinary (locally annelated) topological spaces.

From the time when the *local theory* of rigid-analytic spaces had been started by John Tate, it was also I who posed and popularised the statements of the first crucial "global" theorems to be proved about these new varieties, statements which had been present in my mind even before the first groundwork h a d b e e n done: algebraic-analytic comparison theorems for proper relative schemes on a rigid-analytic space, finiteness theorem for  $R_{f^*}$ , for a proper mor-phism f of rigid-analytic spaces - problems solved by Kiehl in the years

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(\*) More than twenty years have passed since those distant days, when a close friendship bound Tate and me, and his family and mine. I haven't heard from him for years. Nor am I aware that he, or any of my former students and friends who could not fail to have read this book, was moved by the evasion of my name in the introduction. Other times, other customs...

that followed (\*\*\*) (\*\*\*\*). But it is true that, according to the wind that blows these days, it is considered as unimportant, and in the end, quite simply smoky, to foresee new notions, to identify the project managers, and to ask the questions that the real mathematicians would like to take on the task of solving...

In any case, my name is not mentioned in this introduction as having anything to do with rigid-analytic spaces. Nor is Krasner's, for that matter.

- On the contrary, Tate's theory is presented as introducing "a structure rich enough to make the impossible possible: analytic continuation on totally discontinuous bodies" - whereas in 1962 the said analytic continuation ("impossible") had already been Krasner's official "raison social" (so to speak) for ten years, if not twenty or thirty (I couldn't say). Nor is there any trace of Krasner or me in the abundant bibliography. My name does, however, appear in passing towards the end of the introduction, in the name 'Grothendieck topologies'; for this notion reference is made to Artin's notes (from 1962), superbly ignoring (following the example given by the entire cohort of my ex-students...) the meticulous work of clarification done in SGA 4 (since 1963 and throughout the sixties, but under an obviously undesirable authorship...). No allusion either, no doubt about it, to the role I assigned to rigid-analytic spaces in the

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(\*\*) I should point out that from the moment Tate laid the first foundations of a theory of rigid-analytic spaces, it was clear to me that the context in which he was placing himself was still provisional, and in no way exhausted the intuitive content that I had tried to express by the name "rigid-analytic space" - any more than finite-type schemes over a body exhaust the intuition associated with the word "scheme". A thread leading to a substantial broadening of Tate's context (which I put forward to anyone who would listen...) was provided by Tate himself, who had written a "universal Tate elliptic curve" on a certain topological ring (the sub-ring of the ring of formal series  $\mathbb{Z}[[r]]$  which are convergent for  $r$  in the open unit disc of the complex plane, if I remember correctly), which ring obviously had to be considered as the "affine coordinate ring" of a rigid-analytic space, of a type which did not fit into the panoply proposed by Tate. Given the general contempt into which all questions of foundations fell after I left, it is not surprising that the conceptual apparatus set up by Tate in 1962 has not moved a muscle since then.

(\*\*\*\*) (4 June) I was also the first to insist on the need to introduce, for rigid spaces-analytic space, more general 'points' than those envisaged by Tate (with values in *finite* extensions of the base field only). This necessity was suggested as much by the analogy with algebraic geometry as by the desire to find a concrete interpretation of the 'points' of the topos associated with the rigid-analytic space under consideration.

development of crystalline cohomology, at a time (in 1966) when Remmert (and none of his eminent colleagues in complex analysis) showed the slightest interest in these strange (so-called) 'rigid-analytic' varieties that some algebraic geometers had concocted in their corner - as if complex analytic spaces were not enough to occupy the leisure time of serious analysts and geometers. ...

You only need to have first-hand knowledge of the true history of the genesis of the theory set out in the book to see how this introduction displays the same cynicism that was also expressed in the reply made by an anonymous referee to an unknown complainant (with the blessing of this meine R. Remmert): clearly, in the minds of the authors, it is a simple question of 'courtesy' again, of a 'kindness' in short that they are free to grant or refuse, whether or not they are going to include in their 'history' (sic) the name of so-and-so who had played a crucial role in the genesis of the new theory. For them (and, it would seem, for almost the entire mathematical establishment, which takes this kind of falsification in its stride. . . ), 'History' is not *what actually happened*, but is something that can be *decided* sovereignly by the person who arrogates to himself the right to write it, or by the consensus of a handful of people who decide what has a right to be, as well as what has a right to have been.

These people love to talk about what happened in the Soviet Union, and they won't miss a chance (I know what I'm talking about) to sign manifestos for the 'defence of freedoms' (of thought and all that. . . ) *in other countries*, while exercising the same dictatorship of lies where *they* have the power.

(3 June) When I mentioned the picturesque and endearing figure of Krasner on the previous pages just a few days ago, I wondered if he was still alive. He was a generation or two older than me, and it had been ages (well over fifteen years, if not twenty) since I had heard his name. Although I remembered him vividly, it took me a few seconds before I remembered his name. (Admittedly, this is the kind of thing that happens to me a lot now, with age...) Krasner had a reputation for being very hospitable, and his Russian origins were another point in common that could have brought us together. But I was too immersed in my maths to have the time to make friends just 'for the fun of it'. Our ways of approaching math-

tics must surely have been poles apart. We must have chatted together once or twice, between two sessions of a Bourbaki seminar if that's possible, but certainly not about maths. And maths was the only thing I was really interested in...

In any case, today I received a little note from Deligne, just a few lines on a practical matter of no consequence, perhaps to remind me (it must be a few months since there was an exchange of letters between us); or also to place a postscript, which I take the liberty of reproducing here (assuming his agreement):

"P. S. I was saddened to learn that Krasner had died a fortnight ago. I still remember a lecture he gave in Brussels about twenty years ago, which went right over my head, but where I was one of the few remaining listeners. It struck me that he didn't appear in your picture of the fifties (\*), where he did some fine things - even if he was a stranger to the spirit of Bourbaki, and with a genius for badly twisted definitions.

So here is another Eulogy, this time for one of my co-burials. In this one I think I can see a feeling of sympathy, or perhaps the reflection of such a feeling that had once been alive. But no more than in my Funeral Eulogy, my friend Pierre will unbend his teeth to say, in honour this time of a departed without return, *what* were these 'beautiful things' to which he likes to allude without naming them. He knows as well as I do, however, that these 'things' paved the way for the advent of a theory that is now in full bloom - and that, for reasons that he may know, the New Masters have taken to prematurely burying (alongside me) this good-natured, messy and 'untidy' precursor who has just passed away; one, surely, who was 'doing analytical continuation' on ultrametric bodies, at a time when Tate, Remmert and I were still 'doing' the 'new', the 'old', the 'new'.

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(\*) There has been an obvious misunderstanding of my purpose in the first part of *Récoltes et Semailles*, "Fatuité et Renouvellement". At no time was my intention to paint a mathematical 'picture of the fifties', even if only that of the Parisian milieu or that formed around Bourbaki. My main aim was to discover my past as a mathematician. This is what led me to talk about my relationship with certain colleagues or students, when this appeared to be important in my life, or when it could enlighten me about myself.

the equality of triangles and Pythagoras's theorem, and where our friend Pierre was still getting his nose wiped (and wiped...) by his mother!

(d) (16 April) But I have to return to the series of notorious 'misadventures' of my posthumous pupil Zoghman Mebkhout.

I have no idea what was going through Deligne's mind in June 1979, when he heard from a vague stranger, claiming to be inspired by Grothendieck's ideas, the elegant solution to a crucial problem (\*), which he had been working on for a year ten years earlier without coming up with an answer that satisfied him. But I have the impression that his gravedigger's instincts were such a hindrance to his flair (which I had known to be astonishing), that he too has not grasped, even now (six years later), the true scope of the ideas and vision of the vague unknown. Like everyone else, all he saw in the end was 'the cream pie', the unexpected tool that everyone was waiting for, the iron to fracture 'problems of proverbial difficulty'. One day, however, he had made his own a vast vision that someone else had communicated to him - only to bury both the vision and the person in whom it was born, and seize yet another tool, also transformed into a 'fracturing iron' . . .

The first known trace of any reaction by Deligne to Mebkhout's theorem is a short undated handwritten letter to Mebkhout, received on 10 October 1980 (\*\*).

"Dear Mebkhout,

I've sent Bernstein and Beilinson my copy of your thesis: they need your results for their proof of the Kashdan-Lusztig conjecture (I have a summary, in Russian, of their work, which I'll send you if you like). Could you send me another one?

Thank you for your time.

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(\*) (25 May) It is possible that Deligne had long since lost the meaning of this "crucial" character. See on this subject the note ". . and hindrance" (n° 171 (viii)).

(\*\*) this is the document "communicated under the seal of secrecy, and of which I shall say no more here. . . .", referred to in the note "The victim" (page 309). With the benefit of a year's hindsight, Zoghman has kindly allowed me to reproduce it here.

## P. Deligne"

I presume, from this letter, that Deligne must have informed the two Soviet mathematicians about the Good God Theorem, perhaps suggesting that it could be used to prove the conjecture in question; either he realised this himself, or it was already rumoured that Brylinski had ideas on this subject. The presentation by Mebkhout that had 'triggered' Brylinski was already in January 1980. The papers by Brylinski-Kashiwara on the one hand, and Beilinson-Bernstein on the other, proving the famous conjecture using the unnamed theorem of an even less named unknown, were received, one on 19 December 1980, the other on 8 December 1980, i.e. *eleven* days apart. Simple coincidence?

It even occurred to me why Deligne, who knew about the new tool before anyone else, as early as June 1979 (since no one, including Deligne, had bothered to read the pamphlet by the vague unknown) - why didn't Deligne himself think of applying it to this conjecture, and thus reap new laurels instead of helping his Soviet colleagues to pick them? And yet he is no less sharp-witted than Brylinski? It could be that from that moment on, he saw the possibility of recovering by the back door an authorship over the theorem of the good God himself, which (as he must have felt) should have been his for ten years already; that it was by a sort of inadmissible misdirection that this ill-behaved young presumptuous man had arrogated to himself the right to prove things that he, Deligne, had already worked on for a long time without any conclusive success. In the end, he had only been a hair short of succeeding, it wasn't fair for someone else to reap the rewards where he had sweated in vain... But if he wanted to reclaim what was rightfully his (according to the unwritten law that has come to prevail in a certain high-flying milieu of which he feels he is the centre and kingpin...), he had to manoeuvre with an entirely different tact, and not try to swallow too much at once (\*).

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(\*) It is a simple presumption that the appropriation of the famous 'correspondence' was present from the time Deligne became aware of it. I for one am convinced of this. It is true that the letter quoted above would seem to give a presumption to the contrary. For my part, I see in it the sign of yet another challenge - that he, Deligne, had absolutely no need to pay any attention whatsoever, as long as it concerned a vague stranger, who *would not budge*, in *any case*, when he was alone against everyone; that he, Deligne, could allow himself to be 'compromised', just as he could also allow himself, by the provocative appellation 'faisceaux pervers', to proclaim, in a symbolic yet striking way, the true nature of his dispositions. On this subject, see the note "Perversity" (no.° 76), and (in a rather similar, but less extreme, psychological context) the note "The joke - or the 'weight complexes'" (no.° 83).

In any case, Zoghman, already scalded by the strange episodes with Kashiwara and Brylinski, thought it prudent to go and inform Messrs Beilinson and Bernstein himself of the theorem that Deligne had said they needed - just in case such a great man as Deligne had forgotten to remind them, when talking about the theorem, who the modest author was. The following month, from 24 to 28 November 1980, the "Conference on Generalized Functions and their Applications in Mathematical Physics" was held in Moscow. Mebkhout gave a talk on his theorem, published under the title "The Riemann-Hilbert Problem in higher dimension", and he took care to speak to Beilinson and Bernstein in person to explain the ins and outs of his result in detail.

It came at just the right time. Barely ten days after the conference, the two authors sent their work on Kazhdan-Lusztig, in the form of a note to the CRAS (t. 292, 5 Jan. 1981, series I - 15), "Théorie des Groupes - Localisation de g-modules". Note by Alexandre Beilinson and Joseph Bernstein, forwarded by Pierre Deligne. Not surprisingly, Mebkhout's name was not mentioned in their manuscript - apparently Deligne had entirely forgotten to tell them about the vague unknown, whose thesis he had nevertheless communicated to them, precisely for the purpose of... ? Comprene qui pourra ! Mebkhout had great difficulty in convincing Beilinson ("the more honest of the two", he assured me with the greatest seriousness in the world) that in the article by Kashiwara-Kawai that they cited in the bibliography, there was everything except the "construction" (replacing here the endless "correspondence") of which they too, like everyone else, spoke only by allusion, (surely Deligne, w h i l e informing them of the thesis of the unknown where the desired result was indeed to be found (\*), must have suggested to them that it was perhaps more reasonable, if they wanted to give a reference, to quote an article by Kashiwara and it didn't really matter which one, since no one would go and look at it that closely\*) We still promised the said unknown, who appeared there in person, that we would think about him and that we would rectify the situation for Kashiwara.

Sorry - the story of my friend Zoghman's misadventures is decidedly repetitive.  
! In the note from these brilliant authors, *forwarded by Deligne* (whose letter I have just reproduced, written just a month before), *Mebkhour's name is not mentioned*. That of Kashi-

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(\*) (17 April) There was at least a very similar result in the thesis, even if the version in the form used by Beilinson-Bernstein (and by BrylinskiKashiwara) did not appear in full. See the b. de p. note of the same day (note (\*\*)) page 1047 for further details.

wara either (and I can already see a bit of an ear sticking out. . . ). On the other hand, in the last part of the note (proving Kazhdan-Lusztig), there is a double reference to a "*construction exposed* in [4], [5] . . ." The reference [4] is to an article by Kashiwara (the father of temporary substitution). In this article, of course (no more than in Kawai-Kashiwara's, which is written off), there is nothing remotely resembling the 'construction' mentioned by these authors; Moreover, this article dates from 1975 (\*), i.e. nearly five years before the presentation of a vague stranger at a Colloquium in Les Houches gave this same Kashiwara the idea that it would not be so stupid after all to utter the word 'derived category' and thus appropriate, according to the simple law of the strongest, credit for the work done by others. As for the reference [5], it's Mebkhout's talk at the Colloque des Houches in September 1979 - the same one in which Kashiwara

(\*\*) It is worth admiring the vagueness of the expression "the construction *set out* in...", which leaves entirely open the question to whom this "construction" (or "correspondence", or "relation". . . ) is *due*. ); this question was resolved with the virtuosity we know only six months later, at the famous Colloquium (see the note "Le prestidigitateur", n° 75<sup>¶</sup> ): we will learn, in the Beilinson-Bernstein-Deligne article, that the laconic reference [4] [5] (in two places where, surely, the construction had to be (by chance) 'exposed') was pure courtesy, and that the brilliant father of the 'correspondence' is indeed the one we guess...

But even apart from the conjuring trick I've just mentioned, it's already a swindle in itself to refer to a new, profound and difficult theorem by the term "the construction set out in...", as if it were a simple "construction" which had just happened to be lying around and which the authors had chosen, also by pure chance, to use here for their brilliant demonstration. I recognise here the same spirit as that of the "SGA 4 1/2-SGA 5" operation, which consisted in recalling (in passing) "the construction exposed" in SGA 4 and SGA 5 of a formalism of scalar cohomology (as well as the "gangue of nonsense" from which the brilliant author had been obliged to extract it), before pretending to roll up his sleeves and start doing "*real maths...*".(25 May) On the subject of this 'new style', see the note 'Les félicitations - le nouveau style' (n° 169 )<sub>9</sub>

(\*) Checked, this is the article by Kashiwara already cited, in which he demonstrates his con- theorem. structibility, which of course plays a crucial role in defining "God's functors" (functors that nobody except Mebkhout had ever dreamt of before the rush of 1980). It is a gross swindle to pretend to confuse Kashiwara's theorem (which no one would dream of disputing) with the theorem of the good God, which is incomparably more profound, and of a completely different scope. From the point of view of demonstration, this theorem uses all the power of Hironaka's resolution of singularities. From the 'philosophical' point of view, which is much more important still, it establishes bridges between topology, algebra and analysis that were lacking in the cohomological formalism (while waiting for arithmetic, if some of those I see gravediggers end up recovering the use of their healthy faculties. . . ).

learnt that derived categories could be useful, and for more than just ripping off a stranger left behind by his bosses and elders.... .

No more than in the Brylinski-Kashiwara article is there anything to give the slightest hint, to a reader who is not really 'in the know', that this brilliant note would not have seen the light of day, without the appearance of a new and providential tool, hidden under the euphemism 'the construction set out in...'. I also recognise the tried-and-tested (\*) method of drowning a fish, known as 'dilution', by 'mating' the person you want to drown (even though you want to be 'thumbed' and be able to say, if need be, that you quoted him or her... . ) with another, who has nothing to do with the question or whose role is minimal, as if to say here (between the lines, and yet very clearly): this vague stranger who has been put there (purely as a courtesy and in view of his insistence) has no more to do with this famous 'construction' (about which the newcomer consensus dictates that we speak only by allusion and as if it were something well known to everyone. ...) than we have with the 'construction' (about which the newcomer consensus dictates that we speak only by allusion and as if it were something well known to everyone. ...). . ), than an article published in 1975, at a time when no one in the wider world deigned to utter the word 'derived category' (if only in jest. . . ).

(e) I do not regret having taken the trouble, for my own sake as much as for that of any mathematician reader who might be interested in the subject, to review here the three preliminary swindles surrounding the theorem of the unknown on duty. These swindles are the work of Kashiwara, Brylinski-Kashiwara (with the assistance of a referee who shall remain anonymous), and Beilinson-Bernstein, with a Deligne in the wings (\*\*). They show a striking uni-formality of style, on which I need not dwell any further. It's the style I've come to know so well throughout my long investigation of L'Enterrement (\*\*\*)<sup>1</sup>, and which is strikingly prefigured in the 1968 article by my most brilliantly gifted pupil, the same Pierre Deligne (\*\*\*\*). And this circumstance is also enough to remind a

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(\*) For other examples of this method known as "dilution by assimilation", see the sub-note "Les vraies maths..." n° 169<sub>5</sub> ), b. de p. note (\*) page 885.

(\*\*) (5 June) Deligne's role "behind the scenes" is clear, at least in the third episode, and there are has strong presumptions along the same lines for the second. But it would seem that Kashiwara 'opened fire' (for the swindles surrounding Mebkhout's work) on his own account as early as 1978, at a time when (it seems) Deligne was not yet aware of anything. On this subject, see part c) of this note ('Entrance fees - or a young man with a future'), b. de p. note (\*) page 1060.

(\*\*\*) on the subject of this style, see the end of the above-mentioned note "Les félicitations - ou le nouveau

style", n° 169<sub>9</sub>.

I only remember my attitude of ambiguity and complacency towards Deligne and others, whom I saw as brilliantly gifted, and I am not without having contributed my share to the corruption that I see everywhere today.

It is also becoming clear that the apotheosis of the Colloque Pervers in June 1981, barely six months after the third episode we have just reviewed, did not come out of the blue. Strangely enough, this colloquium was (to my knowledge) the first and only one after my departure to be devoted (admittedly without saying so, but nonetheless unequivocally) to exhuming a certain aspect of 'Grothendieckian mathematics', through the unforeseen opportunity of a new tool suddenly appearing, which proved to be irreplaceable. This tool could only be used in a way that was close to things that the consensus of fashion had long since dismissed as obsolete and vaguely ridiculous (\*). And by a strange twist of fate, due to the particular genius of my brilliant ex-student, this dazzling confirmation in practice, and under the pressure of need, of an approach disavowed by him and by everyone else, was also the occasion, through the medium of this same colloquium, of the total and definitive burial of the deceased and unnamed master, in the company of the posthumous student (also unnamed) who had had the good fortune (or misfortune...) to bring all these fine people together.

This colloquium did not come out of the blue, no. One of the characteristics of my friend Pierre Deligne is that he knows how to wait and seize the right moment. The three episodes surrounding the 'cream pie', with the almost complete elimination of any mention of the stranger on duty, clearly showed him that the moment was ripe to discreetly pick up, with his characteristic smiling and affable nature, what was in any case supposed to be rightfully his. I presume there was careful consultation with Verdier, who had to be made to understand that the moment had come to exhume with great fanfare the derivative categories and a 'paternity' that had long been repudiated; at the same time, to bury in the limelight both the vague unknown and the long-deceased master (in case anyone had the bad idea of remembering that he had had something to do with all these beautiful things that suddenly seemed like the 'latest thing'...). ).

Kashiwara as the father of a certain good-never-named theorem,

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(\*\*\*\*\*) See the beginning of the note "Eviction" (n° 63).

(\*) For the psychic mechanisms at work behind these 'fashionable consensuses', which overlap with a certain 'visceral reaction' of rejection to a certain style of approach to mathematics, see the notes already cited "La circonstance providentielle - ou l'Apothéose" and "Le désaveu - ou le rappel" (n° s 151, 152).

It was fine for a while, as long as it was understood that the theorem in question was not going to be named or written down. Kashiwara himself must not have been too keen on this theorem, which he understood even less than Verdier himself - he must have picked it up in passing, as if by accident, the occasion and habit helping. Deligne, on the other hand, who knew how to wait, was well aware that this theorem would not remain the theorem without an address or a name forever. It was, in short, a theorem in *search of a father worthy of it*, and which would only be able to appear in the full light of day once 'true' paternity, the one that should normally have been his (and for twelve years already...), was the subject of a general and intangible consensus. The 'perverse' article, the jewel in the crown of the Colloque of the same name, was a first milestone in this direction, laid down by the main interested party with his customary skill.

I have the impression that Beilinson and Bernstein, no doubt flattered to see themselves unexpectedly associated with authorship of the so-called (but wrongly) perverse beams, and with an even more prestigious kingpin, were in fact manipulated by Deligne, so that they could be used as alibis 'just in case'. As the article is written, any reader who is not very well informed can only think that it is none other than Deligne, of course, who is the author of the providential 'correspondence', although it is never named or spelt out (since everyone is supposed to know it already...).

All that remains is a shadow of (carefully calculated) ambiguity, in this brilliant turn of phrase, about the unnamed "relationship" that "should have found its place in these notes...". (\*). This was the 'thumb I' way of delicately and clearly implying, without actually spelling it out, that the said relationship (in the absence of any mention to the contrary) was due at least to *one of the three authors* of the brilliant article, or (at the very least) to all three jointly. But it was also clear that when the time came (for those who know how to wait...), it would not be Beilinson or Bernstein who were going to compete with a Deligne for a reputation that was already practically established. There must have been a *deal* (\*\*), tacit if not express

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(\*) On this subject, see the aforementioned note "Le prestidigitateur" (n° 75).<sup>22</sup>

(\*\*) The presumption of such a 'deal' came to me by association with two similar situations. On the one hand, there was the (perhaps tacit, but clearly apparent) deal between Deligne and Verdier, the latter 'sacrificing' the Lefschetz-Verdier formula, which was written off for the needs of the 'SGA 4 1/2 - SGA 5 operation', but in return 'picking up' all the 'duality' legacy of the deceased, and the derived categories (discounted article) as a bonus. (For the detailed story, see the sub-notes group "The Formula" n° s 169<sub>5</sub> - 169g.) On the other hand, there is the "contract" concluded by Deligne with a master who had been declared

deceased, and who had in any case disappeared from the circ-

formulated : to Beilinson and Bernstein the Kazhdan-Lusztig conjecture and (for good measure, given that there was already Brylinski-Kashiwara on it) the co-paternity on the so-called (by common agreement, I imagine) 'perverse' beams (\*); to Deligne the famous 'relation' without a name, looking forward to the day, which would not be long in coming and without his modesty having to be disturbed, when everyone would call it the 'Deligne theorem'. And the future 'father' had a good enough nose to know at least this much about this child (whom he had recently repudiated rather than agree to give birth to...): that he had struck a 'good deal' (\*\*).

As for Kashiwara, his role was over, and there is no more mention of him in the brilliant article, about the providential 'relationship', than of the stranger on duty. All against one when it's a vague stranger, all right - but once the place has been cleared of an intruder, every man for himself... .

(f) The 'family album', opened just three weeks ago (\*\*\*) , has just been unexpectedly enriched by a few new faces. The 'family' has grown a lot, obviously, and the old-timer that I am finds it hard to recognise himself in it, especially as times have changed so much. This time, in order of appearance, it was M. *Kashiwara*, R. *Horra* (\*), J. L. *Brylinski*, and

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culation and did not risk reacting, on the subject of the APG 7 seminar done jointly during the two years 1967/69, which was 'shared' three years later by half and half, one for the deceased, the other for Deligne and a makeshift teammate. (For details, see e.g. "Episodes of an escalation", note n° 169 (iii), episode 2). It also goes hand in hand with the 'deal' with this same (unsuspecting) deceased for the so-called (Mac Pherson dixit) 'Deligne-Grothendieck conjecture' (see episode 1 in the same note already cited): the first half for 'the postman' Deligne who had informed Mac Pherson of a conjecture (kept secret until then by my cohomology students), and the second for the deceased, in his capacity as 'collaborator' of the first...

(\*) See "Perversity", n° 76.

(\*\*) It's a 'good deal' that seems to me at the same time to be a very *bad* deal; and this even (and especially...) in the case where everything goes to plan for the person concerned, wasting precious gifts and creative force playing the gangster.

(\*\*\*) See the memo of the same name dated 22 March, n° 173.

(\*) An attentive reader may be surprised not to find in this "parade of actors" (in the swindle-mystification surrounding Zoghman Mebkhout's work) the name of Kawai, co-author with Kashiwara of the oft-quoted article, par. (See on this subject the note "Les cinq photos (cristaux et  $\mathbb{Q}$ -Modules)" n° 171 (ix), and in particular page 1005,) Mebkhout insists that Kawai cannot be lumped in with Kashiwara (whom he would be content to follow, eyes closed...). He described him to me as a guy who's a bit out of his depth, and I got the impression that he's taken a liking to him - he's basically his 'good Japanese', and there's no way he'd let me touch him.

the *anonymous referee* of the Brylinski-Kashiwara article at Inventiones. A group of 'toughs', that's for sure, with well-honed reflexes, and moreover with a finger in the eye when it comes to ripping off a vague private individual, at a discreet sign from the Big Boss behind the scenes (or even, without waiting for a sign. . . ).

And once again I'm back to the allure of a *mafia* (\*\*), reigning supreme over their uncontested fiefdom, the heart of which is the cohomological theory of algebraic and other varieties. These were brilliant, hard-working people with impeccable brains, whom I saw at work throughout the four successive episodes of the 'stranger on duty' operation, culminating in the perverse Colloquium. In addition to the four kingpins I've just mentioned (including one anonymous one), I'd like to remind you of the five other members of the 'hard core'; that's nine who rallied to bury the *Inrus who wasn't one of them*.

There's the Grand Chef, *Pierre Deligne* - the man who always knows how to 'stick his neck out' the least, while pocketing the most. There's his second-in-command, *Jean-Louis Verdier*, known as "the benefactor" - the same man who chaired the jury for a certain thesis by a certain unknown person, and who was also one of the two organisers of a memorable colloquium that shamelessly plundered the same unknown person. There is the other main organiser, *B. Teissier*, who co-signed the memorable Introduction to the memorable Proceedings of the memorable Colloquium. Unlike the others, it would seem that he acted simply as an accomplice and a figurehead, when he had nothing to gain for himself - apart from the pleasure of pleasing people he knew to be prestigious and unscrupulous. And then there are (\*) *A. Beilinson* and *J. Bernsrein* (whom I've just got to know better), delicately moved by invisible strings. . . . And I await, without impatience or illusions, what other Colloques Pervers the future will bring us.

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refrained from writing to him (as he had written to Hotta, another of Kashiwara's team-mates), to point out the frauds in his article with Kashiwara and thereby oblige him to show explicit solidarity with his team-mate and boss.

(\*\*) This unusual impression had already occurred to me last year, in the note 'The Colloquium' (n° 75<sup>2</sup>) (on guess which. . . ), with an atmosphere of racketeering such that it was as if we were dreaming, or watching "a film about the reign of the mafia in the underworld of some distant megalopolis...". This impression accompanied me again, step by step, throughout the present peregrination through the misadventures of the vague stranger on duty. . . .

(\*) (25 May) This "at last" has proved premature - other members of the gang have come to my attention. since then. On this subject, see the b. de p. note (\*) on page 962, in the note "Le jour de gloire" (n° 171 (iv)).

(30 May) Latest news: yet another member, R. Remmert, has just been identified. See part (c) of this note ("Failing memories - or the New History").

with the unreserved acquiescence of the entire Congregation/ for the greater Glory of "Science" and for the "honour of the human spirit".

(<sup>171</sup> 3) (18 April) At the end of this fourth day spent following my friend Zoghman's misadventures step by step, I understand better than I did last year some attitudes and dispositions, particularly towards me, which had seemed strange to me last year. In short, with his work, the scope of which he was well aware, he had thought he was entering 'a big family', a bit like that of the deceased master whom nobody ever spoke about, it's true, and yet who was present even without being mentioned. And now he found himself in a world of sharks with polite, even affable, airs and ruthless teeth - stripped in a jiffy of what he had brought with him, the fruit of eight long years of solitary work; after which he was made to understand that he had been seen enough: a nuisance and an intruder. There aren't many people in his place who wouldn't have been traumatised. I don't know if he ever opened up to anyone about his setbacks, except in bitter allusions, so vague that they seem to testify against him, like an embittered man, a bit of an associate.

I may not have been named, but I was still the 'father' of this unscrupulous world, and there was really no reason for him to trust me. It's true that our first meeting, in 1980, when he had no idea what was in store for him, laid the foundations for trust, and I have a strong feeling that, against all odds, those foundations have been preserved to this very day. Deep down, he knew, shark 'dad' though I am, that I wasn't going to do what they did. But there was a *grudge*, that's for sure, and it liked to take the form of a mistrust that was meant to be visceral, and yet (at least that's how I felt) was 'veneered'.

It's easy to 'fight' for what you believe to be your right, when you're part of a group, however small, with which you feel in unison. But the person who is alone against all, the outcast, the unwelcome stranger, is like a tree deprived of its soil. The strength within him is of no help; it becomes bitterness that turns against itself, as if to join forces with the whole world, which rejects it.

When I held in my hands this book which consecrated the exhumation of the motifs at the same time as the burial of the worker who had brought them to light, this book signed by four of the most brilliant authors of a brilliant generation (which I helped to form) - when I finally became aware of it, by the greatest of coincidences (given that no one up to the time of my death had been able to read it) - I had the chance to read it.

There was nothing in particular that was worth mentioning to me. ... ) - at that moment I knew, for the first time in the thirty-six years I'd been acquainted with the world of mathematicians, *that I was alone in the dark*. A lot of things that had happened over the last eight years suddenly came together and made sense. It's a strange feeling when you suddenly rediscover that solitude. I had to catch my breath that day, and throughout the weeks that followed, taking in day by day the full dimension of L'Enterrement - a burial worthy of the work. But it had nothing in common with Zoghman, 'left behind' by his own people before he could really take root. Fate had smiled on me. Thanks to the elders who had taken me in (and it didn't really matter that they were dead or retired and perhaps hadn't been doing maths for a long time) - thanks to the fraternal welcome I found in my early years, I was able to 'take root' in the soil I had chosen myself. These roots grew and grew, and over the years they became deep and powerful. These roots are firmly planted in a soil that is not that of the 'consensus' or that of any fashion - more deeply, no doubt, than in any of those who find satisfaction in doing what they do best.

and follow them (\*).

In short, I can afford to be 'one against all' - say what I have to say, and go my own way.

(25 May) (\*) It doesn't take much imagination to understand the frustration of Mebkhou, who suddenly feels "swept away" (\*\*) like a bundle of straw, once the strength of his central result is recognised. He writes to me (in a letter dated 24 April, after his recent

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(\*) Although I have never bothered to follow or follow fashion, whether in mathematics or elsewhere, I know that this is precisely one of the manifestations of the strong roots I was lucky enough to develop in my early childhood. Having had strong roots in myself from the start, the energy I put into my major investments is not dispersed by compensatory cravings, such as the craving to set the tone, or to be and appear in keeping with the de rigueur 'tone'.

I express myself concretely about my childhood and these 'roots' (without using the word, I think) in the note 'Innocence (the marriage of yin and yang)' (n° 107).

(\*) The following two pages are taken from what was originally intended as a b. de p. note to the and the bargain" (n° 171 (iii)). I hesitated a little about where to insert them, and finally decided to include them in the present note on 'Roots and solitude'. It is the only note in 'L'Apothéose' in which I have tried, on the basis of my own experience, to grasp as best I could the way Zoghman himself experienced the events and situations I have chronicled.

(\*\*) The expression "swept away" is taken from a letter from Mebkhou (the day before the one quoted in the

I spent eight years putting together the results used in the Kazhdan-Lusztig demonstration. It took them a week to demonstrate it. Once again, a sense of modesty prevented him from going all the way with what he really felt, and I'll take it upon myself to add the 'unspoken' part here: and once the thing was done, 'they' proudly strutted among themselves with the brand new tool that someone else had fashioned in solitude, letting the worker know that he'd been seen enough...

The thing is so enormous, however, that at the time Zoghman still did not quite believe the testimony of his healthy faculties - just as I myself had difficulty believing the testimony of mine, on 2 May last year, when I read the Proceedings of the Luminy Colloquium (\*). It was when I read these same Proceedings in January last year, three years after the Kazhdan-Lusztig 'Dress Rehearsal', that Zoghman finally said

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main text), from which I reproduce here the relevant passage:

"It's true that [Kashiwara's] constructibility theorem... allowed me to get started. Moreover, from that moment on someone like Deligne would have found all my results in the twinkling of an eye, including the theorem of the good Lord in all its forms, with demonstrations in four spoonfuls, as you say. That explains why all that was swept away in a few days."

It seems to me that Mebkhout has explained here, very precisely, the tacit 'reasoning' of a Deligne, appropriating the fruits of other people's labours because he *could* (and *should*) *have* found them himself (with his means, baggage and all) 'in four spoonfuls'. The only problem with this line of reasoning (which we are very often tempted to adopt in similar situations) is that *the answer is to think about it* - and it was Mebkhout, and not Deligne or anyone else, who 'thought' about it. Creation is not a matter of *technology*, which, once it has finally seen something that no one else has been able to see, 'sweeps away' a situation in less time than it takes to write it down. Creation is not in the 'sweeping', but in *the acre of seeing* what no one has been able to see; of seeing with one's own eyes, without 'following' anyone. And it is part of the probity of the mathematician's profession to distinguish between one and the other - between the act of creation and the turning of a crank.

(\*) On the subject of this Colloquium (June 1981), see the note "L'. iniquité - ou le sens d'un retour" or "Les jours de gloire" (n° s 75, 171(iv)). To tell the truth, writing "Cortège VII: Le Colloque - ou faisceaux de Mebkhout et perversité" (n° s 75-80) in the first week of May last year was still not enough to overcome this almost insurmountable inertia "according to the testimony of my healthy faculties", in a situation where one is rigorously alone in making use of them. It was only five months later, when I was finally confronted with reality 'in the flesh' so to speak, in the person of my friend Pierre (Deligne) who came to see me in my retreat, that a secret and tenacious incredulity finally vanished. On this subject, see the note "Le devoir accompli - ou l'instant de vérité" (n° 163), in particular pages 782 to 784.

finally realise what really happened.

It was a terrible shock, I understand - Zoghman thought he was going to lose his life. Fortunately, he's a strong man - Zoghman is still alive today, and has even got married and fathered a child in the meantime... But I think that even then, when he held these 'Acts' in his hands, he still couldn't believe them completely. Something must have 'stuck'. In fact, he still doesn't fully believe it, even as I write. It has to be said that even in simply 'rational' or 'objective' terms, the thing is so incredible, so enormous, that to this day *no one* apart from me (except perhaps him, and even then...) has dared to believe his eyes and see it, even though it's bigger than a cathedral!

But for the man who is hit head-on by the cynical, *gruesome* iniquity at the hands of his admired elders, who have been lavished with everything - surely this is one of those things that can never be fully believed, one of those things that "*go beyond belief*"... And they are also the ones that can, by that very fact, devastate a man's life. What gives them this destructive power is the obscure perception, desperately repressed and yet irrefutable, of *the inrenrion* of devastating, just like that, for nothing, '*for the pleasure*' - for the pleasure of crushing with a careless gesture what for you is of value, that very thing (if possible) which makes up the substance and the salt of your life. It's this perverse pleasure in malice 'for nothing' that truly 'boggles the mind'...

I don't think Zoghman ever really spoke to anyone about it, either before or after the big coup - except in monosyllables, indecipherable to anyone but himself. The Kazhdan-Lusztig episode alone was too enormous, too implausible for him to expect anyone to believe it. The well-established consensus sweeps away the most obvious, the most obvious, the most irrefutable facts like chaff. And here he was dealing with something so painfully close, so 'raw' in his being, that the only risk was that the person to whom he opened up about it would reject the unwelcome message, that his distress at 'what passes understanding' would not be accepted - this risk or this probability took on the dimension of the *inro - lable*, something to which he would not expose himself for any price - even if it meant dying on the spot, if he had to die...

Two years ago, he spoke to me about it 'in monosyllables'. Perhaps deep down he was hoping that I would understand these monosyllables, not just in terms of their meaning, but also in terms of what they meant.

literal sense, but that I would also hear everything he didn't dare to say in person (perhaps not even to himself...). It was a completely mad hope, admittedly (in a situation where everything seemed mad as hell I); I was a thousand leagues from imagining anything of what I have since learnt, from reliable knowledge. It could not have been otherwise, in the absence of meticulous and detailed information (\*). And Zoghamn, for his part, was also a thousand miles from daring to give me this information. It was madness, and that didn't stop him being angry with me. He had to be angry with someone, someone close enough to him, someone tangible, to whom he could transfer at least some of what had been triggered in him by 'things beyond comprehension', and free himself in some small way from what was eating away at him.

(<sup>171</sup> 4) (2 June) It's been two months since I had the satisfaction of putting the 'finishing touches' on l'Enterrement, with the final 'De Profundis' note (of 7 April) - and it's also been two months since I've been working hard to put the 'finishing touches' on the last part of l'Enterrement I C'est la réédition, of what happened around this time last year - when I was still putting the finishing touches to what was to be the first part of Burial. It was, as it is now, the 'last minute' that was dragging on and on - to the point where I was forgetting about eating, drinking and, above all, sleeping. It went on like that until my body gave up, at the end of its tether. That was exactly a year ago (give or take a few days), and I had to drop everything for more than three months, fully occupied with getting myself out of a state of acute exhaustion (\*). But this time I'm wary, and I'm very careful not to go down the same road again. I value my skin...

This time again, it was the 'investigation' that never ends. I was planning a note of ten pages or so, to be called 'The Four Operations', which would summarise and 'tidy up' the results of last year's whirlwind investigation. And now it's been four months since the survey resumed in earnest, the ten pages have become three hundred or so, and it's not (quite) finished yet I don't dare make any more predictions - this is the ninth month, since I resumed work at the end of September, that I have

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(\*) (1 June) It would be more accurate to say that it 'could not be otherwise' in my state of limited openness and presence, except on very rare occasions. I believe, however, that we are all equipped with an 'ear within an ear', perfectly capable of hearing the unspoken - but more often than not we take care to exclude from the field of conscious attention the messages picked up by that ear. ...

(\*) For this episode, see the note "The incident - or body and mind" (n° 98).

am 'about to finish' 1 I won't know it's *really* finished until the last packet of notes has been typed up, proofread and corrected, and handed in for duplication. (After that, the rest is no longer *my job*.) All I know is that I can't wait to get to that point, just as I can't wait to see the end of a long and gruelling illness; and that I have to see it through to the end, as best I can, without letting myself be rushed by imaginary deadlines. I won't stop to take a breath until the end, when everything that needed to be seen and said *now* will have been seen and said.

It's that bloody 'Apotheosis' that gave me the most trouble - I can't say why. These 'four operations' are the only part of *Récoltes et Semailles* that came about in a haphazard way, in bits and pieces and with difficulty - whereas in principle it was supposed to be ready-made, a simple 'putting in order', yes; nothing that involved or challenged my person in a 'neuralgic' way, so as to mobilise forces of resistance, a '*frorremenr*'. And yet God knows there was friction, and with the Apotheosis more than with anything else! Where does it come from?

Already with "Les manœuvres" it was laborious. That's when it started stretching out to infinity. It ended up being eighty tightly packed pages just for that operation alone - and now, a month later, . l'Apothéose has come to do well over double that. And yet, apart from perhaps a few pages (a little 'detective' on the edges...) in 'Les manœuvres' (where I perhaps go into more detail than would have been essential about a certain impossible 'scam'... ) - apart from this circumstantial 'work on parts', which is undoubtedly a bit of a pain in the arse for a reader who isn't 'in the loop', I don't have the impression that these hundred-page bundles that I've ended up lining up here are superfluous, or even a rehashing, a splitting of hairs. What kept me on my toes was precisely the abundance of *new* and unexpected *sustenance* that poured in on me, and that I absolutely had to fit in, whether I wanted to or not - including, yes, mathematical substance! At times I felt overwhelmed, so many things at once that I had to put down in black and white, dare dare - things that were all hot, even burning, and yet I was obliged to deal with them one after the other. ...

Yet such richness is in itself a powerful stimulus to the work, and in no way does it create 'friction' - quite the contrary. This friction, to be sure, does not come from the substance itself, but from the strength of my egotic investment in the work undertaken. What may seem paradoxical is my impatience

even to 'get it over with', to 'throw down the gauntlet' of what I have to say, about such and such things that are happening at this very moment and that concern and affect me closely - it is this impatience (I believe) that creates friction, the dispersion of energy. Friction is the sign of division, of forces pulling in opposite directions, each exasperated by the resistance put up by the other: There's the haste to 'get it over with', to 'let go' of the piece since I've been framing it - and there's the demand to go right to the end of what the present moment gives me a glimpse of, not to settle for more or less, not to let myself be pushed around, nor to let myself be locked into a 'programme' to be completed, into an - 'agenda' fixed in advance. I'm well aware that as soon as I exclude the unexpected, that obstacle to going round in circles, my work loses its quality and its meaning. It becomes 'paper-pushing'. Over the years, I've become very sensitive to this 'little difference' that looks like nothing, but is everything. It still happens, rarely, that such a turn is taken, in moments of great heaviness - but never for long. When it does, the kid throws it all away - there's no point even trying to go on. The desire mimics work, that *desire* which is something other than the urge to accumulate pages or to place a full stop - desire and desire suddenly disappear, and you find yourself foolishly blacking out paper, so there's really no point - all that's left for me to do is to rectify the situation, and right away!

There's always a certain *impariance* in the work (an old acquaintance of mine...), which constantly pulls me forward. It seems to me that it's not the same as the one that has been weighing heavily on me since I started working on these 'Four Operations'. The other impatience is not a weight that weighs down, but a force that pulls. It is the sign of an appetite, not of weariness or fatigue or satiety. It's not impatience to accumulate, or to be finished, or to 'complete' a programme, but impatience to know the unknown before me, about to be revealed. It's the impatience of the naked child, alone in front of the infinite sea, to dive into it to get to know it... (\*)

But it's time to return to the story of my friend Zoghman's misadventures, in this note intended as the last of the Apotheosis. As I have already said, Zoghman himself only gives me this account in bits and pieces, here and there, in the course of letters, phone calls and meetings. The progress of the reflection and the writing of L'Enterrement were undoubtedly affected by this, at least in the part devoted to the vicissitudes of my friend.

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(\*) This image has already been used in the note "The child and the sea - or faith and doubt" (n° 103).

I thought I detected last year) has vanished (assuming it was ever there in the first place). There must also have been times when I felt a certain saturation, expressed in a 'don't throw any more away, for pity's sake 1' attitude. That must not have encouraged him. I was annoyed, it has to be said, by a ritual of 'the Japanese' here and 'Kashiwara' there, which Zoghman must have been singing for four or five years, and he'd seen a lot with them, it's true. But I knew that if he had seen them, and if his work was being plundered in this way, in an almost official way: "Go ahead, good people, help yourselves to plenty, don't be shy... . ! "It wasn't because of some distant Japanese. It was *because of "his own"*: those of the "little family" (\*).

- local people whom he never named except to quote their work with all the respect due to their high reputation.

I didn't want to hear any more about Kashiwara and co! Zoghman had the wisdom and patience to let it go, without losing his interest in my work, and without ceasing to provide me with discreet and effective assistance here and there.

It was during his last visit to my home, at the beginning of April, that I finally became aware of the 'Japanese package'. I was a bit reluctant at first. I thought I was going to be bored stiff by inextricable ultra-technical stories and illegible papers (and in Japanese, if that turns out to be the case...), which I'd never read anyway - and then no 1 It was as simple as that - a bit of a 'pick-pocket story' in the Parisian (or rather, Tokyo) underground. Amusing even, to say the least (at least, as long as it's the other guy who gets his wallet nicked. . . ).

As a result, the situation between Zoghman and myself unblocked, and I was treated to bits and pieces of his misadventures, in flashes, here and there. Episodes that I had written down in the style of a 'technical information sheet' were fleshed out by recollections on the spot; precisely the kind of things that seem to be banned forever from scientific texts, in their impassive 'attention', and even from letters between colleagues - you wouldn't want that! I even had to shake myself, in 'Les quatre opérations', not to fall back into that very style, the 'conclusions of investigation' style (or even the 'sheet of recriminations' style...). These 'snippets' delivered by Zoghman helped me to get out of it, and to keep in touch with a living substance.

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(\*) (16 June) Mebkhou wishes to emphasise that he has completely ceased to identify with the "little family" in question.

I got back to Apothéose on the very day that Zoghman left home, just to make another sub-note or two, while what he'd told me was still hot. The result was the notes (or sub-notes, I don't know any more. . . ) 'Éclosion d'une vision - ou l'intrus', 'La maffia' (which I later subdivided into seven parts, each with a name), and 'Racines et solitude'. I sent the whole thing to him straight away, so that he could give me his comments before I gave it to the typesetter. At that point I felt I was speaking a little on his behalf, and I wanted to be sure that everything I was reporting, according to what he had told me, had his unreserved approval. He sent me his detailed comments by return (letters dated 22 and 24 April). In these comments there are quite a few of these 'snippets', putting living flesh on a skeleton of facts that appears a bit skeletal at times, in my notes.

That's also how I knew that Zoghman had been there, on that memorable 22 April 1980 at the Goulaouic-Schwartz seminar. That was the day when Kashiwara announced the God theorem, which he had learned from Mebkhout a few months earlier at the Colloque des Houches (\*), as his own theorem! It's so big, and with Mebkhout still in the room, that it may seem incredible. Mebkhout didn't explode on the spot (I wonder how he did it. . . ), he waited politely until the end of the presentation "to protest publicly against these methods, reminding him of the Les Houches conference and his question (\*\*). Goulaouic asked me to settle my affairs in private. The room suddenly emptied in a matter of seconds".

So here's one of the 'snippets', delivered by this laconic description. I later got some details on the phone. The incident is worth looking into. It says a lot about the state of morals in the mathematical world in the 80s. This is not about the mentality of some long-toothed 'kingpin', an extreme symptom of the breakdown of traditional values in the world of science, or even of the 'establishment' of prominent and well-connected people, who have a class reflex in favour of 'one of their own'. Here, the whole room empties out in the blink of an eye - suddenly there's nobody left (\*\*\*)! Work it out amongst yourselves - we don't want to know anything about it.... .

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(\*) On the Colloque des Houches and the Goulaouic-Schwartz seminar episode, see the note "La maf-fia" (n° 171), part (b) "Premiers ennuis - ou les caïds d'outre-Pacifique".

(\*\*) This is the question posed by Kashiwara at the end of Mebkhout's presentation at the Colloque des Houches, in September 1979. On this subject, see the note cited in the b. de p. above.

(\*\*\*) this evocation irresistibly arouses in my mind the association of ideas with the whole situation.

I wonder what must have been going through the minds of Goulaouic and the other quiet listeners at this seminar, where a distinguished foreign lecturer was speaking (on a subject with which none of them, I believe, were too familiar). The incident was, after all, food for thought. I doubt that any of them took the trouble to do so, and rather assume that they all agreed to forget the painful incident. But in the end, if you take the trouble to think about it instead of running away, there was *one* thing that was clear, in this dark story. The tone and words of Mebkhou (someone they knew from seminars, to say the least) left little doubt that there had to be *a crook* involved - either Mebkhou or Kashiwara. It's possible, of course, that in their hearts they had already made up their minds: Mebkhou was just making it up, so how could anyone imagine the distinguished visitor pillaging the anonymous listener! This would mean that, in relation to an unknown person, the famous man, whatever he does, is above suspicion: it's a *blank cheque for pillage*, given to the man of notoriety against the man who has no recourse. What he has to say will not be heard: "Work it out amongst yourselves!

Or else they have buried themselves in a state of doubt: how can you tell who's telling the truth and who's telling the lie? (And especially, if you cover your ears!) It's true that the brutal nerve of a Kashiwara, publicly pillaging a vague stranger in the presence of the person concerned, hardly seems believable. But it would be even more unbelievable, after all, if a vague stranger (whom they all know, and who hadn't yet drawn their attention to himself by his swindling tricks or his nerve... . ) should dare to publicly accuse a Kashiwara of crude plagiarism, if what he has to say is pure fabrication... And supposing that what he says is perhaps well-founded, to send him off to the rosés with an "arangez-vous entre vous!" is once again carte blanche for pillage. It's like saying to someone who has been robbed in the middle of the street by thugs in dinner jackets and cries out "Thieves!" and shouting "Thieves!".

It seems that this is how things have been for a long time now, in the slums of New York and other big American cities, where nobody wants to have anything to do with the mafia that rules there. In any case, that's how it's been from

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analogy I had experienced three years earlier, at the end of a Bourbaki seminar where I had been given ten minutes to talk about a certain scurrilous law affecting foreigners. On this subject, see "My farewells, or: foreigners", n° 24.

Nowadays (I can't say for how long), in the mathematical world and in what passes for the 'beaux quartiers', such as the Gaulaouic-Schwartz seminar (\*), or among all those prestigious people who 'do' cohomology of algebraic varieties.

In rational terms, taken at face value, this "work it out between yourselves" borders on stupidity, in a situation where it is clear that one of the two parties must be acting in bad faith. At a psychological level, this stupid formula reflects a *resignation of responsibility* in the face of a situation that is perceived as "embarrassing". It is also a deliberate ignorance of an obvious fact: the question of respect for the elementary ethical rules of the profession of mathematician is by no means a purely 'private' matter, to be settled between the person who arrogates to himself the right to scorn them, and the person who pays the price; it is a *public matter*, a matter that concerns *every* mathematician.

It is thanks to general indifference, to the panic of each individual to assume personal responsibility, that a gangster mentality and operations as shameless as those of the Colloque Pervers can flourish with impunity in the scientific world. The panic of some and the impudence of others are like the other side of the *same corrupt coin*. Those who ran away and covered their ears on 22 April 1980 contributed to the Apotheosis of the memorable Colloquium the following year, just as much as the bigwigs who engineered the grandiose hoax and proudly strutted their stuff.

(3 June) It was also during Mebkhout's last visit to me that he gave me some edifying details about some of the participants in this same brilliant Colloquium, and about the 'new style' that is flourishing among them. I had the opportunity to leaf through the proceedings, in the second volume of the Proceedings, where there are articles by Verdier and Brylinski-Malgrange, and to take a look at Laumon's thesis (with a more informed and less distracted eye than the day I first received it). This thesis is in fact a collaboration with N. Katz. I give some comments about the 'new style' followed in this work, in the long b. de p. note to the note 'Le jour de Gloire' (God knows it deserved that name...), page 962. In this note I refer you, for further details, to this note (not yet written at the time). A promise,

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(\*) I am pleased to say that Laurent Schwartz was not in the room on the day of the unfortunate incident at 'his' seminar. I don't know whether he was subsequently informed.

what's due!

Mebkhout told me how he had had the honour and advantage of talking to N. Katz on two occasions about his ideas on duality and on the links between continuous coefficients and discrete coefficients. The first time was at the Colloque d'Analyse p-adique in Rennes, in July 1978. He explained "in a small group" his global duality theorem for *D-modules*, on a complex analytic space - the theorem that covers Serre's duality and Poincaré's duality" (\*). There were Katz and Illusie, the same people mentioned more than once in L'Enterrement. Illusie, kind and gentle as usual, thought it was really very pretty - something like that (\*\*). As for Katz, who I imagine was hearing about  $\mathbb{Q}$ -Modules for the first time in his life (at a time when it was far from being all the rage, as after the memorable Colloque), he simply declared curtly 'C'est connu ça 1', and turned on his heels just as quickly. As long as it was a vague Monsieur Personne who was talking to him, N. Katz (who that same year was going to give a speech in front of thousands of distinguished colleagues, in honour of the new Fields laureate Pierre Deligne...), it could only be 'known'.

The second time was shortly after the Colloque des Houches in September 1979 (\*\*\*) . Katz was then at the IHES. Given his well-known competence in p-adic differential systems, which Mebkhout clearly felt had something to do with the theorem of the good God that he had just talked about at Les Houches, Mebkhout went to IHES on purpose to bring him his article from Les Houches, and to talk to him about his ideas and results. After the welcome he received in Rennes, it's fair to say that he had the persistence to keep going! As it happens, it was more of the same. Katz was once again given a very high reception by this vague stranger, who took the liberty of coming to ask him a second time, and without announcing himself yet, if that's what it was. When you're an important man, you sometimes don't know how to protect yourself from intruders...

A year later, all it took was for these same ideas, developed and matured over a long period in the

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(\*) This theorem is discussed in the two notes "The work. . ." and "Three milestones - or innocence" (n° 171 (ii), (x)).

(\*\*) This was a gratuitous 'kindness', although the style of reaction was different from From one to the other (in 'yin' with Illusie, in 'yang' with Katz), the essence was the same: as long as it came from Monsieur Personne, it went in one ear and out the other! On this subject, see the note 'La mystification' (n° 85<sup>10</sup>), in particular my observations about Illusie, on page 351.

(\*\*\*) About the Colloque des Houches and Kashiwara's swindle at the Séminaire Goulaouic.

Schwartz, see the note "The Mafia" (n° 171<sub>3</sub>), part (b), "First troubles - or the kingpins from across the Pacific".

It must have been Laumon who had to explain the ins and outs to him - one of Deligne's most brilliant disciples. This same Laumon also knew first-hand about Deligne's work. It was surely Laumon who had to explain the ins and outs to him - one of Deligne's most brilliant disciples. This same Laumon also knew at first hand the origin of these ideas, having been informed of them by the vague unknown himself. But the disciple takes pride in following in the footsteps of the Master, and the latter had shown clearly enough, and without the slightest equivocation, what conduct was to be adopted towards someone doomed to silence and obscurity.

To the Delignes and Verdiers the limelight, and to the Brylinskis, Katzes and Laumons, who turned up at just the right moment to get their share! To them, the music and the bells and whistles, and the standing ovations of a grateful crowd, who turned out in jubilation to celebrate these High Works, in the hands of their New Masters.

(<sup>171</sup><sup>✉</sup>) (14 June) Until a month ago, it had seemed to me that the spirit of l'Enterrement was limited to what I sometimes call 'the beautiful world' or 'the great world' of mathematics, and more particularly, the circles of that world that I used to haunt and of which I myself was a part. At the USTL (Université des Sciences et Techniques du Languedoc, Montpellier), which has been my home institution for the past twelve years, I did not perceive any signs of ostracism, of disrespect or courtesy, or even of rudeness, in line with the burial that has been in full swing for the past fifteen years (\*). A new fact has just burst into this peaceful picture, and drastically transformed it and my own relationship with my home institution.

In accordance with ingrained mechanisms, I did not at first think of including this recent incident in my 'Harvest and Sowing' account, which, at first sight, seemed to come to me 'like hair on the soup'. It was against serious resistance that I finally admitted that it would be failing in the spirit of my testimony to pass over this episode in silence. It's still a very fresh episode, of course, and one that I've 'taken in' quite hard - which gives added strength to the 'inveterate mechanisms' to which I've just alluded. But the sheer force with which I took the eloquent and unwelcome lessons of this incident this time is also a sign that it affects me very closely - and this at the level of my professional activity and my links with the professional milieu to which I belong. So this is typically the kind of thing that Harvest and Sowing would like to be an in-depth account of, with no 'reserved corner' that I would forbid myself from touching, whether out of misplaced 'discretion' towards myself or anyone else.

Moreover, in the more specific context of my reflection on the Burial, I feel it is obvious that there are direct links between it and the incident in question. It's possible that these links are not simply those of cause and effect: that certain colleagues on the spot would have ended up taking note of the Burial, and would have concluded that they too could now 'give it a go'. Even if there were such a causal link, it would, it seems to me, only affect an incidental, accidental aspect of the situation. A more essential aspect, on the other hand, and one that struck me most of all, common to what is happening in the 'big world' of science (with a capital S), or in a modest provincial university, is a certain *degradation*, perhaps unprecedented, in the scientific and academic community.

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(\*) I express myself in this way in note no.<sup>o</sup> 93 (page 396, 3<sup>e</sup> paragraph)

It is a deterioration in the quality of relationships and basic forms of courtesy and respect for others, as well as in scientific ethics, which are indissolubly linked to respect for others and for oneself. The following pages may therefore be considered as a contribution (among the many others already provided throughout the reflections on Burial) to the 'tableau de mœurs d'une époque', or of the end of an era no doubt, in the mathematical milieu.

Rather than give a more or less detailed account of the events, I prefer to reproduce four *documents* that describe them equally well. These are :

1° ) a "letter to my colleagues teaching mathematics at the USTL", dated 28 May, in which I inform them of a certain situation and express the wish for a discussion at a General Meeting;

2° ) the 'reply' from Mme Charles, who is responsible for the mathematics building at the USTL, in the form of a circular letter dated 30 May addressed to me by name, and in fact to all the mathematics teachers;

3° ) the resolution passed by the EBU 5 General Meeting on 6 June on the agenda: "Information and discussions concerning the relocation of Professor Grothendieck's office"; and finally

4° ) of a "Letter to my former colleagues in the Mathematics building", dated the following day, 7 June.

I have refrained from including among the documents my letter to Mrs Charles of 21 May (referred to in the first document cited) and my letter to Mr R. Cano, Provisional Administrator of the USTL (referred to in this same document, and in document 4° , or "Epilogue to a misunderstanding"); these letters do not seem to me to provide any new information compared with that contained in the documents reproduced below.

As my only comment on Mme Charles's letter ("it is in fact very difficult to contact him" - "him" meaning my humble self, to whom the letter is supposed to be addressed), I would like to point out that letters from Montpellier to my home take a day to arrive, and that for years I have only been away from home when I am at the USTL.

LANGUEDOC UNIVERSITY OF SCIENCE AND TECHNOLOGY

Institute of Mathematics

## RANSACKING OF THE MATHEMATICS BUILDING

Letter to my colleagues teaching mathematics at U. S. T. L. by Alexandre GROTHENDIECK

Montpellier, 28.05.1985

Dear Colleague,

I was informed last week, by an EBU secretary whom I had instructed to collect a piece of work from my office on the fourth floor, that it had been emptied of all my belongings - which I was able to verify today: only the bare floor remains. I had not been informed that my office would be requisitioned without further ado, so I had been unable to give my consent to the operation, let alone authorise anyone to enter my office in my absence and touch my things. On the same day I telephoned Mr Lefranc, director of the EBU, to inform him of the situation, which (it seemed) was the result of an initiative by Mrs Charles, something which seemed to be confirmed by this telephone call. I told Mr Lefranc that I was shocked by the procedure, that there was no way I would agree to an office transfer carried out in such a brutal manner, and that I expected my belongings to be returned to their rightful place as soon as possible. He assured me that he would do what was necessary. On the same day, Tuesday 21 May, I wrote to Mrs Charles to tell her that I considered the untimely 'emptying' of my office to be an abuse of power, and that I felt it was a form of violence.

I expected a detailed explanation from him and an unreserved apology. If not, I would submit the matter to the University Council, which would decide whether this type of behaviour towards a USTL lecturer should be considered acceptable.

When I came to the USTL today, I could see that Ms Charles had not seen fit to reply to my letter (a copy of which I sent to Mr Cano and Mr Lefranc). Nor has Mr Lefranc seen fit to send me any explanation for the fact that my office is still empty of my belongings, a week after he assured me that he would arrange for them to be returned to my office. Neither he nor Mrs Charles has seen fit to inform me of the whereabouts of my belongings.

find the stuff that's been rounded up. I was told by secretaries that these items would be stored in the office of one of them. Having bumped into Mrs Charles in the meeting room, she assured me that she was only following the instructions of the EBU Director, Mr Lefranc, and asked me to speak to him about this matter, which did not concern her. While waiting for the situation to be resolved, Mr Nguiffo Boyom kindly agreed to share his office with me.

Maybe I'm the only one who thinks there's something wrong - a violence and a contempt; it's true that I'm also the only one who seems to be being thrown out without any further ado. (If anyone else thinks that this is not the kind of atmosphere they want to work in at the USTL, I'd be really pleased if they'd make themselves known to me...(\*)) Personally, I don't think it would be a luxury if, following this 'misunderstanding' (to use the charming euphemism of one of my colleagues), there were to be a meeting of the UER, to give the director, Mr Lefranc, and Mrs Charles, the opportunity to explain their intentions and their motivations, and for the teachers of the UJSR to say whether they consider these procedures to be normal (when they are applied to others. . . ).

In the twelve years I've been at the USTL, I've often had the opportunity to appreciate Mr Lefranc's benevolent attitude, dedication and efficiency whenever it was a question of rendering a service - and I'm grateful to him for that. It is with all the more regret that I would withdraw my confidence from him, seeing that he is becoming an instrument in the hands of others and allowing an atmosphere of arbitrariness and contempt to develop. From now on, I urge him to assume his responsibilities as director of the EBU, or to resign from his position. And I call on Madame Charles to resign from her position as 'head of the EBU premises', a position which she has been happy to abuse.

We look forward to hearing from you.

Alexandre GROTHENDIECK

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(\*) It goes without saying that such a gesture only makes sense to me if it is understood to be binding on the signatory, who authorises me to make public mention of it.

P. S. Being so inclined to be of service, last year, at Mr Lefranc's request, I agreed to an exchange of offices with Mr Lapscher, who (I was told shortly afterwards) subsequently changed his plans. It goes without saying that my agreement did not mean that I authorised the ransacking of my office, at that time or at any other time.

UNIVERSITY OF TECHNICAL SCIENCES. DU LANGUEDOC  
*MATHEMATICS*

Thursday 30 May

1985 Mrs J. CHARLES "in charge of the premises at the Institut de Mathématiques".  
to Mr A. GROTHENDIECK, Professor of Mathematics. Dear  
Colleague,

(1) Where does the "work" of the "premises manager at the Institut de Mathématiques" begin and end?

This 'manager' receives requests from Mathematics teachers - either to house a new teacher (or researcher) - or to house elsewhere a teacher (or researcher) who is already housed. In the latter case, requests are generally motivated by a work objective: bringing together members of the same group.

This "person in charge" then studies the possibilities first and foremost with the director of U. E. R.5 who is officially the manager appointed by the President of U. S. T. L\* for the premises of the Mathematical Research building. He then works with the people concerned to find possible solutions; changes are made after agreement has been reached. (2) This is what has been achieved in recent years:

- bringing together members of the geometry group
- (3) Difficulties encountered in this "work" :
- virtually everyone we contacted felt they 'owned' their office
- it seems impossible to force anyone to "change" their office. (4) The last request I received and the progress made in finding "solutions" to the problem posed:
  - li request made by Mr LAPSCHER, a teacher: to put Mr LAPSCHER and his secretary's office, Mr MICALI, on the same level,

— the first solution envisaged: exchange of offices between the third and fourth floors so that "applicants" could be grouped together on the fourth floor. This exchange concerned Mr GROTHENDIECK and Mr THEROND in particular. Mr GROTHENDIECK was contacted by the Director of EBU 5, who told him that HE WOULD NOT HAVE HIS OFFICE IF HE HAD ONE. By

Mr THERONO, who at one point agreed to the deal, subsequently refused to accept it.

— the second solution envisaged. Mr. GROTHENDIECK: I then asked Mr. LAPSCHER to contact his colleagues himself to propose another solution, and he was told to do so by the Director of EBU 5. He kept us informed of his actions: the "occupants" of 5 offices had agreed to a swap, and Mr. GROTHENDIECK's agreement was the result of his conversation with the Director of EBU 5.

— the implementation of this second solution: after being informed of this agreement, the Director of EBU 5 gave the "green light" for the proposed change of offices.

Mr LAPSCHER told me about a problem with keys during the period when the move would be discussed but not completed, and I pointed out to him that - no new keys were likely to be available, - I did not think it advisable to prolong the move, which could be completed in a few hours with the participation of all concerned.

Mr LASPCHER then informed me that the equipment from Mr GROTHENDIECK's office had been transported to his future office; this had been done without having been able to contact Mr GROTHENDIECK beforehand.

It should be noted that Mr GROTHENDIECK lives a long way from Mont-Pellier and is currently on secondment to the CNRS; it is therefore very difficult to contact him. (5) My impression as the "person in charge" of what could be called a "conflict": - I had the opportunity to point out to Mr GROTHENDIECK that, acting on behalf of UER 5, I could not myself reply to his letter; he therefore had to ask the Director of UER 5 for a reply. Following this 2nd letter addressed to everyone, I consider that I must withdraw from the "obligation of reserve" that I had imposed on myself. - it would have seemed desirable to me at least to inform the people concerned before moving their equipment - it would also have seemed desirable to me to carry out the move in a maximum of one day. - I thought the solution was a good one, but it didn't in any way change the rate.

for each of the people concerned.

I'm not waiting for an answer.

Yours sincerely

N. B. Copy of this letter sent for information to - all the Maths- ématiques teachers who received Mr GROTHENDIECK's letter of 28.05.85. - the Director of EBU 5, who also received a copy of the letter sent to me by Mr GROTHENDIECK on 21.05.85. - the provisional administrator of the USTL, who received a copy of the letter of 21.05.85 and to whom I enclose a copy of the letter of 28.05.85. UNIVERSITY OF

## SCIENCES AND TECHNIQUES OF LANGUEDOC

Institute of Mathematics

### MATHEMATICS INSTITUTE

Minutes of the meeting held on Thursday 6 June 1985 at 6pm.

Present: Mr AUBERSON, Mrs CHARLES, Mr CIULLI, Mr CONTOU CAR- RERE, Mr CUER, Mr DE LIMA, Mr DELOBEL, Mr DE ROBERT, Mr GROTHENDIECK, Mr HOC- QUEMILLER, Mr ESCAMILLA, Mrs HUBERT COULIN, Mr LEFRANC, Mr LOUPIAS, Mrs MEDEN, Mr MOLINO, Mrs PIERROT, Mr PINCHARD, Mr SAINT PIERRE, Mrs VOISIN.

After discussion, those present (19) adopted the following text by 16 votes in favour, with 3 abstentions: "The Mathematics teachers apologise to Mr GROTHENDIECK about the unacceptable conditions under which his belongings were moved. They undertake collectively to ensure that these regrettable events do not recur. In particular, it must be made clear that the key to an office cannot be used by anyone without the explicit agreement of the occupant."

MR LEFRANC

Director

## LANGUEDOC UNIVERSITY OF SCIENCE AND TECHNOLOGY

Institut de Mathématiques

Epilogue to a "misunderstanding"

Letter to my former colleagues (teaching and technical staff, 3rd cycle students) in the Mathematics building

par Alexandre Grothendieck

. . on 7.6.1985

Dear Colleague,

I am writing this as an epilogue to the ransacking of my office, which I mentioned in my letter of 28 May. That letter was addressed solely to maths teachers, although it also concerns all those who occupy an office in the maths building. I had inadvertently and indiscriminately omitted to address my letter to the technical staff and students of 3<sup>o</sup> cycle, judging (hastily) that to do so would be to give the incident an extension that it did not deserve. I sincerely apologise to those concerned, especially as I have received expressions of sympathy from several of them (supposedly uninformed...), which have touched me. It was also because of this oversight, sans doute, that\*\* the EBU General Meeting yesterday, devoted to the incident, was limited to "EBU 5 members".

Among many other things, this incident will have taught me that it is not the first of its kind to occur at EBU 5 - it is only the first time that it is a "senior teacher" who has been targeted. I don't know whether the pious resolution passed yesterday will prevent this kind of incident from happening again, in the general indifference (as before), particularly to non-tenured teachers or 3<sup>o</sup> cycle students. I will be sure to check with Mrs Mori and Mrs Moure whether they have indeed received instructions from the Director of the EBU not, under any circumstances, to entrust the key to one of the offices to anyone or to use it for anyone else, except with the express authorisation of one of its occupants.

My previous letter ended with the words "awaiting your (or your) reply". In response, I have received *three* expressions of sympathy and solidarity. They come from Louis Pinchard, Pierre Molino and Christine Voisin. I also received a similar message from Philippe Delobel, a 3<sup>o</sup> cycle student who (like Christine Voisin) had done a DEA with me. It was on his initiative that a number of 3<sup>o</sup> cycle students attended yesterday's General Meeting. I am pleased to express my esteem and gratitude to him and to all those I have just mentioned, who have shown their solidarity with me (without ambiguity or evasion). It's one of the fruits of 'hard' experiences like this, to have your friends recognised, when you're lucky enough to have them... .

I received yet another letter in reply to mine, from a colleague who was visibly delighted at what was happening, and who took the opportunity to make fun of me. It was

the only echo in this sense that I received. Among all the others, a great deal of total indifference on the part of some, and embarrassment on the part of others (where more than once I sensed the unspoken fear of being seen in a bad light and thus compromising one's chances of promotion, or a precarious situation). For all those, among them, who were so moved that they went out of their way to attend this General Meeting (convened on the spur of the moment at the last minute, even though it had been planned for a week...), I sensed above all a deliberate, well-thought-out intention to drown a fish, to the tune of "everyone's nice, everyone's cute". In the end (after three-quarters of an hour of palaver) we settled on the designated 'villain', the absent one (as if by chance). Mr Lapscher - the one who had (according to what had just been hinted) taken the initiative to lend a hand. There was no question of going so far as to accuse him by name - or anyone else, of course.

I was shocked by the shameless brutality of a Mr Lapscher, by the rudeness of a Mrs Charles (who, once presented with a fait accompli, covered it up by adding some insolence of her own), and by the courtesy of a Mr Cano, Provisional Administrator of the USTL, who did not reply to the letter in which I informed him of the situation and asked him to refer it to the University Council. Cano, Provisional Administrator of the USTL, refrained from replying to the letter in which I informed him of the situation and asked him to refer it to the University Council. But most of all, I was disconcerted and saddened by the ambiguous attitude of Mr Lefranc, Director of UER 5. From Monday 20 May (when I informed him of the situation I had just uncovered and of my feelings about it) until yesterday, he had not seen fit either to inform me of what had happened or to distance himself unequivocally from the brigandage of a Lapscher or the rudeness of a Mrs Charles. By doing his utmost, from start to finish, to maintain the fiction of an unfortunate 'misunderstanding', he has succeeded in making behaviour that I personally find intolerable seem harmless, even respectable. To avoid hurting anyone's feelings, surely, he has chosen to be (very) gentle with the goat and (a little) gentle with the cabbage.

I also took note, among other signs, of the silence of many of those I had thought to count among my friends (including three who had been my students); of the indifferent ostentation of one, the embarrassment of another, and the honeyed jubilation of yet another. And also the silence of one Micali (co-beneficiary of the helping hand, and who had had ample opportunity to convince himself, a few years ago, of the disadvantages of attracting the bad graces of

Mr and Mrs Charles...), and the complaisance of Mlle Brun, taking orders from a Lapscher

to play mercenary locksmith and removal man (without a word of regret, once the nature of the operation was no longer in doubt).

In the light of all this, and having found yesterday what had been my office for twelve years, transformed this time into a battlefield - my things (plus the furniture) restowed in a hurry (a good fortnight after a helping hand - lightning. . . ) - I no longer have the heart to rearrange it again. I'm assured that it's unlikely that the same incident will happen to me again, and I can take the initiative by taking the second key, entrusted until now to Mmes Mori and Moure. But insofar as this is materially possible, and in particular for the duration of my secondment to the CNRS, I prefer to give up the use of an office at the USTL, and leave the place, without a struggle, to the Lapschers, the Charles et al.

If I can avoid it, I won't go back to teaching at the USTL. I will have spent my time there, cfest sûr, as a foreigner - one whose homeland is elsewhere - in terms of my approach to mathematics, teaching and lifestyle. I believe that I have learnt what the half-academic crocodile had to teach me, with the final 'part' being the lessons to be learnt from this incident, which has just been brought to a close to everyone's satisfaction. There's a good chance that this EBU 5 meeting I've just attended will be my last, and that this letter will also be my last chance to write you (or to write to you). And this time I'm not expecting a reply.

Alexandre Grothendieck

(<sup>172</sup>) (22 March) I thought I'd have a day or two and a dozen pages at the most, with these famous 'four operations' that I've been planning to review since October. And I've been working hard on it for over three weeks now, clocking up well over a hundred pages - and I'm still not quite finished 1 The first draft, from 26 February to 1 March, already took me four days. It just gave me the canvas on which to build a 'story' (after all), and not just the conclusions of an investigation.

- When I reread this first draft, the day after 1 March, it gave the unfortunate impression of a never-ending 'sheet of grievances', and as it stood was probably incomprehensible to all but three or four truly expert readers (assuming they had the patience to read it. . . ). I realised that I had to at least explain roughly what it was all about,

so at least provide a context - otherwise there was no point (\*).

Inevitably, this led me to make a few repetitions in relation to the first part of L'Enterrement - but there are cases where repetitions are not only useful, but even indispensable (in mathematics as much as anywhere else). In such cases, moreover, you soon realise that the so-called 'repetitions' are not really so, because what is 'repeated' is in fact *re-examined, seen anew* and in a different light. By situating certain aspects of my work as a 'con-text' for the four operations, I have the impression that I've learned something about it, that I've been able to situate it better. I may not have learnt anything really new about myself or others in the process, but I don't regret the trouble I took in rewriting this first draft of my grievances over several days. I had put the best I had to give into this work, and it deserves the hindsight that maturity gives me to look at it again and in a different light. At the very moment when I was preparing to make a detailed assessment of what this work has had to endure since I left it (in good hands, I had no doubt...), it was a good idea for me to *reflect* a little on it, on its place and on the unity that makes up its beauty, if only for the space of a few pages, as a way of once again showing my respect for what I have seen scorned.

But that was not all, far from it! Abandoning the 'sheet of grievances' style, with numbered references to the more fleshy notes in the first part of Burial, I realised that these notes that I was taking up, like all the other sections and notes in Harvest and Sowing, had to be intelligible and convey the essence of what they had to say, independently even of these references to notes that were part of *another part of the reflection*. Once again, this led me to a number of 'repetitions' that were not repetitions at all, in other words, to revisit in a new light what I had written down day by day nearly a year ago, in the fresh emotion of discovery. At the time, I was overwhelmed by so many unexpected and sometimes unbelievable facts that there was no question of any real, methodical 'quest'. At the time, I was content to do my best to absorb what was tumbling down on me, and to 'fit it in' as best I could, without going into too much detail. Most of my energy was then absorbed in *dealing* with what the pots-

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(\*) The only other moments in the Harvest and Sowing reflection where I made such a departure (admittedly on a lesser scale) from the 'spontaneous' mode of writing was in the section 'The note - or the new ethic' (n° 33) and in the note 'Iniquity - or the meaning of a return' (n° 75).

aux-roses that I was discovering were *crazy* and incredible (as in the tale of the Emperor of China's robe... (\*)), and above all, to take on this 'breath' of violence, cynicism and contempt that suddenly came back to me, 'underneath those good-natured airs... . ." that I recognised only too well; the breath of other times, that I had lived through and that I haven't forgotten...

The last three weeks, on the other hand, have been an opportunity to complete last year's stormy investigation, by delving a little more closely into certain texts (SGA 5 and, above all, the so-called 'SGA 4 1/2'). This gave rise to a series (which at times never seemed to end 1) of (more or less) detailed footnotes, some of which became sub-notes, and one of which (with the intended name 'The Formula') occupied me for four consecutive days and split into four others (\*\*). . . at times it seemed as if I was never going to finish - and then no, it ended up converging (\*\*\*)<sup>1</sup>. I'm leaving out for the moment about ten pages that are decidedly too crossed out, which need to be redone, and the footnotes to the last two notes ("Le partage" and "L'Apothéose") which I'll add later. That's enough for now! I'll come back to the 'stewardship' later, but I can't wait to finish and tell you what I see without further ado. There's still a lot to be said for the "four operations" chapter.

I distinguish in Burial two 'aspects' or 'levels' that are intimately connected, but nonetheless distinct. They are quite clearly separated (for me at least) by a *threshold*.

On the one hand, there is the 'wind of fashion' aspect (which sometimes goes as far as the 'breath of derision' I mentioned more than once in *Récoltes et Semailles*). It manifests itself above all in what I have called elsewhere (\*) 'attitudes of automatic rejection - of\* attitudes which often cut short the simple reflexes of mathematical common sense, and which are exercised against certain people and their mathematical contributions. In this case it is me, and a few others who are classified (sometimes in spite of all the efforts of the person concerned to distance himself from me) as having 'links' with me. In my case, it was certainly not possible to 'reject' (or 'bury') *everything* I had contributed, even though much of it had already entered the common domain of everyday use, even before I left the scene.

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(\*) See the note of the same name, n° 77<sup>2</sup>.

(\*\*) (1 June) Which have since become six...

(\*\*\*) (1 June) A very provisional 'convergence', in fact, since the note 'L'Apothéose' ended up splitting into thirty or so separate notes, sub-notes etc., running to well over 150 pages on their own!

(\*) In the note "Le Fossoyeur - ou la Congrégation toute entière", n° 97.

mathematics in 1970 (\*\*). It is true, however (and I made this point for the first time in the note "My orphans" of a year ago (note n° 46)) that by far the largest part of my written or unwritten work on the cohomological theme was buried, first and foremost by my students, as soon as I left. (Some of the themes I had introduced were unearthed four, seven or twelve years later without any mention of me - but that's the 'second level'...)

We can certainly regret such automatic rejection, which sometimes runs counter to simple delicacy and the respect due to others, and is in all cases foreign to common sense and mathematical discernment. It is all the more regrettable when it strikes young mathematicians with sometimes brilliant resources, when the 'bite of disdain' extinguishes a joy and distorts what had been a beautiful passion, in the bitterness of investments that appear to have been wasted (according to the prevailing consensus. . . ). And we can regret it too, when this rejection affects simple and fruitful ideas that have amply proved their worth, to bring out of nothing powerful tools that nowadays 'everyone' uses without looking twice. In the first case (that of a devastated vocation) the damage is likely to be irreversible, but not in the second - because sooner or later, the simple and essential ideas, those that are 'on the way', will eventually appear or reappear, and become part of the common heritage. Be that as it may, it is unreasonable to want to force anyone to think *well of* a person, or a work, or an idea, which (for whatever reason) they feel like thinking *badly of*, or forgetting altogether. This kind of question is certainly a delicate and essential matter of personal 'ethics', but I don't think we can make it a matter of collective 'scientific ethics'; or if we tried to do so, it's to be feared that the cure would be worse than the disease...

The second 'aspect' or 'level' to which I was referring, however, is precisely where such a collective ethic is breached. The *threshold* I was talking about is a *consensus* that, as far as I know, has been universally accepted in all the sciences since

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(\*\*) It is true, however, that even some of the ideas and techniques that were already in 'everyday' use (at least in the limited circle of my students and close collaborators) were buried? as soon as I left. This was particularly true of the *A-adic* cohomological tool, which I had developed in great detail in SGA 5 (based on the key results of SGA 4). It was kept under wraps by my cohomology students, led by Deligne, only to be exhumed in the form and spirit that I know in 1977.

that these are the subject of written testimonies. This is the consensus which stipulates that no one is supposed to present as his own ideas (\*) which he has taken from others. This consensus obliges us, therefore, to indicate the origin of the ideas we present, use or develop, at least whenever these ideas are not of our own making or part of the common heritage, already known (not by three or four initiates, but) by "*roux*" .

I don't recall ever having heard this consensus called into question. In the days when I was part of the mathematical community, between 1948 (as a young twenty-year-old beginner

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(\*) When I say 'ideas' here, I'm obviously not talking about 'results' alone in mathematics. Often, a simple, well-posed question, which touches on a crucial point that no one had been able to see before, is more important than a 'result', even a difficult one. This is still the case, even if the question has not yet been condensed into a precise *statement*, which would constitute the embryo of a hypothetical answer, or even a more or less complete (and still conjectural) answer. It is understood that producing such a statement from an initially vague question is an essential and creative part of mathematical work. Presenting an elaborated version of a question (perhaps a profound one) while concealing its origin (even though the elaboration is the work of the presenter-prestidigitator), just as concealing the origin of a statement in profound form, on the pretext that you are presenting a demonstration of it, is plagiarism just as much as presenting as your own a demonstration taken from someone else.

The same applies to the introduction of fruitful *norions*, which are often even more crucial than good statements - for the question of 'good statements' only arises when we have already been able to identify the right notions. Here again, using the pretext that you have modified or even improved a concept taken from someone else, in order to hide its origin, is just as dishonest as if you 'borrowed' the concept *rie varietur*. More often than not, it is the first step - raising a question (however vague), proposing a statement or a notion (however imperfect and provisional) - that is the crucial step, not the improvements (in precision, breadth, depth) that are made. But even if this were not the case, this cannot be taken as a 'reason' for the person who would be doing original work by improving what he has received, in order to hide what he has received (or, which may amount to the same thing, to 'debunk' it...).

As I have already pointed out elsewhere (in sub-note n° 106 of the note "The muscle and the gut (yang buries yin (1))", n° 106), the "value" of a conjectural statement depends neither on its presumed difficulty, nor on its more or less "plausible" character, nor on whether this statement will turn out to be true or false. In any case, the 'value' that we are prepared to attribute to a mathematical idea (whether expressed in a question, a statement, a notion or a demonstration) or a set of ideas, is to a large extent subjective and can hardly be the subject of a consensus of scientific ethics. This is why an honest scientist will indicate the origin of *all* the ideas he uses (explicitly or tacitly) and which are not part of the 'known good', without indulging in the tendency to keep quiet about the origin of an idea which he has decided in his heart of hearts (and perhaps for the needs of a dubious cause....) that it was in any case 'obvious', 'trivial', 'unimportant' (or other similar qualifiers).

1970 (when I left the mathematical scene), I have only very rarely had the opportunity, and with only one colleague and friend who was somewhat negligent in this respect (\*), to witness or even to be informed of a clear breach of this consensus, or principle. As I pointed out in the first part of Harvest and Sowing (in the section entitled 'A well-kept secret', n° 21), respecting this principle is by no means a matter of course for anyone with a modicum of honesty and self-respect. On the contrary, it requires a great deal of vigilance, because reflexes ingrained from childhood naturally lead us to suvesti- mer our own merits, and to confuse the work of assimilating ideas coming from others with the conception - even of these ideas - something which is absolutely not of the same order. When I wrote the above section over a year ago, I was clearly still not clear with myself about the importance of this consensus. There was a certain vagueness in my mind at the time (which I wasn't clearly aware of at that stage of my reflection) in relation to this diffuse feeling that a strict demand on *others* (my own students, for example) to respect this principle in their relationship with me was a sign of a lack of generosity, of a pettiness unworthy of me. So there was an *ambiguity* in me at the time, which I only clearly detected in the reflection in the note of 1 June of the same name (n° 63<sup>22</sup> ). This reflection completely dispelled this ambiguity, which I then realised) had weighed heavily on my relationship with my students, from the beginning (in the early sixties) until just last year. I realised that rigour in the practice of the profession of mathematician (or, more generally, of scientist), means first and foremost great vigilance with regard to oneself, in respect of this crucial consensus between us all, but also an equal requirement with regard to others, and all the more so with regard to those whom we are responsible for introducing to the profession that is ours.

With each passing year, I understand better how much *more* this profession is than just a certain technical know-how, or even the ability to use one's imagination to solve reputedly difficult problems. In a way, I knew that all along - but I underestimated the 'ethical' aspect, or *collecrif*.

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(\*) This colleague's case is mentioned in passing in the first part of R et S, in the section quoted in the next sentence. With the benefit of more than a year's hindsight, this 'case' takes on a weight I hadn't previously given it.

(\*), as something that was supposed to 'go without saying' between people of good faith and good company. In this way, I was ready for the 'ambiguity' of which I spoke, and which was also (under cover of a false 'generosity') an indulgence towards my students and assimilates, and in an even more hidden way, an indulgence towards *myself*.

I left this milieu of 'people of good faith and good company', which had also been *my* world, with which I had been happy to identify. When I took the chance to look around a bit (in the weeks following 19 April last year) I found, less than fifteen years after I left it, a *corruptibility* that I could never have imagined even in a dream. It's a mystery to me what *meaning* there is in 'doing maths' as a member of that world - if not only as a means to *power*, or (for those of modest status) to secure a *piracy* under material conditions that are, well, comfortable (when you're lucky enough to already be 'settled' somehow...).

(<sup>173</sup>) (\*) a. (22 March) To put it more bluntly, there is a 'fashion' level in burial, and a 'swindle' level. Perhaps I'm just being tardy, and what was considered a swindle in my day has now become a perfectly acceptable and honourable thing to do, as long as those who practise it belong to the gentry. Perhaps the 'threshold' has long since disappeared?

The 'second level' consists of *a single er vasre operation of swindling*, targeting the whole of my work on the cohomological theme, and after it, that of Zoghamn Mebkhout,

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(\*) I do not mean to say here that the "ethical" aspect of a situation is always, at the same time, a "collective" aspect, affecting the relationship of a person to a group (in this case, a group of "colleagues" or "fellow human beings"). This is certainly the case with the 'consensus' I am examining.

In accordance with the particular conditioning that has shaped my view of things since childhood, until last year I tended to underestimate (or even ignore) what is collective, in favour of what is personal. The 'collective adventure' aspect of my personal 'mathematical adventure' became clear to me last year, first of all in the section 'The Galois legacy' (n° 7), but especially in the sections at the end of the first part of R et S, 'The solitary adventure' and 'The weight of a past' (n° s 47, 50).

(\*) This note "The family album" was initially the immediate follow-up to the previous note "The threshold", written on the same day (22 March). This part now forms part a. ("A deceased well surrounded"), to which were added on 10 and 11 June two other parts, b. ("New faces - or the vocalises") and c. ("The one among all - or acquiescence"). The following note "L'escalade (2)" (n° 174), again dated 22 March, follows directly on from part a. (of the same day) of this note. The b. de p. notes to parts b. and c. are dated 13 and 14 June. Finally, a last part d. ("The last minute - or the end of a taboo") was added on 18 June.

the imprudent continuator, posthumous, obscure and obstinate pupil of the buried master. The great conductor of the operation was another pupil, by no means posthumous but on the contrary hidden, that's right, playing the tacit role of 'heir' to my work, while disowning and debunking both the work and the worker. This is my friend *Pierre Deligne*. His zealous lieutenants were none other than the four students who, with him, had opted for the 'cohomology' course.

*J. L. Verdier, L. Illusie, P. Berrhelor, J. P. Jouanolou.* The deceased is certainly well surrounded, both by the co-deceased (\*\*) sharing the honours of the funeral with him, and by those who were close to him during his lifetime - as auxiliary undertakers, lending a hand in the double funeral staged by the Grand Chef, I see seven other 'world-renowned' mathematicians (to use the words of a certain advertising placard (\*)), who appeared from time to time during the funeral ceremony reviewed in the family album (also known as 'The Four Operations'). They are (in order of importance in the Ceremony) *B. Teissier, A. A. Beilinson, J. Bernsrein, J. S. Milne, A. Ogus, K. Y. Shih, N. Karz.*

This is the list of mathematicians known to me to have participated in Operation Burial in one capacity or another. There are twelve of them (\*\*). For the last four named, I cannot prejudge their bad faith, based on the facts known to me. I consider that their responsibility is no less engaged than that of the others. For if they did not know what they were doing, that was a choice, which in no way relieves them of responsibility for their actions.

As for the participants with direct connivance, I would certainly be incapable of drawing up even an incomplete list, or of estimating their number, which is surely of an entirely different magnitude. Suffice it to say that among them are all the

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(\*\*) In fact, there are not one, but *forty* "co-defuncts" that I know of, who are the subject of the four coffin notes (coffins 1 to 4) n° s 93-96.

(\*) This is the IHES jubilee brochure published in 1983 to mark the twenty-fifth anniversary of its founding. foundation. See on this subject the notes Funeral Eulogies (1)(2) (n° s 104, 105) and more particularly page

454. (\*\*) The same "twelve" as in the section (of the first part of R et s) "Jesus and the twelve apostles", reviewing all the students who have worked with me up to the level of a state doctorate thesis. It is true that among the active participants in my Funeral, but this time on the company side of Springer Funeral GmbH (instead of the Congregation of the Faithful), there are still Dr. K. F. Springer (co-director of the esteemed establishment) and Drs. Peters and M. Byrne, who will be mentioned in a later note (n° 175). And that makes fifteen!

participants in the "memorable Colloque" at Luminy in June 1981 (known as the Colloque Pervers), and also all those among the readers of the volume entitled "SGA 4 1/2" who were even slightly aware of the meaning of the acronym SGA - and who "let it run".

I see two written texts that bear witness to a *disgrace* in the mathematics of the seventies and eighties, the like of which has probably never been seen in the history of our science. In one of these texts, the disgrace bursts forth in the name it has already given itself, which is in itself an imposture (of genius...): the text called "SGA 4 1/2" (as a common reference acronym), and also "Cohomologie Etale" - by p. Deligne, with the "collaboration" (among others and in addition to L. Illusie and J. L. Verdier) of A. Grothendieck (\*\*\*)�. The second text is the Proceedings of the Luminy Colloquium of June 1981, and more particularly the first volume, consisting of the Introduction to the Colloquium (by B. Teissier and J. L. Verdier) and the main article of the Colloquium (by A. A. Beilinson, J. Bernstein, P. Deligne).

It would surely be to everyone's benefit, and to the credit of the generation of mathematicians who have tolerated such disgraces, if at least *one* of those who have directly contributed to them, in one capacity or another, were to find in himself the simplicity and courage to make a public apology - or better still, to explain publicly what has happened, as far as *he* is concerned. But that is probably too much to hope for.

It is also too much to hope that J.L. Verdier will cease to occupy the position that Henri Cartan once held at the École Normale Supérieure. This is surely the key position in France for training the next generation of mathematicians. When I learned, a long time ago, that Verdier had been promoted to this post, he who had been one of my students and for whom I had a great affection, I felt honoured (and at the same time, secretly flattered). There was not the slightest doubt in my mind, then, that Verdier would fulfil Cartan's role perfectly, with regard to the young people most motivated by mathematics, who would learn their trade perfectly in his hands. If I see today (and have done for years, but never before with such brutal clarity) that I was wrong, and if I say so clearly here, it is not to opprobriate him or anyone else. I believe that he has disqualified himself from directing research. In saying this, I am not denying my share of responsibility for having taught him badly (as I have taught all my other students).

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(\*\*\*) On the meaning of this "collaboration", which is part of Deligne's mystification, see the note "Le renversement" (n° 68).<sup>✉</sup>

this profession that I loved, and continue to love.

b. (10 June) Two and a half months have passed since I wrote the beginning of this note on the 'Family Album'. Of course, I had no idea that I would have to come back to it again, following new twists and turns in the investigation into the Burial. Above all, it was the splitting up of the modest five- or ten-page 'apotheosis' that I had just written into a grandiose one-hundred-and-fifty-page Apotheosis in capital letters, which immediately introduced me to some 'new faces' who must have their place in the family album. There were also some already familiar faces, who it turned out were also part of the legion of those who actively participated, at the 'swindle' level, in 'Operation Burial'. I'm reviewing them here 'for the record', and to make sure that everyone concerned feels in good company (but that's probably been the case for a long time now. . . ), I'm inserting the new photos in the order in which they came to my attention.

First of all, on the Springer Verlag GmbV side, there are K. F. *Springer* (one of the company's co-publishers), K. *Perers*, and Mrs C. M. *Byrne*. I give more details in the note below "Les Pompes Funèbres - "irri Dienste der Wissenschaft"" (n° 175). At the time of writing the beginning of this note, on 22 March, I had just received a letter from K. F. Springer (dated 15 March) which dispelled my last doubts about the spirit which reigns in the esteemed Funeral Home, faithful to its motto "In the service of Science".

On the Apotheosis side (via the burial of the service unknown), I was made aware of contributions from M. *Kashiwara*, R. *Horra*, J. L. *Brylinski*, B. *Malgrange*, G. *Laumon*, and R. *Remmerr*, not to mention an *anonymous referee* whose bad faith can't be doubted; but it's true that if we start counting the complacent referees of crooked articles or books, closely or remotely linked to L'Enterrement, we'd surely need a new album. Equally, my old friend N. Katz has reappeared, this time in such a context that the presumption of good faith (relative, at least) that I had with regard to him has vanished. This brings to fourteen (and fifteen, counting the famous anonymous referee) the number of mathematicians, all of international repute, who are known to me to have played an active part in one capacity or another in the mystification-scam known as the 'Colloque Pervers'. For duly documented details on this subject, I refer you to the Apotheosis, and more particularly to the notes '. . et l'aubaine", "Le jour de gloire", "La maffia", "carte blanche pour le

pillage - ou les Hautes Œuvres" (n° s 171 (iiii (iv), 1712, 1714).

Finally, on the side of the 'Motifs' operation, another of my former students appeared (better late than never), a little away from the main pack. In retrospect I found myself almost obliged to count him (as a sixth grader) among my 'cohomology' students, even though 'in my day' he hadn't the slightest idea what cohomology was. I'm talking about Neantro Saavedra Rivano, who has clearly been used (of his own free will, of course) as a 'pawn' in the hands of others, rather than acting on his own behalf. His adventures with Monsieur Verdoux (disguised as his 'escort') have been reconstructed page by page in the series of notes 'Le sixième clou (au cercueil)' (n° s 1761 à 1767), dated 19 and 20 April (except for the last, which has yet to be written). This brings to six (out of twelve) the number of my 'former' students who took an active part in the master's funeral. The part played by Saavedra in this burial stands out in that the 'Tannakian categories' operation, in which he was a stakeholder, was the first large-scale operation aimed at concealing the authorship of a major part of my work and of the philosophy I had developed (in the wake of and on the occasion of the philosophy of motives, in this case).

Taking into account the new arrivals in the album, and putting aside the Springer-pompes-Funèbres contribution, to retain only those coming from the Congrégation des Fidèles, this brings to nineteen (\*) the number of well-known mathematicians who are known to me to have participated actively in the Burial, at the level of what was called in my time a swindle operation. Among these participants, there are only three, namely the three co-authors with P. Deligne of the 'memorable volume' Lecture Notes 900, whose bad faith I do not take for granted.

This list is far from exhaustive of all my colleagues and/or former students or friends, who in one capacity or another and in a more or less active way took part in my funeral, without going so far as to associate themselves with a blatant swindle. I have listed about thirty of them, most of which have already been mentioned in the course of my reflections on the funeral.

Including the previous ones, I'm well into my fifties - and these are just the ones I've been aware of in spite of myself, even in my distant retirement, over the last eight or nine years, or those that have come to my attention over the years.

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(\*) Twenty, including the famous anonymous referrer.

of a deliberately limited investigation.

These figures alone speak volumes, and provide unexpected support for the impression I had already gained last year, namely that the burial of my work and of my modest person is not the undertaking of a single person, or of a strictly limited group (such as my students before I left, or my 'co-homologist students'), but rather a collective undertaking, at the level of 'the entire Congregation'; or at least, at the level of that part of the mathematical establishment which had witnessed and taken part in the growth and development of my work as a geometer between 1955 and 1970. My departure in 1970 was the signal, in that part of mathematics at least, for *an immediate and draconian rejection* of 'Grothendieckian' mathematics, seen as the symbol and embodiment of 'feminine mathematics' (\*) : where vision constantly precedes and inspires the technical aspect, where difficulties are constantly resolved instead of being cut and dried, where constant contact with the profound unity in the apparent disparity of things, enables us at every moment to detect what is essential in the amorphous mass of the accidental and the accessory. At the same time, my departure signalled a spectacular halt to all conceptual work, or to put it more accurately, the *outlawing* of all such work, which was suddenly derided under the pretext of 'deepening'.

Thus, by mutilating the work of mathematical creation from one of its essential 'sides', the 'yin' or 'feminine' side, the result has been an astonishing 'verflachung', a 'flattening', a 'drying up' of mathematical work (\*\*). The thing was done (it seemed to me\*) by a brutal and draconian turn, practically overnight; it's such a strange thing, such an unheard-of thing, that it seems incredible. It took me more than a year of intensive reflection on Burial to finally grasp what had happened.

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(\*) On the subject of these reactions of rejection towards a certain style of approach to mathematics, see the notes "Le muscle et la tripe (yang enterre yin (1))", "Les obsèques du yin (yang enterre yin (4))", "La circonstance providentielle - ou l'Apothéose", "Le désaveu (1) - ou le rappel", "Le désaveu (2) - ou la métamorphose" (n° s 106, 124, 151, 152, 153). I try to identify some of the key features of 'feminine mathematics', alongside the complementary 'masculine' features, in the notes "The rising sea...", "The nine months and the five minutes", "The arrow and the wave", "Brother and husband - or the double signature", "Yin the Servant, and the new masters", "Yin the Servant - or generosity" (n° s 122, 123, 130, 134, 135, 136).

(\*\*) For an initial observation on the subject of this "flattening", see the note "Useless details" part (c), "Things that look like nothing - or drying out" (note no.° 171 (v)).

the past and face the facts. I don't know if there has been a comparable shift, in recent years or decades, or at any other time, in any branch of science, or in any other human activity involving (among other forces) our creative abilities.

But let me come back to my album. I thought it useful to include here the names of those, apart from those already mentioned, whose participation in the Burial I have no doubt about. I'm not convinced that any of them mean me any harm, and there are surely more than a few among them who even have feelings of sympathy or even affection for me (responding to similar feelings in myself). There may not be a single one of them who will not be sincerely surprised to hear of a 'Burial' that has taken place of me and my work, and even more, to learn that he is supposed to have participated in it in one way or another. The fact that he is mentioned by name here will already have the (welcome for me) effect of informing him about this, and (if he himself is interested) thus providing an opportunity for an explanation between us. I am, of course, entirely at the disposal of interested parties to provide any clarification they may require on the subject of what I have perceived (rightly or wrongly) as participation in my funeral, either directly or through 'co-burials'. It is out of the question for me to question the good faith and professional honesty of any of them (\*), and for more than one I can even add that their complete good faith and honesty are for me above suspicion.

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(\*\*) (16 June) Following new information that has just reached me, this presumption of good faith no longer applies in the case of A. Borel. According to correspondence between him and Z. Mebkhout last year, on the occasion of a seminar on the theory of  $\square$ -Modules directed by Borel in Zurich, it was already known to me that Mebkhout had informed him of the fact that he was the author of the central category equivalence in the theory (the so-called "RiemannHilbert"), giving him the precise references and sending him all his works, where Borel could easily convince himself of the reality of the facts. This did not prevent Borel from treating him with the necessary condescension (or even courtesy). In a Colloquium just held in Oberwolfach on the same theme (Algebraic theory of Systems of partial differential equations, Oberwolfach 9-15 June 1985), where Borel gave the first three introductory talks (under the title "Algebraic theory of  $\square$ -Modules"), preparing the ground for the "theorem of the good God", *the name of Mebkhout was not pronounced* in any of these talks, nor in any of the following ones (except for a single "thumb-reference" in passing, in Brylinski's talk). According to the report I have just received from Mebkhout, this Colloquium, at which Borel played the role of conductor (in place of Deligne, who did not attend), was a veritable *re-run of the Pervers Colloquium* which had taken place four years earlier. Almost the entire 'mafia' was there: Verdier, Brylinski, Laumon, Malgrange and even (this time) Kashiwara (who had already played a leading role in the Zurich seminar, notwithstanding the detailed information that Mebkhout had given Borel).

Rather than stupidly drawing up a list in alphabetical order (something a computer would do better than me), I prefer to give the names of the faithful, making chorus at my Funeral, in an approximate chronological order; not according to the moments of their appearance at the Funeral ceremony (which are not known to me, most of the time), but according to those when I clearly became aware of their participation. On the other hand, I will set aside all my pupils (\*). With the sole exception of Mrs Hoang Xuan Sinh, who works in Vietnam and is decidedly a little far away to lend a hand at my funeral, there is not a single one of my students who, in one way or another, did not take part. I have already explained this in the note 'Silence' (no. 84) and at the beginning of the note 'Coffin 1 - or the grateful D-Modules' (no.° 93), and this is not the place to return to it, but it is in the case of each of my pupils that an in-depth explanation of what happened seems to me to be most desirable.

The 'choruses at my funeral' come in a wide range of pitches I've identified four main ones, all of which make for a first-class polyphonic funeral in grand style! There's the 'discreet and efficient' *boycorr*, opposed to any attempt to develop mathematics with a Grothendieckian odour. There's the *discourtesy* and lack of tact that I hadn't encountered in the mathematical world before I left.

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about him). Needless to say that (no more than at the Zurich seminar) it was not deemed useful to ask Mebkhout to give a talk, and that (apart from occasional interventions by this same Mebkhout, falling into freezing cold) the name of the ancestor was not mentioned (apart from his presence in the unfortunate "Grothendieck group"). The theory of biduality still goes by the name of 'Verdier's duality', including in Borel's presentations. Mebkhout had already reminded him insistently last year that this biduality had been copied from Lecture I of SGA 5 - but apparently Borel has developed an allergy to a certain style and to a certain absentee, an allergy that forbids him to take such references into account. ... Moreover, he took part in the same swindle in his book 'Intersection Homology' (Birkhauser Verlag, 1984), published *after* Mebkhout had pointed out Verdier's deception to him.

I had maintained a presumption of good faith towards Borel to the limit of what was possible, having known him well in the 1950s, when we were both members of the Bourbaki group and worked together there. He is the first among the members of what I truly consider to be 'my original milieu' in the mathematical world, whose direct participation, and at the level of a 'swindle', in the Burial, I have to acknowledge today without any possibility of doubt.

(\*) When I say 'my students' here, I mean those who have worked with me on a dissertation at D. and who (with the exception of Deligne) did a doctoral thesis with me. There are fourteen of them (including two "after my departure"), reviewed in the note "Jesus and the twelve apostles" (n° 19).

In one or two extreme cases it takes the form of thinly veiled derision. There is the *deliberate intention* to *ignore* or minimise the influence of my ideas and points of view in one's personal work, or in a particular part of contemporary mathematics, in cases where this influence is nevertheless obvious and crucial, or to attribute to a third party results or ideas that are due to me without any possibility of doubt. Finally, *there is the 'hive-mind' attitude* of those who find themselves unlucky confronted with an eye-watering scam, of burying their heads in the sand and pretending not to have seen or felt anything.

Needless to say, in the choir of the faithful, there are more than a few who vocalise on several tuning forks at once.

All that said, here at last is the promised list (\*) to complete our family album: B. Eckmann, A. Dold, N. A. Campo, B. Mazur, V. Poenaru, D. B. A. Epstein, P. Cartier, D. Quillen, N. Kuiper, R. D. Mac Pherson H. Hironaka, F. Hirzebruch, J. Tits, S. S. Chern, M. Artin, R. P. Langlands, G. C. Rota, C. Goulaouic, W. Fulton, A. Borel, J. Tate, J. P. Serre.

c. (11 June) I felt a bit foolish last night, typing this list of names, when each of the names lined up there stupidly evoked, on its own, a whole rich cloud of associations, none of which are reflected here. But I can't go into each of these names and what they evoke - that would take another volume, and I can't wait to finish with this one! I apologise to those concerned for 'sticking' them like this, rather cavalierly, in a 'table' of presence (at my funeral) that is not very inspiring. It's true that most of them have already been mentioned in one capacity or another here or there in the course of Harvesting and

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(\*) I have not included in this list the names of the eight 'non-cohomology' students, which can be found in the note (n° 19) already cited, together with the names of the cohomology students already reviewed above.

It would also be fair to include in my "Family Album" the names of those of my colleagues and former friends who are known to me as "non-entrants", through unequivocal expressions of sympathy and esteem. First of all, in connection with my work "A la Poursuite des Champs" ("In Pursuit of the Fields") carried on in 1983 (work to which I intend to return)/ I received warm encouragement from J. Benabou, N. J. Baues, A. Joyal, and above all from Ronnie Brown and Tim Porter, who (in more ways than one) have given me a real boost.  
effective help throughout my work.

It is true that these colleagues belong to a rather different milieu from the one with which I used to identify myself, which is also the milieu in which my magisterial funeral naturally took place. As mathematicians who belong to or are close to this milieu, and from whom I have recently (in the last one or two years) received testimonies along the same lines, it is a pleasure for me to name here

B. Lawvere, J. Murre, D. Mumford, I. M. Gel'and and (last but not least!) J. P. Serre. It is this last nominee

who has the unique distinction of appearing on both 'lists' at the same time - those of the 'buriers', and that of the loyal friends!

Even if it wasn't necessarily as a participant in my funeral. Four of them are friends of mine from the Bourbaki group, with whom I had close ties, through work and (for two of them) through friendship, 'thirty years ago and more. There are nine more, in this concise list, to whom I have felt linked by feelings of warm friendship, and who have not died out even as I write these lines. But more than once, over the years, when I have come face to face with one of these friends of yesteryear, or with one of those who were my students, I have been seized by the strange impression that\* the person towards whom I still felt this surge of sympathy that I found in myself Intact, was no longer with me - or at least, that contact with that person had been lost, perhaps irretrievably.

That an *aurre* had replaced the one I had known, filled with intense, quivering life, and seemed to have erased all traces of it. It was like a *drying-out*, a desiccation that had taken place, and a hard, watertight shell had appeared where there had been sensitive, living flesh...

Before closing this family album, which I've only just opened, I'd like to focus on just one of the photos I've just inserted. It's the one that comes last in this album. Even more than for any of the others I ended up including, there was serious resistance in me (unconscious, as it should have been) to parting with certain preconceived and long-standing images of our relationship, and coming to terms with the humble evidence. This is Jean-Pierre Serre.

More than once in the course of *Récoltes et Semailles*, I have had occasion to speak about Serre, most often by name (\*). The little I have said here and there will already have been enough, I think, to make it clear that he played a role in my mathematical past that belongs to no one else. This is something that I had never thought about before writing *Harvest and Sowing*, and which I discovered as I went along. For twenty years, from the early fifties until I left the mathematical scene, he played the role of 'privileged interlocutor' (\*) for me, and most of my major ideas and my

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(\*) I have refrained from naming Serre two or three times, in *Fatuité et Renouvellement*; at a time when it did not seem useful, more often than not, to refer by name to the people about whom I was expressing some criticism. The passages in *Récoltes et Semailles* where I express myself most fully about Serre and the relationship between him and me are to be found in the notes "Les neuf mois et les cinq minutes", "Frères et époux - ou la double signature", and "Les détails inutiles" (notes n° s 123, 134, 171 (v)).

(\*) Between 1965 and 1969, when Serre and I still had a close relationship, it was Deligne who took over.

The major investments I made were directly stimulated by Serre's ideas (which were sometimes 'innocuous in appearance'). At times, especially (I think) in the second half of the fifties and perhaps again in the early sixties, there was a kind of intense mathematical 'symbiosis' between him and me, who were of complementary mathematical temperaments (\*\*\*) - a symbiosis which proved to be very fruitful on each occasion. The relationship between Serre and myself was not of a 'symmetrical' nature; for example, Serre was by no means inclined, as I am, to rely on one or more 'privileged interlocutors' to keep him abreast of what might interest him or what he thought he needed. This does not prevent me (or so I presume) from having played an equally exceptional role in his mathematical past, and I can imagine that my unexpected departure in 1970 was a breaking point in his mathematical life (of a certain equilibrium, perhaps, where I represented the 'yin' pole), a sudden turning point, a kind of 'void' that suddenly appeared. I don't know...

The fact remains that Serre's close relationship with me and my work was certainly perceived in the mathematical world, even if it remained in the realm of the unspoken. Surely, apart from Deligne, Serre was perceived, with good reason, as the mathematician who was 'closest' to my work. Deligne's relationship to my work and to me was very different - it was one of pupil and 'heir'. Deligne drew on my thoughts and my written and unwritten work, whereas none of my great ideas or investments were inspired or stimulated by him. He was 'closer' to me than Serre, in the sense that, during the years he spent with me (1965-69), he did not reject certain aspects of my work and my approach to mathematics, as Serre did; This is what enabled him, in the space of barely three or four years (given his exceptional means, and also exceptionally favourable circumstances), to assimilate intimately and in its entirety the vast unifying vision that had been born and developed in me over the previous years. But his relationship with me was profoundly ambiguous - and he systematically played on this tacit relationship

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who played the role of privileged interlocutor. The reason for this surely lies in very strong affinities of temperament and, above all, in Deligne's openness (towards what I felt was the essence of what I had to contribute) which was often lacking in Serre. I will come back below to the very different nature of these two relationships, which were the two closest in my past as a mathematician. See also the note quoted in the b. de p. note that follows.

(\*\*\*) On the subject of this complementarity, and on the affinity between Deligne and myself, see the note already quoted "Frères and spouse - or double signature" (n° 134).

of pupil and heir, which represented for him the means to *power*, while denying it and working to bury both the master and his vision. ...

There was no ambiguity of this kind in the relationship between Serre and myself - at no time did either of us have the slightest desire to take 'power' over the other, or to use this relationship for the purposes of power. I think I can even say that such power games did not exist in the 'Bourbaki milieu' that welcomed me at the end of the 1940s, and I don't think I was a witness, let alone a co-actor (albeit in spite of myself) in such games, until I left in 1970 (\*). This is probably another way of saying the same thing, concerning the relationship between Serre and myself (or the relationships I was able to observe within the Bourbaki milieu): at no time did I detect the slightest element of antagonism (\*\*), on either side. There have been occasional frictions, to be sure, which have been discussed and about which perhaps

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(\*) I should, however, make a reservation, taking into account a certain game that has been played, entirely without my knowledge, among some of my students around my person and my work. This game began at least as early as 1966 (the year in which the SGA 5 seminar ended), with the first clearly visible episode being Deligne's 1968 article on the degeneracy of spectral suites (see on this subject the note "L'éviction", n° 63). I only began to learn about these games, which are indeed power games, last year, almost twenty years later. It's true that the active players were not members of the initial environment that welcomed me and into which I had integrated (an environment in which I still can't discern such games, even with the hindsight afforded by greater maturity). They trained 'the next generation'. It's also true that the deterioration in quality that I see in this new generation, compared with the mother group, is surely closely linked to a similar deterioration that took place in each of the members (or very few) of this initial group, which was of exceptional quality. On this subject, see the two sections "Bourbaki, ou ma grande chance - et son revers", and "De Profundis" (n° s 22, 23).

(\*\*) I should, however, make an exception here for the episode *Survivre et Vivre*, in the early seventies. This episode brought to light the fact that my own ethical and ideological options, on many points that seemed important to me (and still do today), were the antithesis of those of almost all my friends in the mathematical establishment, including Serre. This put a sudden end to my feelings of identification with this 'establishment', which I had tended to confuse with an ideal (and idyllic) 'mathematical community'. (See on this subject the section "The 'Mathematical Community': fiction and reality", n° 10.) This unexpected revelation, and the resulting 'change of camp' in the space of just a few months, led me to adopt antagonistic attitudes towards some of my former friends, whom I was now inclined to classify as 'reactionaries', etc. I have since returned to these attitudes, and to the 'mathematical community' as a whole. I've since come round to these peremptory and superficial classifications. The fact remains that, in a reversal that's hardly surprising, Serre was one of those whom, for a time, I saw as 'adversaries', if not 'awful'. I was pleased to note that this episode left no trace of resentment or enmity in him - or in me either, need I add!

I'll have to come back to that, but that's something else entirely. The relationship between Serre and myself drew its strength, it seems to me, from our shared passion for a common teacher, mathematics, without any 'parasitic' component of an egotistical nature, where the other would appear as a means, as an instrument, or as a target. This is undoubtedly why, when I recently resumed a correspondence with Serre that had been interrupted for ten or twelve years, I found, in the spaces between the lines of the two or three letters I received from him, signs of an intact friendship and delicacy, as if we had just parted the day before.

Moreover, even though the opportunity to write to each other had not arisen for more than ten years, the echoes that reached me from Serre, from far and wide, all pointed in the same direction of an unchanged friendship - and by no means in funeral tones, as was the case for many of my friends of yesteryear. That's why, until the last few weeks, it never occurred to me that Serre would have played a part in my funeral. Everything I knew about him seemed to point in the opposite direction. It is certain, moreover, that his mere presence on the mathematical scene set certain limits to the Funeral (a most modest limit, it must be admitted...). Leafing through J. S. Milne "Etale Cohomology" (\*), published in 1980, i.e. *after* the incredible "SGA 4 1/2 - SGA 5 operation", I was struck by the fact that Milne "confidently" followed, practically verbatim, the terms in which Serre had expressed himself in a certain Bourbaki seminar (February 1974, n° 446) concerning the authorship of etale cohomology, namely that the theory had been "developed by Grothendieck, with the help of M. Artin" (\*). In more ways than one, it is clear that Milne read only occasionally in SGA 4 and SGA 5 (\*\*), and he follows both

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(\*) Published by Princeton University Press, Princeton, New Jersey. This is the same J. S. Milne who, two years later, took part in the 'memorable volume' Lecture Notes 900 scam (referred to in the note '... and exhumation', n° 168 (iii)). Flipping through Milne's book, I got the impression that it is written in good faith, and without any deliberate intent to bury. Even though his perception of things is obviously limited to following in the footsteps of eminent figures such as Serre and Deligne, he nevertheless has the merit (and originality...) of expressing himself courteously on the subject of the SGA 4, SGA 5 parent seminar.

Serre (speaking glibly about SGA 4 and SGA 5, in the same Bourbaki lecture) and Deligne (shamelessly debunking these same seminars, in the volume he christened "SSA 4") to present, in his introduction, the original texts of SGA 4 and SGA 5 (\*\*\*) as being difficult to access. This is precisely the situation that his book (following on from Deligne's three years earlier, which was a little thin on the ground) is supposed to remedy; or, to put it plainly, to spare the user the useless and tedious work of reading the original texts. The opinion of the highest eminences (Serre first, in this case, followed by Deligne, with the deceased sitting mute in his padded coffin...), an opinion that Milne, like everyone else, follows with his eyes shut (if not with eagerness, given the funeral context...), peremptorily rules out the use of the original text. . . ), peremptorily excludes that these texts present anything other than "useless details" (or even a "gangue of nonsense" . . . ), but rather the foundations of a new "general topology" version of topos (buried by unanimous agreement in. at the same time as the worker... ) - and that, in the long run, we will no more be able to do without this new topology, which (among other things) allowed the theory discussed in Milne's book to emerge, than we were able to do without ordinary general topology, which Milne, Deligne and Serre had the advantage (as did I) of learning at school, and which they therefore meekly admit (as a matter of course) must have been worth the effort...

I think it was last year that I first took a quick look at

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(\*) Two years earlier, at the 1978 International Mathematical Congress in Helsinki, in the speech given by N. Katz (still the same Katzi) in honour of the new Fields laureate Pierre Deligne, the theory of staggered cohomology was presented as "developed by M - Artin and A. Grothendieck, in the direction envisaged by Grothendieck" - which goes to show that alphabetical order sometimes works well... The fact that Milne chose to follow Serre, rather than Katz, in his version of things, seems to me to be one sign among others of his good faith.

(\*\*) It struck me, in particular, that Milne (and Mebkhout, who was nonetheless an attentive reader of my works...) did not notice the existence in SGA 5 of an explicit Lefschetz formula for general cohomological correspondences on an algebraic curve, a formula brilliantly concealed by the two prestidigitateur-arnaqueurs Deligne and Illusie - the work of an artist, 1 On this subject, see the two sub-notes "Les prestidigitateurs - ou la formule envolée" and "Les félicitations - ou le nouveau style" (n° s 1698, 1699).

(\*\*\*) As far as the published version of SGA 5 is concerned, which (thanks to the "care" of the publisher-sic Illusie) is no more than a disfigured ruin of the original seminar, Milne is excused for finding it "difficult to access". The good Samaritan Illusie has done all he can to turn it (following the good Samaritan Deligne's good pleasure) into an indigestible collection of 'technical digressions' . . . .

this Bourbaki presentation by Serre, on which I commented recently, in the note "Les détails inutiles" (n° 171 (vi), part (a), "Des paquets de mille pages..."). The passage in which Serre ironically refers to the 1,583 pages of SGA 4 held so little of my attention at the time that I had even completely forgotten about it when I read it again a month or two ago, when I was writing The Four Operations. It has to be said that Serre's attitude of distancing himself from my famous 'thousand-page packets' had been known to me for a long time, long before the APG 4 seminar series appeared, and so it came as no surprise. The first time (I think) that such a reaction of 'visceral rejection' was triggered in Serre, towards a certain style of approach to mathematics which is mine, was on the occasion of the theory of coherent duality, which I had developed in the second half of the fifties. These were indeed potential 'bundles of a thousand pages' at least, especially if you consider that there was a whole new co-homological algebra at stake, the derived categories version; but potential or actual 'bundle', what was clear was that Serre didn't want to hear about it any more than Weil suffered to see a cohomology group written in black and white, or to hear the words 'topological vector space' uttered.

But this time (\*), when I came back to this text by Serre from 1974, against the backdrop of a year's reflection on a certain Burial (which, in 1974, had been 'going well' for four years. . . ), this passage finally clicked. It worked in me, slowly, over the days and weeks. I realised that this attitude of Serre's, which I had come to expect and which, before I left, 'had no consequences', acted as a kind of *verr fire* at the Burial that took place. The first thing that occurred to me, with the force of evidence, was that Serre's own words (but 'with added malice and impudence'), were eagerly taken up by a Deligne (or better said, with secret delight) barely three years later tatfd, as 'background noise' for his memorable Manoeuvres.

I expressed myself along these lines for the first time in the above-mentioned note of 4 May, and this reflection is deepened in part (c) (of 27 May) of the same note, "Des choses qui ressemblent à rien - ou le dessèchement". This is also the first hint of a reflection on the relationship between Serre and myself, in the particular light provided by the Burial \*). At

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(\*) In fact, it's only the *third* time I've had this text in my hands that it 'clicked'.

As I was writing these pages, I must already have had a vague perception of the crucial role played by Serre in L'Enterrement. In the two weeks that have elapsed since then, the work of integrating and assimilating a whole range of facts and impressions has had to continue, and the forces of inertia opposing a direct and nuanced perception of things have, I believe, resorbed without struggle or effort. The time seems ripe for me to bring this work to a conclusion, now trying as best I can to formulate what is perceived.

One might think that Serre's long-standing tendency to distance himself from certain aspects and parts of my work would have acted as a kind of unfortunate coincidence, which would, alas, have favoured an equally unfortunate burial. To come straight to the heart of the matter, it has become clear to me, in view of Serre's unique relationship with me and my work, and also in view of his exceptional influence on mathematicians of his generation and those that followed, that the *Enrerremenr could not have taken place if he had not acquiesced in my enrerremenr*.

In addition to the 'deceased', who was decidedly absent, there were *two main actors* in this funeral, whose acts and omissions followed on from each other and complemented each other, without the slightest friction or blunder it would seem (but I can't even begin to talk about connivance here, as the two protagonists operated on different tuning forks).

Pierre Deligne and Jean-pierre Serre.

The first was discussed at length at the very beginning of this long reflection on the Funeral; he represents the 'foreground of the picture' of the Funeral, as the Grand Officiant at the Funeral, at the same time as the occult heir and the principal 'beneficiary' of the operations he initiates (and this, even before the symbolic 'death' of the funeral... ). Serre, who is mentioned here for the first time as a leading figure in the funeral ceremony, represents the "third plane of the picture", made up of "the congregation of the Faithful".

Ever since last year, or to put it better, even before I discovered Burial in its crudest and most aberrant forms (and under that name), I knew that those who were burying me with such eagerness, in a world in which I had not even been aware of my own existence, would be the ones who would do it.

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(\*) In a previous b. de p. note (note (\*)) page 1117) I also noted two other notes in which I spoke about the relationship between Serre and myself, but in a rather different light - the 'pre-Burial' light.

They were, above all others, my *friends of the past*, and some of them had not ceased to count themselves (albeit with lip service. . . ) among my friends. At present, it is also clear to me that, among those friends who were not also (and above all) my pupils (\*), the one who was truly the *pillar of the ceremony*, as representative of the Congregation and as guarantor of the acquiescence of all the Faithful, was also the one, of all, who, in terms of our common passion, had been closest to me.

The most striking sign of Serre's acquiescence is certainly not, for me, in a certain quip, sent with the casualness that I know him well - a quip that almost escaped my attention (even if it wasn't lost on everyone...). The sign, which is truly astonishingly obvious once I stop to think about it, lies *in the ignorance in which he was able to maintain himself*, on the subject of this Burial which was taking place right under his nose, so to speak (\*\*) - the burial of a work of art in

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(\*) Throughout the reflections on Harvest and Sowing, it became clearer and clearer just how much the simple fact of having been someone's pupil (mine, in this case) *marks* a relationship and gives it a special quality, making it similar to a relationship with a father or mother.

(\*\*) It can be said that in his Bourbaki lecture of 1974, already quoted, in which he set out the demonstration by A line from the last part of Weil's conjectures. Serre had his nose right in l'Enterrement - without, however, having the innocence to take note of it. I thought I sensed his unease at being confronted with this apparently absurd situation: that ten years after my paper (also at the Bourbaki seminar) in which I gave the broad outlines of the proof of an *A-adic cohomological formula for L-functions*, the crucial 'fixed point formula' (which I had admitted) had still not been proved in the literature.

Serre then chose to *evacuate* this uneasiness with a gesture of humour, by ironically referring to the famous "1583 pages" of SGA 4 (implying: and which did *not even* provide the formula we needed), which was the easy way out, consisting in evading an unpleasant reality.(x). Yet he knew full well (but perhaps he had been pleased to forget. . . ) that in the SGA 5 seminar I had demonstrated at length a formula for fixed points that went far beyond the formula for the Frobenius correspondence - and he also knew that my lectures had been dragging on for *eight* years in the hands of so-called volunteer 'editors'. Although he was happy to forget the theme of SGA 5 ('*L-functions and A-adic cohomology*' - the title says it all) and its content, he knew me well enough, having seen me do maths for more than twenty years, to know that I was not in the habit of doing things by halves, quite the contrary (and I even did them so 'not by halves' that he was often annoyed, not to say excited...). It might have helped him to refresh his memories of what had happened at the SGA 5 seminar, where he'd been often enough, at least, to know the broad outlines of what I was doing there and where I stood.

Clearly, he didn't want to see his memories refreshed or to ask himself questions. And this is just one of many cases where my friend preferred to close his eyes and plug his nose, rather than face up to a reality he couldn't accept without deeply questioning himself.

to which he had been linked from the very beginning, and more closely than anyone else in the world. And it's a complete mystery to me whether reading Harvest and Sowing (assuming he reads this 'package' of over a thousand pages, again...) will finally encourage him to use his nose, after fifteen years of hard work... ), and the rest. But I'm well aware that for him, as much as for any other participant in my funeral, accepting my message and using his healthy faculties also means accepting to question himself, profoundly.

It seems to me that Serre's role at the head of the Congregation of the Faithful who came to attend and chorus at my funeral is both typical and exceptional. If he is exceptional, it is because of his extreme character - as the one closest to me, closer than any other member of the Congregation; and also because of his exceptional stature (\*). This eliminates from the deepest motivations the usual "parasitic" components of antagonism "by com-pensation" (\*\*). As I pointed out earlier, I do not detect in Serre's relationship to

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(x) (22 June) Since writing these lines, I've come to realise that this kind of 'unpleasant reality' is now being welcomed with alacrity, almost as a godsend! On this subject, see d. and e. from "L'album de famille".

(\*) There is a third circumstance that gives Serre's role in L'Enterrement this exceptional, or 'extreme', character. He is one of the group of 'benevolent elders' who welcomed me when I first came into contact with the world of mathematicians. (I write about this group, for the first time in my life, in 'The Welcome Stranger' (section n° 9), and then in the Introduction to Harvest and Sowing (I 5, 'a welcome debt')). This is perhaps the main reason, in addition to the bonds of friendship and sympathy between us, why it took me more than a year to come to terms with the crucial role played by Serre in my mathematical burial.

(\*\*) I have already alluded two or three times, here and there, to this "antagonism without cause" (apparent), and notably in the note of 3 April (below) "The messenger (2)" (n° 182). There is no doubt in my mind that such an 'archetypal' antagonism is at work in the vast majority of the participants in my funeral - perhaps in all of them, with the sole exception of Serre. This force seems to me to be distinct from that which expresses itself in the process of repression (or 'burial') of 'the disowned woman who lives within herself'. But these two forces are nonetheless intimately linked, and in Burial they are intertwined and appear in a kind of amalgam, where it is often difficult to dissociate them. Yet I believe I have identified *the two great forces* at work in L'Enterrement. But I'd be at a loss to say whether one is more important than the other, and if so which. I would tend to think that it was the first of the two that I detected, namely, the force of repression of the feminine side of her own being.

If Serre's case appeared to me to be 'typical' (as well as exceptional), it's undoubtedly because it's the latter of the two forces at play (the one I tend to see as primordial) that appears there in all its force, to the exclusion of any trace of the other (qualified here as 'parasitic' - in the sense that it would obscure a clear apprehension of what I thought I perceived as the *essential*). I presume (as long as

As far as I know, apart from the famous joke, this acquiescence was expressed in a purely passive way, by *omission* without more. But this tacit 'green light' given to a Burial of vast dimensions, accompanied by operations so enormous at times that they seem to define both common sense and decency, now appears to me as the invaluable and crucial 'counterpart', the 'negative' as it were, of Deligne's intensely active and self-interested participation in this same Burial (\*).

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that the work of integrating and assimilating the raw facts and perceptions continues) that the coming months will bring me a more nuanced understanding of the part to be played by each of the forces involved, both in the Burial and in other conflict situations in which I am involved in one capacity or another.

(\*) There is a rather remarkable *inversion* in the distribution of roles between Serre and Deligne, in L'Enterrement: Serre's persona appears almost exclusively passive, Deligne's intensely active (even if this role of 'leader of the game' is constantly obscured, for the sake of the argument and in keeping with my friend Pierre's particular style). In fact, however, it is Serre's persona that has a strongly pronounced 'masculine' dominance, and Deligne's has an equally pronounced 'yin' (or 'feminine') dominance; and this (for both of them) as much at the level of egotic mechanisms, of the 'T' and its conditioning (thus that of the '*parron*'), as at that of the drive for discovery, of what is original and escapes (in its intimate nature) conditioning (the '*child*' level). Between the extreme opposite temperaments of Serre and Deligne, the two 'pillars' of L'Enterrement, the deceased represents a sort of middle ground, with a strong 'masculine' predominance on the 'boss' side, and an equally strong 'feminine' predominance on the 'worker' (or 'child') side. (This distribution of "basic tones" appears in the note "Brothers and spouses - or the double signature", n° 134.)

The forces and mechanisms of 'reversal' between the yin and yang roles were in fact the main theme of reflection, giving rise to the long meditation 'The key to yin and yang' and remaining present throughout. It appears implicitly from the very first note of the Key, "The muscle and the gut (yang buries yin (1))" (n° 106), and comes more or less to the forefront of attention in eleven of the subsequent notes (notes n° s 124, 127, 132, 133, 138, 140, 145, 148, 151, 153, 154). Here, I have unexpectedly come across a somewhat similar 'reversal' situation, driven by the internal logic of the profound forces at work in Burial.

Recently, I was struck by yet another apparently paradoxical aspect of the 'reversal' of yin and yang roles in this funeral rich in apparent paradoxes! This time it's a question of the respective roles of the premature 'deceased' on the one hand, and all the participants in his or her funeral on the other. At the level of collective unconscious intentions, this Funeral of a deceased person (who is supposed to confine himself to the complete passivity befitting his state) is, above all else, that of 'feminine mathematics'.

It seems to me that I clearly perceived the force at work in Serre. It is at a deeper level than that of personal antagonism, or the search for 'profit' in the usual sense of the word. The recent exchange of letters with him was revealing in this respect. I feel that in the fifteen years since I left, my friend has undergone a *ransformarion* (\*). This is precisely in the direction of this 'visceral reaction of rejection' towards certain dominant aspects of my approach to mathematics. These are aspects that were also present, but to a less pronounced degree, in Serre's own approach, in the most fruitful years of his mathematical past.

- years of openness and intense creativity, before a process of *repression* of these aspects of his creative personality, of the 'child' in him, sets in. These are the 'yin' or 'feminine' aspects and traits of creativity. The transformation that I felt in my friend, with striking force, was that of a state of harmonious cooperation of the creative forces yin and yang, with a pronounced yang (or 'masculine')† 'dominance,' in a state of

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(See for example, on this subject, the notes "Les obsèques du yin (yang enterre yin (4))", and "La circonstance providentielle - ou l'Apothéose", n° s 124, 151.) However, the internal logic of the situation obliges each of these "hard" participants in question to play a typically "yin" or "feminine" game.

It's a game of 'velvet paw', of halftones, silences, omissions, insinuations placed there under the surface of nothing, or constantly suggesting one thing or another while pretending to say the opposite - the 'inch!' (See, on the subject of this style, the note "Pouce I", and especially the notes "Patte de velous - ou les sourires" and "Le renversement (4) - ou le cirque conjugal", n° s 77, 137, 138.) On the other hand, it is the 'deceased', the embodiment of the plethora of feminine sluggishness, who emerges from his cosy coffin when you least expect it, resuming his familiar 'macho' role, playing cards on the table, sticking his indiscreet nose and impudent verb, electric torch in hand, into the most exquisitely ambiguous shadows, rudely calling everyone by their name and a cat a cat and a rascal a rascal - a real misfit to

to say the least, and a serious obstacle to going round in circles in the muffled purr of a beautiful funeral ceremony... (\*) This expression '*rransformarion*' is immediately associated with the '*méramorphose*' in my friend Pierre, that

I saw it clearly for the first time when he visited me last October. (I say more about this in the note "Le désaveu (2) - ou la métamorphose", n° 153.) The term 'metamorphosis' is stronger, and corresponds to the fact that, in my friend Pierre, there was a veritable *reversal of* an original temperament with a pronounced 'dominant' yin, into 'macho' borrowed attitudes with a touch of zinc. This apart, the transformation that I felt in both friends goes in the same direction, and is driven by the same force of repression of traits felt to be 'feminine'.

of 'virile to zinc' imbalance, where 'yin' or 'feminine' qualities are ruthlessly extirpated.

To tell the truth, as I already suggested a fortnight ago (in the note quoted earlier), this is the culmination of an evolution whose first signs I can see as early as the fifties, and which became more pronounced during the sixties. Even then, there was a gradual shift in balance, manifested in a *narrowing of vision*, and in the range of creative faculties allowed to come into play. The reactions of rejection towards certain major aspects of my approach to mathematics, and progressively, towards everything that really made up the life, depth and strength of my work

- this rejection was simply the outward projection, the tangible manifestation in his relationship with me, of a rejection of a completely different scope, with regard to an essential aspect of his own being and his own creative faculties.

It is possible (as I suggested earlier) that as long as I was in the par- ages, the relationship with me acted as a brake on this evolution in Serre, that it represented in his life, in the fifties and especially in the sixties, a kind of counterweight, and thus a factor of relative equilibrium. If this is indeed the case, my sudden departure must have given free rein to this force of repression of feminine qualities - a kind of force that has become familiar to me, as one of the dominant egotic forces that also acted in my own life; with this remarkable difference, however, that in my case this force of repression was confined to the egotic mechanisms and my relationships with others, without interfering with my love affair with Lady Mathematics, or (more generally) with my spontaneous approach to the adventure of discovery, whether mathematical or otherwise (\*).

To return to the subject of Burial, I can do no better than to quote the lines that conclude the reflections of 10 November, in the note "Les obsèques du yin (yang enterre yin (4))" (n° 124, page 564):

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(\*) I speak about the role of this force of repression in my own life in the note "Le superpère (yang enterre yin (2))", n° 108. I began to detect this force in 1976, the year that marked a crucial turning point in my spiritual adventure. This turning point is discussed in the two notes "The reunion (the awakening of yin (1))" and "Acceptance (the awakening of yin (2))", n° s 109, t10. I note the predominance of 'feminine' traits in my mathematical work (where these traits seem to have taken refuge, safe from suspicion!) in the note 'The rising sea', no.° 122.

". . . And all of a sudden these funerals appear to me in a new, unexpected light, in which my person itself has become an accessory, in which it becomes a symbol of what must be 'handed over to disdain'. These are no longer the funerals of a person, or of a work, or even of an inadmissible dissidence, but the funerals of the 'mathematical feminine' - and even more profoundly, perhaps, in each of the many attendees who have come to applaud the Eulogy, *the funerals of the disowned woman who goes vir in himself.*"

This last intuition appeared that day in a sudden flash, at the very moment of writing these last two lines, like an unexpected revelation, in addition to the one that was the subject of the previous lines. This intuition remained a watermark in my thinking over the weeks that followed, and was finally taken up and deepened in the three consecutive notes from 23 to 26 December: "La circonstance providentielle - ou l'Apothéose", "Le désaveu (1) - ou le rappel", and "Le désaveu (2) - ou la métamorphose".

Neither on the day when this intuition first made its appearance, nor in the first two of the three notes quoted, where I probe it further, did I have in mind a precise case in point, if not, to some extent, that of my friend Pierre (examined in a more detailed way in the third note quoted). I was well aware, moreover, that this case was by no means typical of the entire Congregation of the Faithful, forming the famous 'third plan' at my Burial. Also, because it was not exemplified in a precise case, my apprehension of a certain reality, suddenly glimpsed, was still tainted by a certain vagueness - that of things sensed, 'known' at a certain level, but not fully and clearly 'seen'. I vaguely remember being a little embarrassed by this vagueness, that there was a desire to find someone 'representative', among those of my friends whom I knew to be involved in the Burial, to somehow 'hang' this diffuse knowledge on it, to see it embodied in a tangible reality.

The thought of Serre never crossed my mind at the time - he was one of the few of my old friends for whom it was clearly decided (on a conscious level, at least) that *he*, at least, was *not a party* to my Funeral! But if my groping mind could not then (or even before . . .) find the person who, at my funeral, was to embody 'the whole Congregation', it must be that somewhere inside me, it must have been quite clear that there was *only one person in the world* capable of playing that role - and that it was precisely the person whom a heaviness within me had made me exclude.

by a kind of tacit and peremptory taboo...

Now that this heaviness has dissipated, following a slow and obscure subterranean work, it now appears to me in full light that it is also he, of all people, to whom this intuition-?i-la-recherche-d'une-incarnation applies in such a perfect way that you might think it was none other than this very person who had brought it out in me and who had given it, from the very moment it appeared, that peremptory and unanswerable force of things 'known' (\*).

d. (17 June) Reality always goes beyond any premonition (no matter how acute) and even beyond any 'knowledge' of it - and it's only when I come into contact with it, usually unexpectedly, at the bend in the road, that I gradually become imbued with its taste and smell. Even though this contact might seem to simply *confirm*, without more, what was sensed or 'known', very often it disconcerts and shakes a certain, almost ineradicable *disbelief* in what is well and truly known, said, written, re-said and re-written - and yet, at a certain level (that of an immense heaviness), continues to remain a dead letter. More than once I've detected this heaviness (\*) and my impatience has been irritated by it - a stubborn heaviness that insists on keeping me in the rut of familiar ideas and images, or those that have more or less general approval - even though I also 'know' (or that someone or something *else* in me knows...) that these ideas and images are not the same....) that these ideas and images, so well established, are a sham, often an obvious sham, that they don't hold water... Thought, even when driven by an intense desire to know the final word (of the thing that is both 'known' and rejected) - thought is powerless...

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(\*) I'm even inclined to think that this 'one could believe' actually corresponds to the reality of things. This would demonstrate, once again, the extent to which our faculties of knowledge go beyond the pale and derisory reflection to which we allow access to the narrowly defined field of the conscious gaze.

(14 June) The thought, or sudden intuition, that ended the day before yesterday's reflection also appeared in a 'flash' at the moment of writing, without any apparent preparation or desire to examine it. It presented itself with a kind of 'force of evidence'. It was only in retrospect that I remembered that in the note immediately preceding the one from which the quoted passage of 10 November is taken, I had had occasion to mention Serre and the relationship between him and myself in some detail (for the first time, incidentally, in *Récoltes et Semailles*).

(\*) See also, on the subject of this "heaviness" and this "incredulity in the face of the testimony of his saints facultés", the note "Le devoir accompli - ou l'instant de vérité" (n° 163), pp. 782 to 784, and in particular the note from

b. de p. (\*\*) p. 782.

It's only the peremptory force of direct contact with reality that sometimes has the power to upset this gravity, to dent it or shift it a little, if not really erase it. I phoned Serre yesterday to ask him about Tate's notes on 'Rigid analytic spaces', which were mentioned recently (\*\*). I thought I vaguely remembered that there had been a short introduction to this text, mentioning the sources of this work - it seemed to me that this introduction had "jumped" from the edition published by *Inventiones Mathematicae*, in 1971. In fact, Serre confirmed that there was no such introduction in Tate's notes. They were a bit like *d a y - b y - d a y* notes, which Tate had sent to Serre about his rigid-analytical cogitations, like letters almost, and (of course) without any fixed idea of publishing them. I remembered taking care to have them distributed by the IHES (with the subtitle "Private notes published with (out) his permission" - after the author's name), but I had forgotten that Serre had been an intermediary. In any case, apart from Tate and myself, it was Serre who had been most 'in the loop', in the birth of rigid-analytical spaces, in 1962. It was he who had explained to me, perhaps a year or two before, the theory of elliptic curves known as 'Tate's curves', on the field of fractions  $K$  of a complete discrete valuation ring. I was a bit taken aback by what I remember as a flood of explicit (and, it seems, 'classy') formulae, which went a bit over my head, without 'catching on'. But what remained was a striking geometrical image, surely prompted by a comment of Serre's along these lines: that, in short, Tate's elliptic curve (or, at least, its 'points') was obtained by 'passing to the quotient' in the multiplicative group  $K^*$  by a discrete subgroup isomorphic to  $\mathbb{Z}$ . It was therefore the analogue of the complex case, where we first divide  $C$  by a first factor  $Z$ , to find  $C^*$ , and then again by a factor  $Z$ , this time to find an elliptic curve. In this case, the passages to the quotient had a precise meaning, in the complex analytic domain, and the Riemann-Serre theorems (of the GAGA type) ensured that the final quotient (which was a compact complex curve) had the canonical structure of an *algebraic* curve. In Tate's case, alas, working in the context of somewhat familiar analytic spaces, on the complete value field  $K$ , the quotient was a compact analytic space that was *really disconined*, and there was no chance of deriving an elliptic curve from it. And yet (this is what Serre must have said to me then) everything was happening, as if... . Tou-

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(\*\*) See the note "La maffia" (n° 171<sub>2</sub>), part (c<sub>1</sub>), "Les mémoires défaillantes - ou la Nouvelle Histoire".

In fact, in terms of  $K^*$  and its discrete subgroup, Tate was able to produce a genuine elliptic curve using explicit formulae.

I seem to remember that neither Serre nor Tate believed that there would in fact be an "explanation" in terms of a new notion of "analytic variety" over  $K$ , for Tate's computational construction. As far as I was concerned, it clicked straight away, and there was no question of my 'seeing' Tate's curve as anything other than the result of a quotient passage, for a notion of 'variety' that had yet to be worked out - just the sort of work I have a crush on! It's quite possible that it was also Serre, sceptical though he was, who pointed out to me that there were people, and at least Krasner, who were 'doing analytical extension' on ultrametric complete value bodies, which are therefore totally discontinuous. This seemed to support my (slightly crazy) hope that there would, in spite of everything, be a 'good notion' of analytic variety, smarter than the one we knew and close (in terms of 'connection' properties) to real or complex, or even algebraic, analytic varieties. But once again, I was the only one in the trio who really believed in it - at least that was the impression I had at the time.

I couldn't get it out of my head for months, maybe a year. The situation reminded me of an old perplexity - the impossibility, in the conceptual context available at the time (using ringed spaces, such as schemes and formal schemes), of making sense of the *generic fibre* of a formal scheme on the discrete valuation ring  $A$  under consideration. It soon became clear that this was essentially the same perplexity - and that the kind of 'varieties' I was looking for to give a geometric meaning to Tate's construction had to be the very one that would make it possible to give a meaning to this famous yet non-existent 'generic fibre'. Finally, I had a third thread (in addition to the rumour concerning Krasner), which appeared in 1968 - it was the intuition of 'generalised topological spaces' (which at that time had not yet been given a name such as *sire* or *ropos*, since I had not begun any conceptual work on them), which was to make it possible to define the famous '*Weil A-adic cohomology*' entering (implicitly) into Weil's conjectures. This suggested to me that, as with Weil's cohomology, the new 'kind of structure' I was looking for was not to be found on the side of the endless ordinary 'ring spaces', but perhaps in these 'generalised spaces', provided with a bundle of suitable rings.

I can no longer say when these scattered intuitions finally became strong enough and con-

I had to take a break from my regular duties (especially the EGA and SGA) to begin an embryonic piece of work. What I do know is that this work was done, as is usually the case, in solitude - I was the only one to 'see' that there was something there, and consequently the only one who was in a position to do the initial work that would bring it to light. I remember that I started to think about it for a few hours here, a few hours there, even a whole day, a bit like playing hooky (although there was no shortage of 'routine' work 1). One day I finally had to bite the bullet and stick with it for good - I must have spent at least a few days in a row, if not a week or two. The hardest part was overcoming ingrained habits of thought, which constantly seemed to want to pull me back into the rut of the known - that of 'ordinary' analytical spaces (now called, I think, 'flabby' - or 'welk', in German). I had to try three or four times - to get out of the rut, when I saw that I'd gone back into it, like a horse in its stable! But it was clear that the old man wasn't going to do the trick here...

At the end of this work, I had a clear idea: modulo a supplementary technical work, which I was not motivated to do at the time, I had set up a notion of "rigid-analytic space" (this is the name I gave it, to express by the word "rigid" properties of the kind of connectedness, close to algebraic varieties and at the antipodes of those of the so-called "flabby" analytic variety) sufficient in any case to respond to the two desiderata that were in my mind at the time: to give an interpretation', in terms of these spaces, of Tate's construction, and of the generic fibre, of a formal scheme.

I didn't think of looking any further, being in a hurry to get back to the tasks I'd momentarily abandoned. If I had played around a bit more, I would soon have realised that spaces as simple as the closed crowns  $r / = r / = R$  (which also deserved a 'rigid-analytic' structure) were escaping my construction. It was Tate, whom I had of course informed of my cogitations, who made the necessary adjustments to be able to include them. Apart from the conceptual work itself, which I had done for the most part, there was also more technical work to be done, to get a good grasp of the 'building blocks' used, playing the role of affine diagrams. This is precisely the work that is done, with his characteristic elegance and care, in Tate's 1962 notes (\*).

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(\*) To put things in perspective, I think it's fair to say that both my work and Tate's represent-

It took me a while, in fact, before I realised that the building stones I'd used were a little short around the edges. They were enough for both

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were stages, each as essential as the next, in the birth of the theory of rigid-analytic spaces. My part had been in the initial vision (which had been lacking in both Tate and Serre) and in the mainly conceptual work, which was by no means free of certain technical aspects that had to be tackled head-on. The work at Tate was mainly technical, although there was also some conceptual work. My work was predominantly 'yin', 'feminine' (and that's why, in addition to my absence from the scene, it's the object of general disdain), while Tate's was predominantly 'yang', conforming to the canons of good taste and good behaviour.

If I had not intervened, pushing my work sufficiently so that there was no longer the slightest doubt about the *existence* of a good 'rigid-analytical' notion, and for a clear vision of a master builder of a theory, it is probable that this notion would still not have seen the light of day today. In fact, although this notion, which is by no means an 'invention', was bound to be discovered and developed 'sooner or later', the need for it has not, however, made itself felt in the twenty-three years that have passed since then, in a sufficiently compelling way to 'force' people to 'take the plunge'. I was apparently the first to foresee (in 1966) another field of application for rigid-analytic theory, apart from the two initial motivations, with the development of crystalline cohomology.

I'm not aware of any geometrical uses other than the three I had planned - including, of course, the generalisation of Tate's theory to general abelian schemes. It would seem that the people who subsequently 'worked on the subject' saw it mainly as a way of developing the theory in a vacuum (since it existed and there was a consensus that it was a 'serious research topic'), without incorporating it into a broader geometric vision. This is a striking case of *aromisarion*, of the fragmentation of mathematical thought, linked to the contempt into which any kind of work on the foundations has fallen, just like any work that is not reduced to some technical tour de force, making it possible to solve some 'competition problem'. A particularly eloquent sign is the absence of any attempt to develop a more general notion of rigid-analytic space, which would be to that developed by Tate as the notion of scheme is to that of algebraic variety over a body - so as to be able to link together rigid-analytic geometries over "variable" complete value bodies (and in particular, of variable characteristic, and including both the real and complex cases, as well as the "ultra-metric" cases). This absence is one of many signs of the astonishing stagnation of mathematics over the last fifteen years, at the level of any work on foundations (which is clearly crucial, in this case).

Coming back to Tate and me, it's just as likely that if my first 'breakthrough' hadn't 'clicked' with Tate and triggered him into a 'second round', the rigid-analytical spaces wouldn't exist any more! I would have talked about it here and there around me, but as there was never a shortage of juicy questions (including questions that seemed even more 'urgent'), it's doubtful that anyone would have taken to it - and certainly not nowadays, when the very idea of introducing such crazy things would have seemed a bit too much like someone whom it's more charitable not to name here. . .

problems that had motivated me in the first place - so why look any further! I couldn't get my head around it. Tate eventually convinced me, in his quiet yet thorough way, that there were more than just those two examples after all, and that even though I didn't seem to have encountered circular crowns yet in my life, that was no reason to rule them out. And there was no way, apparently, of "catching up" with my own building stones (except by using an infinite number of them, which more or less put me back in the "flabby" rut).

I'd done my share of the work on my own, as was normal, so for sure I was the only one who believed in it - but that didn't stop me, of course, from telling the two main (and practically only) people involved, namely Serre and Tate, once I'd reached the (provisional) end of the story - it obviously struck a chord with Tate, and I think Serre must have been convinced too, when I told him what I'd come up with. I don't remember exactly what happened, but if by any chance it had been different, I'm sure I would have remembered.

So when I phoned Serre yesterday, I took it for granted that he knew, almost as well as I did, what part I had played in the birth of the new notion of variety. I didn't anticipate that he would have the opportunity to allude to it, but it was he who pointed out to me, when I told him about Tate's notes, that they had been published *ne varietur* in the *Inventiones*, and that Remmert and two other authors had just published a book devoted to the famous rigid-analytic varieties. This is the book I had occasion to mention recently, in the note '*La maffia*', part (c) '*Les mémoires défaillantes - ou la Nouvelle Histoire*', where I accuse Remmert of having a 'faulty memory' (although Tate's own notes could well have refreshed it), in the service of a bad faith that seemed to me to be patently obvious. I mentioned this in passing to Serre - I had already had occasion, in my last letter to him, to allude to a certain '*Burial*' (\*), and there was a certain 'bad faith' there.

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(\*) It is in the reply to this letter (in the last letter of Serre's that I received) that Serre quotes Siegel's expression, on the '*Verflachung*' ('flattening') of contemporary mathematics, on which I comment and which I continue in the note '*Les détails inutiles*' (n° 171 (v)) part (c), '*Des choses qui ressemblent à rien - ou le dessèchement*'. As I said in that note, Serre had dismissed this impression of Siegel as "*unjustified*" - although I had the impression that he was a bit puzzled that Siegel thought like that. And it's that same term that he uses again (probably unintentionally), to dismiss my reference to a Funeral.

Needless to say, it didn't occur to him to ask me *what it was that* made me say that there was something else going on (I didn't mention it in my letter, preferring to wait until he asked me). The cause,

quite a blatant illustration.

The first crazy thing was that Serre (God knows, he'd had a front row seat at the time I) - well, he didn't remember either, not at all, that I'd had anything to do with these famous rigid-analytical varieties! I was literally speechless! It was crazy really - when I alluded to the modest part I thought I'd played in them, based on the two examples that had triggered me off, it was *just the opposite* that Serre thought he remembered: almost that I wouldn't have wanted to know anything about these new varieties, saying (according to him) that with the formal schemas, we already had everything we needed! I could hardly believe my ears at the time (\*) - and for all that, just a few days before, I'd written a few pages in the most serene fashion, in which there was talk of a certain crucial role, a 'pillar' role, that Serre would play in a certain Burial. Well, here I was in the middle of the Burial, right under my nose - at the other end of the line, and in the very person of this same Serre, very much at ease as is his wont, and clearly acting in the best of faith i (And I can't imagine Serre acting in bad faith anyway, especially when it comes to maths...). I didn't feel like chatting, that's for sure, and Serre even less so, but we did have an off-the-cuff conversation, for five or ten minutes. Ten minutes well spent if ever there was one, to rub shoulders with the tangible reality, colour, taste, smell and all, of a Funeral that had ended up becoming a bit remote, by limiting myself to looking at nothing but paper! The first thing I had to think about saying was that the very *name*, 'rigid-analytical spaces', was mine (implying, if I didn't say so clearly: at a time when I was still the only one dreaming about these things I was calling so....). Serre was a bit taken aback - obviously he couldn't remember it either, but it was also clear that I wasn't having fun making up stories.

But never mind, a name is just a name.

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had already been heard...

(\*) In retrospect, I realised how my friend's memory (a little faulty around the edges) had been distorted. As I had used formal diagrams as my main and almost only guide to derive a definition of a rigid-analytic space (so as to be able to associate a rigid-analytic generic fibre with a formal diagram), he had remembered (twenty-three years later) that I would have stubbornly maintained that there was no need for a new notion of variety, as 'my' formal diagrams would suffice for everything. (Which goes to show that memory lapses often do things good...) However,  $K^*$  (my second thread) does *not* come from a formal scheme. In any case, here again, the case had already been made!

name after all, and a *real naturel* all the same... This 'so natural' clearly implied that it was so natural, that it no longer meant anything, that anyone with their nose in front of it couldn't help calling it just that: 'analytical rigidity'. In short, it was a compliment that my friend was paying me unintentionally, about that name - but with the air of 'if that's all it is... . !'. Besides, I hadn't published anything about it, had I? So there was nothing to say...

I was more and more dumbfounded. Published or not, for me it didn't change a thing. A woman who's carried a baby for nine months and given birth to it, and now it's frolicking around in good shape, someone would tell her that it's not her baby, since nothing's published and she can't even show off the birth certificate - she's sure to laugh in the face of anyone who says such a thing. To tell the truth, I didn't laugh in Serre's face, which isn't my style, and in any case I was still too stunned. Nor did I think to discuss the fact that Tate himself, in his notes, made no secret of the part I had played in starting up the theory - something that Serre had apparently forgotten just as much as Remmert (\*) - and that in 1972, when I wrote the *Esquisse Thématique* in which I alluded to it (\*\*), Serre had not yet even pretended to raise an eyebrow at the subject (his memory must be a long one).

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(\*) I felt, once again, that '*in any case*, the case had been made'. If Tate said that he was following 'with complete fidelity' a masterpiece that I had provided him with, well, never mind - it was only a masterpiece after all, a vague drawing that any kid could draw in the sand, a vague Grothendieckian sauce, to be sure - it was still nice of Tate, a real pal, to take the trouble to mention it...

(\*\*) This is the text, dated 1972, presenting a rather dry (and not very inspiring) sketch of my con-I wrote it in connection with my application for a post at the Collège de France (a post that was awarded to J. Tits). This text, supplemented by more detailed historical comments, will appear in volume 3 of *Réflexions*. It is mentioned in particular in the introduction, 3 (Boussole et Bagages). In the Thematic Outline, 5 e), I write :

*"Rigid-analytic spaces.* Inspired by the example of the "Tate elliptic curve", and the be- soins of "formal geometry" on a complete discrete valuation ring, I had arrived at a partial formulation of the notion of rigid-analytic variety on a complete value field, which played its part in the first systematic study of this notion by J. Tate. Moreover, the "crystals" that I introduced on algebraic varieties on a field of characteristic  $t \neq 0$  can sometimes be interpreted in terms of vector fibres with integrable connection on certain types of rigid-analytic spaces on fields of zero characteristic; this gives a hint of the existence of deep relations between crystalline cohomology in car.  $p \neq 0$ , and cohomology of local systems on rigid-analytic varieties in zero characteristic."

to have worked since then). It would have been a wasted effort anyway, obviously.

- as long as nothing was published, anything I said would count for nothing...

But the word 'unpublished' had struck a chord, and I went on to say that most of my work consisted of unpublished material that was passed on by word of mouth. I sensed that Serre was still taken aback - it was an idea that seemed to strike him as a bit preposterous, like a contradiction in terms 'work - unpublished...', for him it didn't seem to go together. I said the word 'motif', and he jumped on it straight away: now he was going to disabuse me of the ideas I'd had about Burial, and he was happy to tell me that two, three years ago there had been a whole book published on motifs - really, I couldn't complain about the 'motifs' chapter!

"And then, did you hold it in your hands, this famous book?" I asked him (just as well, I'd been thinking about asking him this interesting question for a while).

Held in my hands - but maybe I was joking, Serre retorted, for sure he knew this book; he even spoke of it as someone who had read it cover to cover, and he must indeed have read it. I could have avoided asking the question if he hadn't found anything special in it - he obviously hadn't, and yet (that's how we're made, I can't help it!) I asked him anyway! And as he didn't seem to understand the meaning of the question, I told him that when I picked it up last year, I could hardly believe my eyes.

I had to say the word 'scam', but I felt that was an understatement. As I really felt it, and still feel it as I write this, it was an *indecency* - but I refrained from reading it. Deep down, I felt that it didn't matter what word I used; nothing had passed in the fifteen years since 'it was hard' and Serre chose not to feel anything (which is what I had just written a few days earlier), and whatever I said wouldn't 'pass'.

It was almost as if he'd been waiting for it. Escro- querie? You want to dream, my poor fellow, but it was Deligne himself who wrote this book and

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That's Grothendieck all over again!

fine work again, yes - OK, everyone knows very well that it was you who introduced the motifs, but that's no reason to repeat it every time the word 'motifs' is uttered, is it? Not to mention the fact that you've never published a single line, and that your yoga depended on unproven conjecture (here I thought I was hearing someone else speak to me through Serre's mouth...), whereas the whole point of the book is that it doesn't use any conjecture, in fact it doesn't use *anything* you've done in the past...

His tone was brisk and without retort, like someone who knows exactly what he's talking about and has nothing left to learn - with a hint of the irritation of a man in a hurry, taken to task by a lump who stubbornly refuses to understand the most obvious things. It wasn't the right moment to ask about anything - everything had already been settled and awarded, obviously. Serre's axioms, in terms of the ethics of the profession and what is important and what is accessory, had obviously changed - and there was nothing I could do about it. I had to take him as he was, with his new axioms.

So I hit on 'conjectural', in desperation! I could have told him that Weil's conjectures were conjectural too - and yet there was no question of him or anyone else treating them with a straight face - but it's true that Weil had taken care to publish these conjectures! But as I was just at the 'Sixth nail' (in my coffin) (\*) I turned instead to the 'motivic Galois group'; there was nothing 'conjectural' about it, I had developed a whole theory of great precision on categories of the Galois-Poincaré type, which was one of the basic notions used in this famous book, without it seeming necessary to make the slightest allusion to me.

Serre jumped at the hint, once again he was going to be able to disabuse me of my ideas about Burial - the whole theory was published in black and white in a book by another of my students, Saavedra (\*\*) - wasn't it I who had even got him to do this thesis? Again, it was obviously a book he knew perfectly well, he'd had to refer to it more than once (\*\*\*)". So there's nothing in that book that's got to you either?

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(\*) This is the group of notes (n° s 176<sub>1</sub> à 176<sub>7</sub>) to which I am in the process of putting the finishing touches, and in which I unravel the swindle, precisely, around the notion of motivic Galois group and Galois-Poincaré-Grothendieck categories (baptised "Tannakian" for the occasion) - a swindle set up by a Deligne and (initially) through the intermediary of the "pawn" Saavedra...

(\*\*) This is the famous book 'Tannakian Categories' (sic) by the mime Neantro Saavedra Rivano, published in

Lecture Notes 265 (1972), Springer Verlag.

(\*\*\*) I understand, moreover, that when Serre has the opportunity to quote from this book in which my name is not mentioned

struck" - I asked him again (and this time it was clear that I already knew what the answer would be).

No, it obviously didn't strike him that my name wasn't mentioned in this book, either for the theory which is its subject, or for the related notions (such as motif, crystal and tutti quanti) which are introduced ab ovo and developed as examples. However, Serre did not seem to have any memory lapses - he still remembers (for the moment at least...) to whom these notions are owed, which appear there, under the pen of another of my students, without my name being mentioned either. If there is indeed a 'failure' here, in my friend, it is certainly not at the 'memory' level...

We talked for a few more minutes about the name 'Tannakian categories', which I implied I considered to be a hoax, whereas Serre, with the evidence to back him up, thought it was perfectly appropriate. I knew this too, deep down, even before I raised this new issue; just as I know *why* this name suits my friend so well, whereas I, who bore and gave birth to this thing, find fault with it.

As is usually the case between us, it was Serre who cut the conversation short - and indeed, it's true that the conversation had gone on long enough. There had been no 'communication' at any point, and that's surely why it left me with this feeling of dissatisfaction, of disharmony. And yet, just like the two or three short letters I've received from him recently, and even more forcefully, this short conversation taught me a great deal. Things 'known', surely, but half-rejected; known and not believed 1 And surely this feeling of frustration (which hasn't dissipated even today) is a sign of my resistance to welcoming and accepting the message.

An unwelcome message, to be sure. Just a few months ago, I had no doubt that Serre (as I vividly remembered him, the embodiment of incisive elegance and probity free of all complacency), when he became aware (better late than never, but...), thanks to the reading of the providential text 'Récoltes et Semailles', of the turpitude of a certain Enterrement (of which he was certainly far from suspecting).), thanks to his reading of the providential text 'Récoltes et Semailles' (Harvest and Sowing), of the turpitutes of a certain Burial (of which he was certainly a thousand miles from suspecting, poor fellow...), well, his blood would just run cold and he would throw himself into the fray this time (\*). This image

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(I might as well say), and without finding anything wrong with it (as far as he's concerned), he nevertheless takes care (out of some scruple) to refer to me at the same time. He must be the very last person to take this

kind of trouble...

d'Epinal has dissipated over the last few weeks, helped by a harmless exchange of letters. And yesterday I was able to see, without the slightest possibility of doubt, that Serre has been in the thick of it for a long time now, in L'Enterrement, and that he's quite happy with it. And this, needless to say (and without any kind of irony on my part), with the best faith in the world !

It was some time ago that I realised that 'good faith' is by no means as simplistic and clear-cut as it had seemed for most of my life. A certain type of 'good faith', one of the most widespread, consists simply in giving oneself the lie, like a good-natured flag used to cover up sometimes dubious merchandise. Our psyche is made up of superimposed layers, and as our eyes become finer, we see the 'good faith' of one layer sometimes serving as a cover and an alibi for the deceptions of the layer underneath.

As for Serre's good faith, I continue to give him credit for the fact that he will never write a book that makes essential use of someone else's ideas without saying so clearly - even if those ideas have never been published and would be known only to the person who communicated them to him (assuming he is still alive) and to himself. In other words, I think I know that Serre will never write a book like those we discussed yesterday. I think I can even say that the mere fact that someone like Serre or like me (\*) writes a text (in this case a mathematical text) aimed at an audience, is not enough for him to write a book,

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(\*) When I wrote 'this time', I thought of the two other times when I had gone out on a limb to try to get a message across to the famous 'mathematical community' - and even, on both occasions, to mobilise it. The first time was in 1970, when I left the mathematical scene, on the occasion of the connivance of the scientific establishment with the military apparatus. The second, at the more modest level of my French colleagues alone, was in connection with a certain iniquitous article affecting foreigners in France. (See on this subject the section "Mes adieux - ou: les étrangers", n° 24.) Both times, my efforts were met with general indifference, in which Serre, nor any of my other friends in the milieu I had just left (with the sole exception of Chevalley and Samuel), was an exception. All bets are off as to the effect (or non-effect) that the paving stone 'Harvest and Sowing' will have in this same establishment - starting with Serre himself...

(\*) When I speak of "Serre or me", I'm thinking, in fact, of any of the members of the community of which

We were both members of this milieu in the 1950s - a milieu which I try to define to some extent in parts III and IV of "Fatuité et Renouvellement", and more particularly in the section "Bourbaki, or my great luck - and its downside". It is true, however, that even in this restricted milieu, I am aware of two members who have 'gone wrong' (mentioned in due course in Récoltes et semailles).

brings into play inveterate reflexes of professional conscience, which will tend to eliminate or at least correct (I think) certain 'memory lapses', which are not so consequential in a simple casual conversation like yesterday's (\*\*). All this is in line with what I wrote as recently as three weeks ago, in the note 'Des choses qui ressemblent à rien - ou le dessèchement' (n° 171 (v), part (c)): 'I am well aware that Serre, no more than I, would dare to howl with the wolves, to pillage, to schematise and to debunk, where 'everyone' pillage, schematise and debunk'.

Having said that, I note that all this does not prevent Serre from enjoying, in some cases at least, the plundering, scheming and debunking of *others*, openly and manifestly, 'in the public square' and 'under the spotlight'. He can certainly do it 'in the best faith in the world' - he doesn't get his hands dirty by simply giving his unreserved blessing to the plundering, scheming and debauchery of others, and all the less so because he doesn't pocket any visible profit: he doesn't boast about the fruits of others' labours, while finding it good that others (appointed dealers, I would have liked to write) play such a game, in full view of everyone. The 'profits' he reaps are more subtle than the slightly shady publications and bank accounts that others are so fond of. It must be said, however, that they are of consequence, to give rise to the astonishing metamorphosis of the man I once knew, who is now (I can't say how long ago) participating, eyes closed and nostrils plugged, in the general corruption (\*).

e. (18 June) Yesterday I hesitated to add a fourth part to the note 'The family album' (n° 173), in order to give an 'on the spot' account of the phone call with Serre the day before. It's true that the phone call had left me with a 'feeling of dissatisfaction, of disharmony' (as I wrote yesterday) - and these are euphemisms to express a malaise so incisive that it bordered on anguish. This uneasiness created the need to come back

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(\*\*) Thus, I have no doubt that if Serre had been the author or co-author (as R. Remmert is) of a book on rigid-analytic spaces, he would not have given in to the 'natural inclination' to pass over in silence that which must be passed over in silence; that he would have gone beyond somewhat complacent 'lapses' of memory to the said natural inclination, to which it pleased him to give in to in a private conversation. It is also true that even fifteen years ago, with the rigour I knew him for then, he would not have allowed himself to indulge in such a slope, it seems to me, even in a private conversation. ...

(\*) This finding of involvement in corruption is similar to that made (for listeners of a certain seminar in March 1980) in the note "Carte blanche pour le pillage - ou les Hautes Œuvres" (the name says it all), n° 171<sub>4</sub>, in particular page 1090 second paragraph.

on this episode, as if it were a ripe abscess that needed to be drained. And then there was the usual procrastination. For weeks now, the USTL duplication department has been waiting for someone to bring them the sequel to this famous fascicule IV of Récoltes et Semailles, which is still in the making; already it's just-August to get it all out and stitched up before the university closes for the year (15 July), especially as I'm not the only one involved.

- At the end of the academic year, there's an influx of theses of all kinds, which have to be given priority. In short, I said to myself that you have to know how to finish a book; that if I kept putting in 'last minute' work, I wouldn't have finished it by next year, that it had gone on long enough... .

And yes, I've finally got round to it - and too bad if the Harvest and Sowing edition isn't due back until the autumn! It's waited fifteen years (not to say thirty), now it can wait another two or three months, but let me take the time to look at what I have to look at, and say what I have to say, without letting myself be rushed by 'deadlines'...

It's been a hard day's work, or rather a night and part of a morning - I wanted this 'extra' text for typing to go out with today's post. And so it has.

At this point, I feel as if I've reached the end of something that *needed to* be done. I suddenly feel light, like I've been relieved of a great weight that I've been carrying around, probably without knowing it, and I can't say for how long. It must have been the weight of a certain tenacious illusion - which must have started to take hold of me at the end of the forties, when an adopted identity began to blossom in me, that of a member of a certain 'community' (ma- thématique), of a certain milieu, which for me was full of warmth and life. I talk about this blossoming of a new identity in *Fatuité et Renouvellement\**, in the sections "L'étranger bienvenu" and "La "communauté mathématique": fiction et réalité" (n° s 9, 10), and also in "Bourbaki, ou ma grande chance - et son revers" (section n° 22). It is true that this identification was swept away without return by the events surrounding and following my departure in 1970, in the wake of my involvement in militant activity. With the benefit of hindsight, I now realise that there was still a *link* to the environment I had left behind, in which I no longer saw myself; an invisible link perhaps, but one of great strength, part of that 'weight of a past' (which I began to glimpse last year, in the section of the same name, n° 50). Although I had left this environment with no desire to return, a certain *image* of what had been this 'family', in short, that I had left for a 'family' of my own.

another adventure, remained alive in me, and maintained this link. This image must have remained more or less static, it seems to me, from the time I left (and long before that, of course) until the time I began to reflect on it in *Récoltes et Semailles*. The latter began to nuance the image I had of a certain past, and to incorporate into it, as best I could, elements of the present, often disconcerting, admittedly, but also my own. In the end, I came to realise that there had been a staggering *decline* in the state of mentality and morals in what had become the milieu with which I had identified myself, and (it would seem) in the mathematical world in general. This deterioration, I realised, was not a recent phenomenon, and I had had time, even before my departure, to play my part in it (a part that I had glimpsed, at least, in the course of my reflections in *Fatuité et Renouvellement*). I did get the impression, however, that there was a kind of unbridled escalation in this deterioration after my departure, in which some of my ex-students played a leading catalytic role.

Be that as it may - throughout the revelations that followed one another in my investigation into the Burial, I maintained in my mind a sort of tacit 'taboo' around those of my old friends who were part of the milieu that had welcomed me in my younger years - I simply could not conceive that any of them had been seriously affected or 'damaged' by the profound degradation I was witnessing. When I sometimes spoke of the complacency of the 'whole congregation' with regard to operations which (for me at least) were beyond imagination, there must surely have been a kind of inner 'clause' in me, absolving those who, for me, had to remain 'above suspicion'. They didn't suspect anything, obviously - they must have been busy elsewhere, surely - you can't blame them 1 A bit in those tones. And for the oldest of my elders, this way of seeing things corresponds, I would like to think, to reality, or at least to a certain aspect of reality. But certainly not for people like Serre, Cartier, Borel, Tate, Kuiper, Tits and others whom I've known well, who are of the same generation as me, fully active, fully integrated into the milieu I'm examining here and who continue, even today, to wield considerable power there and to set the tone, just as much as certain newcomers who have ended up forming an unscrupulous 'mafia', with the unreserved blessing of their elders.

So there was a stubborn and flagrant contradiction in the image I had of reality, as it appeared through the first-rate 'revelation' that was the Burial. It was surely this contradiction, perceived at one level and rejected at another, that I had to face.

another, which created that 'unease' I mentioned earlier, bordering on anguish - anguish revealing a *division*. And the person who, more than any other, embodied this milieu for me, the people whom someone in me persisted in perceiving as 'close' and the person who had been 'closest' to all of them, was Jean-Pierre Serre. As such, it was in him, more than in anyone else, that the crux of the contradiction lay.

I made a timid start on this contradiction only six weeks ago, in the first part (dated 4 May) of the note "Useless details" (n° 171 (v)). This reflection deepened considerably in the third part of the same note (dated 27 May, three weeks later), 'Des choses qui ressemblent à rien - ou le dessèchement'. I come back to the person of Serre, against perennial inner resistance, a week ago (on 11 June) in part c. ("The one among all - or acquiescence") of this note. This time, Serre's crucial role in the Burial finally came to light. This was another major step forward in my understanding of the Burial.

- but the crux of the contradiction was still not addressed! For me, Serre remained (as if nothing had ever happened) 1 incarnation of an 'elegance' and 'probity' without fear or reproach. The 'taboo' remained safe and sound!

It was the phone call the day before yesterday that exploded the contradiction, putting me right in the middle of it (l'Enterrement), whether I liked it or not. As is only natural, there was an immediate mobilisation of considerable forces of resistance (mentioned earlier), to maintain the status quo, rather than accept the contradiction: to take note of it, in one way or another, and thereby resolve it. I was free to do so, or not.

I took the plunge - and I'm glad I did. The reward was immediate: a sense of *liberation*, a feeling of lightness, of relief; relief from an inner tension, of course, but more than that, freedom from a weight.

The only other moment in Récoltes et Semailles when there was a similar feeling of liberation was the one that marked the first major turning point in my thinking, in *Fatuité et Renouvellement*, with the section 'La mathématique sportive' followed by 'Fini le manège I' (n° s 40, 41). I have the impression that this new step I have just taken follows on from the one I took last year. I can't really say at the time why or in what way. My triumphant exclamation at the time, "No more merry-go-round", was certainly premature (as I realised as early as the following month). But the new step I've just taken is, to say the least, a step further away from the merry-go-round. Time will tell,

to what extent this is the case.

After yesterday's reflection and that of 11 June, I have the impression of having arrived at a less blurred vision of the Burial. It was mainly this 'third plan' that remained vague. The reflection on the 11th will have given it a tangible form in the person of Serre, who in turn took on a very concrete shape (it's a good way of putting it) during yesterday's reflection.

Finally, in this entire fourth part of *Récoltes et Semailles*, it is the reflection on the relationship with Serre that seems to me to be the most crucial part, for my own understanding of L'Enterrement, over and above the 'supplements to the investigation' and the colourful tables from the depths of the mathematical megapolis. It's also true that if I hadn't taken the trouble, out of respect for the subject I'd set myself the task of investigating, to get to grips with this 'tidying up of an investigation' with all the care I'm capable of, also taking great care to shed as much light as I could on all the slightly dark corners that presented themselves along the way, this reflection on Serre would probably never have seen the light of day either, and my understanding of the Burial (and my involvement in it) would have remained as hazy as ever. Everything comes together in a work of research!

The most substantial part of the reflection, in this last part of the Burial, actually appeared "at the last minute". In principle, the 'final point' under this part had been made two and a half months ago (on 7 April). There were just about ten pages to go, and a few footnotes to add (as was the case a year ago, towards the end of May...). The unexpected started to happen in the following days, with the visit of Zoghman, who came to read this last part (in principle finished) and give me his comments. They materialised in some three hundred pages of additional text - including these pages in which I return to the relationship between Serre and myself, in the light (hitherto eluded) of the Burial.

(<sup>174</sup>) (22 March) (\*) As I have already pointed out elsewhere, there are not in fact four operations (for a Funeral), but one and only one "*Operation Funeral*". Its division into four main parts was convenient for the exhibition, but is artificial and (if taken too literally) misleading. Certainly, in the Director - Chief

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(\*) (14 June) This note follows on from part a. ("A deceased well surrounded") of the previous note, written on the same day.

I tried, during the long meditation on yin and yang (\*\*), to get to know this little devil better than I had done in the past, when I had confined myself to noting from time to time that he was always there stirring, and moving on to something else the next moment. I don't claim to have fully succeeded in getting to know him, and perhaps that's not my job after all. One thing's for sure, though: he's still there, bustling about like he used to be, and there's no guarantee that he'll stop before my friend breathes his last. As I write these lines, the famous 'Operation Burial' is still going on. And I wonder whether the publication of this 'Family Album' will at least put an end to the biggest (and most iniquitous) of all the partial operations?

...which consisted in burying alive a young mathematician, Zoghman Mebkhout, whose ideas and results have been used by "everyone" working in the cohomology of algebraic or complex varieties for four or five years... ...

Leaving aside the fiction of 'four' operations where there is clearly only one, it would be interesting to sketch, in chronological order, the main episodes and stages that I know of. I will not do so here, believing that I have done enough by bringing together, in the four main notes above ("Silence", "The manoeuvres", "The division", "The Apotheosis", n° s 168, 169, 170, 171) all the episodes known to me, which the curious reader will be able to order himself on a chronological scale. Curiously enough, from the point of view of the 'second level' or 'operation' (to use euphemisms), the year of my departure from the mathematical scene, 1970, does not seem to mark a discontinuity in the succession of episodes, which continue at a fairly regular pace, it seems to me, from the end of the SGA 5 seminar in 1966, until 1977 with the double publication of 'SGA 4 1/2' and the Illusie edition of SGA 5 (\*). This operation seems to me to mark a sudden and striking *qualitative change*. Before, there was a discreet 'mowing down'. Now I feel the sudden eruption of a gust of violence and contempt, attacking the work of a

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(\*\*) This is the reflection that forms the major part of the third part of Harvest and Sowing, with notes n° s 104 to 162<sup>00</sup>.

(\*) (3 June) This impression should be corrected, taking into account the large-scale operation "Categories tannakiennes" (sic), the first episode of which (with the "straw father" N. Saavedra) took place in 1972 (and the epilogue in 1982, with the "real Father" P. Deligne taking over). On this subject, see the series of notes entitled "The sixth nail (in the coffin)" n° s 1761 - 1767.

absent, declared "deceased".

After this sort of collective *outburst* by all my cohomology students (under the complacent eye of the 'whole Congregation'), there seems to be a four-year lull. Whereas during the eleven years between 1966 and 1977, I detected a typical 'episode' every one or two years, I know of none between 1977 and 1981 (the year of the Pervers Colloquium). On the contrary, Deligne's long article 'La conjecture de Weil, II', published in Publications Mathématiques in 1980, i.e. the year before the incredible Colloquium, can almost be considered normal, these days...(\*\*). It was also the year in which Deligne learned of the 'theorem of the good God' (alias Mebkhout) at a Bourbaki seminar from the author himself (\*\*\*)�. This was the beginning of a sudden melting of the ice in a long stagnation of the cohomological theme. And it was also the signal the following year, for the second and final (?) culmination of Operation Burial, this time on the iniquitous diapason, when all restraint, and even simple prudence, were blithely thrown overboard.

The episode of the "memorable volume" LN 900 the following year (devoted to the exhumation of the motifs without any mention of my person, an episode that had moved me so much on a certain 19 April last year...), just like Berthelot's report of the same year (in which my humble self was eliminated from the 'history' - sic - of crystalline cohomology), seem to me in retrospect to be the natural and, all things considered, fairly innocuous extensions of what had happened at the colloquium, whose name will perhaps go down in history (or what remains of it) as a *warning*. And the 'Funeral Eulogy' the following year, incredible though it may seem to anyone who 'reflects' on it, also appears as such an extension, or (as I wrote earlier (\*)) as an 'epilogue'. As for the two years that have elapsed since then, all they have done is to confirm, in the writings

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(\*\*) Of course, no allusion is made to my person in connection with the main result which is the subject of the work, and the statement of which was part of the yoga of motives that Deligne took from me. On the other hand, I was struck by the fact that my name appears, along with Miller's, in one of the paragraphs of the work, in connection with De Rham's complex of divided powers, which had been introduced (around 1976) independently by Miller and myself. I gave a talk on this theme in 1976 at the IHES (which was, incidentally, the last public lecture I gave in my life), but it was clear that I wouldn't be publishing anything. No-one would probably have noticed, or even objected, to the author's failure to mention this unofficial co-authorship. ...

(\*\*\*) (i June) In fact, this episode took place the previous year, in June 1979, at the Bourbaki seminar.

(\*) In the note "Les joyaux", n° 170 (iii).

and in people's minds, the 'achievements' of a brilliant conference and its follow-up...

It's a remarkable coincidence - or rather, it's clearly *not* a 'coincidence' - that as early as last year, and before I'd even become acquainted with the 'SGA 4 1/2 - SGA 5' operation or the Colloque Pervers, I noticed two 'turning points' in my friend Pierre's personal relationship with me, in the years 1977 and 1981. I included them for the first time in a common focus of attention and tried to fathom their meaning, in the note 'Two turning points' of 25 April, six days after I discovered L'Enterrement (by reading the memorable LN 90O). At the time when the two turning points took place, years before, I was far from suspecting (not on a conscious level, at least) of the Burial that was taking place, and I would have been hard pressed to link either of them to any event known to me that might have shed light on them.

(<sup>175</sup>) (March 23) To complete my overview of 'Operation Burial', it remains for me to review the role of one last active and eager participant, whom I have had occasion to mention 'in passing' many times in the course of this long reflection on the said Burial. This is the honourable Springer Verlag GmbH (Heidelberg), well known as a publisher of scientific books and periodicals, and proud of its motto "Im Dienste der wissenschaft" - in the service of science (\*\*).

The Lecture Notes in Mathematics series is undoubtedly the best-known of the company's mathematical publications. It is also perhaps the most successful series of scientific texts in the world, with over a thousand titles published in the space of twenty years. In fact, I think I played my part in this unprecedented success, by lending my support to a series that was still in its infancy, through the publication of numerous texts by myself and my students in the 1960s and early 1970s. I was also associated with Springer as one of the editors of the 'Grundlehren' series (der Mathematik und ihrer Grenzgebiete), where three books (including the reprint of EGA I) were published by myself (\*).

After my departure from the mathematical scene in 1970, I refrained from all

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(\*\*) (1 June) On enquiry with Dr. J. Heinze, it appears that this is not really a "motto", but rather an advertising slogan. Its English form is "Springer for Science".

(\*) The other two books are the theses by Jean Giraud and Monique Hakim (on the formalism of fields). and non-commutative 1-cohomology, and on relative schemes on general annelated topoi).

activity as an editor, I continued, by a simple inertia effect, to be one of the editors of the series until last year, when I finally 'officially' withdrew from any responsibility as editor at Springer. I was prompted to do so by two related reasons. On the one hand, at a time when I am returning to 'orthodox' mathematical activity, by going back to publishing maths, I want to draw precise limits to this 'return', which for me in no way means a return to a 'powerstructure' (a structure of power and influence), but solely to personal mathematical *work* intended for publication. On the other hand, since 1976 (with the episode of Yves Ladegaillerie's thesis), I had had occasion to smell a certain air of Burial, long before I had the slightest inkling of the large-scale operation that I discovered last year. (On the subject of this thesis, one of the most brilliant I've ever had the honour of inspiring, see the note "On n'arrête pas le Progrès" (n° 50), and above all the more detailed note "Cercueil 2: ou les découpages tronçonnées", n° 94.) This made me realise that "the kind of mathematics that I love and would like to encourage no longer has a place at Springer Verlag" (\*\*); and even more, perhaps, that the spirit that I felt there did not encourage me to continue or resume any close links with this publishing house. The year that has passed since I resigned from the Grundlehren editorial board in February last year has only confirmed and reinforced this feeling.

But this is on the fringes of 'Operation Burial' itself - that 'second level' I mentioned yesterday, to which it's time to return. As far as I know, there are *five books* directly linked to the operation in question (\*).

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(\*\*) This quotation is taken from the short letter (addressed to Dr. Peters) of 18 February last year, in which I informed him of my decision to withdraw from the Grundlehren editorial board. Dr. Peters had in fact already left Springer Verlag (he now works at Birkhauser Verlag), and correspondence continued with Dr. J. Heinze, who is in charge of the Grundlehren at Springer. I had asked for a copy of my letter to be sent to each of the co-editors of the Grundlehren (eighteen in number), and I repeated this request to Dr Heinze on two occasions (in April 84 and January 85) without him seeing fit to tell me whether or not it had been complied with (it turned out that it had *not*). I took the trouble myself to send a copy of my letter to each of the eighteen publishers, with a few words of explanation about why it had been sent. I know seven of them well personally, and counted five of them among my friends. Only one (Artin) took the trouble to reply to me, and none of them apparently found anything unusual (even if only in relation to *themselves*) in the fact that Springer had not taken the trouble to send them the letter in question (as early as February 1984).

The following volumes were published: SGA 7 I (published under my name in 1972) and SGA 7 II (published under that of Deligne-Katz in 1973), presenting the SGA 7 seminar on monodromy groups in 1967/69; the volume entitled "SGA 4 1/2" (by Deligne) and the Illusia edition of SGA 5 (published under my name) in 1977; and finally the "memorable volume" devoted to the exhumation of motifs, published under the joint signature of Deligne-Milne-Ogus-Shih in 1982. Remarkably, all *five* volumes were published by the *same* publisher, in the *same* series of Lecture Notes (\*\*). The first four volumes were published when Dr. K. Peters was in charge of Lecture Notes (\*\*\*)<sup>1</sup>, the last volume with Mrs. M. Byrne in charge of this series.

These five publications were made under conditions which seem to me to be grossly irregular. As I have already pointed out elsewhere, the two volumes APG 7 I and APG 5 *published under my name* in 1972 and 1977 (LN 288 and 589) were published without Springer deeming it necessary to contact me, to ask for my agreement or simply to inform me of the publication project. The publication of the two volumes entitled APG 7 II and APG 4 1/2, under the acronym APG, which I consider to be in no way available to anyone, but notoriously linked to my work and my person, were published without asking for my agreement to the use of this acronym for the planned publications, even though I do not appear (as one would have been entitled to expect) as the author or director (or one of the directors) of the volume or seminar of which it presents an edited version. Finally, volume LN 900 presents, without naming me, notions, ideas and constructions which are well known, among well-informed mathematicians, to have been introduced by me. In this case, it was therefore obvious (without having to be one of the rare insiders at an SGA 5 or SGA 7 seminar) that this volume constituted what is commonly called a *plagiat*. I certainly don't expect Mrs Byrne, who was in charge of LN (unless I'm mistaken) at the time

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(\*) (1 June) Since these lines were written, it has come to light that we should add to the following list a sixth book/whose very name is a mystification: "Tannakian Categories", by Neantro Saavedra Rivano. Remarkably, this book also appeared in the same series of Springer's Lecture Notes in Mathematics. But in the case of this operation, Springer does not appear to be responsible, as it is for the other five volumes. For details of the 'Tannakian Categories' operation, see the series of notes 'The sixth nail (in the coffin)', n° s 1761 - 1764.

(\*\*) These are volumes n° s 288, 340, 569, 589, 900.

(\*\*\*) As I pointed out in the penultimate footnote, Dr. Peters has since left Springer Verlag for Birkhauser Verlag.

of the publication of this volume, has the competence to recognise the fraud by its own means, on the basis of the manuscript. But it is, I imagine, part of the job of a serious publishing house to ensure that its publications are serious, by surrounding itself with competent advisers. These same advisers were also in a position, if they honestly did the job for which they were (I imagine) paid, to point out to those entitled to it that the APG sign is not an acronym for everyone, that it has a *meaning*, which should be respected by consulting the only person qualified to decide on the use of this acronym, namely myself. Finally, as an aggravating circumstance concerning the publication of the volume presenting itself under the misleading name "SGA 4 1/2", it suffices to peruse either the introduction to the volume, or the "Ariadne's Thread" which follows it, or the introduction to the first chapter, to note the casual disregard with which the SGA 4 and SGA 5 seminars are treated therein; it is moreover common knowledge among the slightly well-informed, that these latter seminars took place towards the middle of the years Sixties, while the volume presenting itself as "SGA 4" is made up of apocryphal texts from the 1970s. I therefore believe that for a reasonably well-informed person in possession of all his means, the deception could only be obvious. This made it all the more imperative not to publish such a volume under such a name, without first seeking my agreement in good and due form.

I therefore believe that Springer Verlag is entirely responsible for the publication of each of these five volumes, which constitute key episodes in the massive swindle that has been perpetrated on my work on the theme of cohomology. Through these publications, Springer acted as an auxiliary and *conveyor for* this unusual operation. I cannot, of course, claim that this was done with full knowledge of the facts. But I can say that the repeated discourtesies I have experienced from Springer in its dealings with me since 1976 (I don't think I had occasion to deal with them between 1970 and 1976) are also consistent with this operation and are part of a certain *spirit that is* inseparable from it.

In the sub-note "The eviction" (n° 169<sub>1</sub>) of the note "The manoeuvres", I alluded to my letter to Mrs Byrnes concerning the publication of SGA 5, and to her reply, which blew me away I must say - (It is certainly not the first time nor the last that I have been "blown away", in this brilliant operation "in the service of science" . . . ) I learnt from his letter (dated 15 February 1985) that, in accordance with 'the usual way of acting when a work contains contributions from several authors' (sic), there was no need to address more specific questions to 'the author'.

to me, who was only the seminar *director*... The five 'authors' of SGA 5 are Bucur, Houzel, Illusie, JouanoLou and Serre, to the exclusion of my humble self, who appears only as 'director' - no doubt purely honorary, as I had said too much (\*) - for this brilliant seminar.

Some time before receiving this instructive letter and finding the time long (having received nothing for a month), I took up my best pen (in German) to write to Dr. K. F - Springer himself, who is one of the directors responsible for Springer. It was a nice two-page machine letter, explaining to him that I was very unhappy about a long series of inconveniences in my relationship with Springer, and beyond that, about a number of gross irregularities against me, of which I was content for the moment to submit two, which seemed to me particularly flagrant: the publication of two volumes of Lecture Notes (n° s 288, 589) published under my name and without deeming it necessary to consult me. That in these two texts, the ideas, methods and results that I had developed in the oral seminars were shortened or mutilated, sometimes to the point of being unrecognisable. That the coincidence of this last fact, with the unusual circumstances surrounding the publication of these two volumes, could not be for me the effect of pure chance. And that I expected a public and unreserved apology from Springer, in a form to be determined by mutual agreement, once an agreement in principle had been reached. That I hoped he would share my desire to put an end to an unpleasant and unacceptable situation and to find a solution that was equal to the circumstances ("eine dem Fall geziemende Lösung zu finden", which is even more distinguished), "hoachachtungsvoll" (as it should be) signed by my best hand.

To play cards on the table, it seems to me that I've played cards on the table! He won't be able to tell. Mr K. F. Springer, that he was not personally informed of the situation, and first-hand at that, by none other than the main interested party himself!

As luck would have it, I finally received a reply (a good month later) just yesterday. It's so short that I can't resist the temptation to reproduce it here (translated) in full. It took me a while to realise that it was in fact

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(\*) In this famous "Ariadne's thread" (through SGA 4 etc) in the volume called "SGA 4 1/2", nothing could lead the reader to suppose that I had the honour of making presentations in SGA 4 and SGA 5 (on the other hand, I did have the honour of "collaborating" in "SGA 4 1/2"...). On this subject, see my comments in the note "Les double- sens - ou l'art de l'arnaque" (n° 1697), p, 899.

a reply to my nice letter of last month. Here is the reply.

Heidelberg 15.3.1985

Dear Professor Grothendieck,

I must thank you again for your letter of 9 February. Mrs Byrne's letter of 15 February will no doubt have answered your questions.

Receive etc

K. F. Springer

At least now I know! The 'well-informed' people (who have already been mentioned) must have explained to him that there was no point in him bothering about the slightly excited gentleman who was writing to him - that he was definitely not one of the beautiful people. And it's true, too . . .

While I was waiting to receive this edifying reply from the management of Springer Verlag GmbH (it was nice of them to honour me with a reply signed by the director himself), I had time to think about my own intentions. The role played by the esteemed company seems to me to be really big, and I thought about the possibility of a show trial, in which I would claim astronomical damages as an outraged 'gentleman', the victim of unspeakable preferential treatment. But I also said to myself that a trial like that must take up an awful lot of energy. Even supposing I were to win my case and receive dizzying damages (let's be optimistic!), after X number of years of course - what good would it do me? I'm not in need and I don't need any more than I've got - and a swindle is no more or less a swindle because a certain lawsuit has been won or lost. I'm not going to make the world any better, either myself or the manners of Mr K. F. Springer and some of his employees. F. Springer and certain employees of the company he runs, and certainly not their way of thinking about their job, by bringing in lawyers and having them bring in their own (\*). Nor will I improve a certain spirit in a certain beautiful world that I have left behind, the spirit that makes possible the kind of operation that Dr Springer and his esteemed company have made themselves (for thirteen years) the servants of. I have (I hope) a few years left to live - time flies, and I'm seeing a lot of exciting things

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(\*) It also occurred to me that the situation might well be reversed, and that it might be the esteemed company that sues me for damage to its reputation. These people 'in the service of Science', they must be picky in this respect (as long as it's *their* reputation that's at stake. . . ).

to do in the time I have left. It can't be very exciting putting together evidence to convince judges that I had something to do with SGA. It's not for them, any more than it is for Mr K. F. Springer, that I bothered to write them...

As for those (apart from myself) for whom I have written the SGA, their relationship to what (for me at least) remains a part of myself is in no way indifferent to me. Strangely enough, I only know this relationship well (or at least a little) because of my five cohomology students: the very ones who have made it possible today for a Dr. K. F. Springer to dismiss me as a scoundrel who has nothing to say about what is done or not done with texts bearing the APG acronym, whether or not the quidam in question appears on the cover.

The mathematician reader who has followed me this far, and who might one day have haunted the SGA (the real ones, I mean), might have the idea to drop me a line about what he thinks of it himself. It would certainly give me great pleasure to receive a note from someone who thought that the work into which I alone poured all my energy for ten years of my life, and which no *one* in the world had the heart to continue once the worker had left - that this work truly bears the imprint of the person who conceived it and carried it inside him for as long as it took, before it took shape under his hands and became a *house for everyone* (\*\*). And that a house for everyone is not a vespasian in a slum, where everyone feels free to relieve themselves as they please and scribble their obscenities on the dilapidated, sticky walls...

And if the person reading this is one of my former students, or one of my former friends, and does not feel prompted to write or speak to me, at least on this subject if no other, let him know that his silence is also eloquent, and that it will be heard.

(<sup>176</sup> 1 ) (\*) (19 April) I finally had the opportunity to read (on 10 April) the article

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(\*\*) This idea of building 'houses' that are good 'for everything' has played a considerable role in my mathematical work since the early fifties. It has been the concrete expression in my work of what I have called the 'service impulse', which has been (without my even detecting it before the reflection 'The key to yin and yang') one of the profound forces giving my mathematical work its living force. The archetype of the 'house' appeared for the first time in my thinking, without my having foreseen it, and with great force, in the note of 26 November 'Yin the Servant, and the new masters\*' (n° 135).

(\*) (16 June) The following group of notes (n° s 176<sub>1</sub> a 176<sub>7</sub> ), under the title "The sixth nail (in the coffin)" must be considered: as a natural sequel to the group of notes "Silence" (n° s 168 (i) to (iv)), devoted to the "Motifs" operation, and more particularly to the last of these, "Pre-exhumation" (n° 168 (iv)), dated 8 April.

by R. P. Langlands cited in the note "Pre-exhumation" (n° 168<sub>1</sub>). According to the "bibliographie commentée" on the motives that Deligne sent me last August, this article by Langlands, along with the one by Deligne published in the same volume (the article which is the subject of the note cited), is the first in which the motives have been used, since I left in 1970 (\*\*). I am excused for not having been aware until last year of Langlands' article (any more than of Deligne's), since the author did not deem it necessary (any more than my ex-student) to send me a separate copy. One wonders why he would have taken the trouble, when it is clear from his article that my modest person has strictly nothing to do with the subject 'Automorphic representations Shimura varieties, and motives' mentioned in his article. My name (to use a phrase that my typewriter has known by heart for a year to the day!) appears nowhere in this article, nor in the bibliography. However, I thought I recognised certain ideas that I had come up with around 1964 (or dreamt that I had come up with them - I'm definitely repeating myself again...), and I even wrote in black and white this memory of a dream (or perhaps the dream of a memory of a dream...), on that same nineteenth of April 1984 (\*) I would have thought I was back on that same day, a year ago.

It's true that I've had time to become jaded in the intervening year. If there was any displeasure, it was hardly a surprise (considering how little, you might say. . . ), and certainly not a shock. There is, moreover, a major difference between this article, which was the precursor to the memorable LN 900 flight that was to follow it three years later, and this one: I did not have the honour of meeting Langlands in person, and it was not from my mouth that he learnt (as it were) about the LN 900 flight.

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The following notes, with the exception of the last one (no.° 167<sub>7</sub>), are from 19 and 20 April. If I have preferred to reject them here, at the end of the 'Four Operations', instead of attaching them to the 'Motives' operation, it is because the reflection that had been going on in the preceding weeks on the other three operations, and especially on the one (known as 'the Perverse Colloquy' or 'the unknown on duty') that is the subject of the group of notes entitled 'The Apotheosis', threw an unexpected light on the 'new fact' (just as unexpected) that had just appeared. I would remind you that when I wrote the notes that follow, I had already, in principle, put the 'full stop' under L'Enterrement (whose final note, 'L'amie' (n° 188) is dated 7 April), and I was expecting to have the complete manuscript of L'Enterrement III typed up any day now. In other words, these notes were written as 'last-minute supplements'...

(\*\*) With the exception, however, of the presentations by Kleiman and Saavedra in 1972, in line with the few mod-  
estes "gammes" on the description of the category of reasons (compare with the note by b. de p. (\*\*) on page 794, in the note "Les points sur les i", n° 164).

(\*) On this subject, see the note "souvenir d'un rêve - ou la naissance des motifs", n° 51.

was the case with Deligne around 1965 or 66) the yoga of the Galois Cou "fundamental group") called "motivic". But, throughout the second half of the sixties, I talked enough about it around me, to anyone who would listen (and Langlands, after all, has not just arrived. . . ), to have a presumption that Langlands knows perfectly well where this new "geometric" philosophy concerning Galois and fundamental groups of all kinds, seen as suitable affine pro-algebraic groups, comes from. I presume that he knows perfectly well that this philosophy was not born in 1972 from the brain of a certain Neantro Saavedra Rivano, who has since disappeared from circulation without a trace (\*\*). I don't think it would be a luxury for Langlands to explain himself on this subject, if he sees fit, of course. Admittedly, given the times we live in, it's perhaps over-optimistic of me to hope that he'll take the trouble...

(<sup>176</sup> 2) As good surprises never come alone, the day after I came across Langlands' article, I also had the opportunity to read Neantro Saavedra Rivano's volume (to which Langlands refers extensively), entitled "Tannakian Categories" (Lecture Notes in Mathematics 265, 1972).

Of the nine (male) students I had before I left, Saavedra was the only one I had never heard from again, and so there was no echo either that would have indicated to me that he had taken on any of the 'colour' or 'smell' of a certain Burial. I hastily concluded, with my customary naive confidence, that (if only for lack of opportunity, perhaps, having left mathematical waters from what I've heard. . . ), he was the pupil of all who had remained\* entirely alien to the spirit of the Burial 'operation'. And yet, as in Jouanolou's case, I'd heard so little about it, that it might just have tipped me off. I knew, of course, that what, at the time he was working with me, was supposed to become his thesis, had finally appeared in Lecture... Notes in 1972 in the volume cited, which I don't remember ever bothering to look at until last week (\*). Fully absorbed in other tasks, it hadn't occurred to me that it was a bit strange that Saavedra hadn't given me any sign of life, if only to inform me of his thesis defence, and to ask me to do something about it.

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(\*\*) According to what Deligne told me when he visited me last October, Saavedra has practically changed jobs (he is now 'in economics'), and hasn't done any maths since he defended his thesis in 1972.

It's when I read this volume that it becomes clear why he preferred not to disturb me in my other occupations, and to pass his thesis 'on the sly', before a jury whose composition I am entirely unaware of (\*\*). The burial was already well under way, since none of the members of the jury thought it worthwhile even to inform me of the examination, let alone to ask for my participation in the jury (as had also been the case for Jouanolou's thesis, which must have taken place around the same time) (\*\*\*)�.

This volume sets out a crucial part of that 'arithmetical geometry' whose vision was born and developed in me throughout the sixties (without yet having been given a name), and of which the yoga of patterns was (and still is (\*)) the soul. Essentially, Saavedra's book is a careful and detailed exposition of my ideas on a kind of 'Galois-Poincaré theory' of certain categories (which I would never have dreamt of calling 'Tannakian'...), ideas that I explained to Saavedra at length and patiently, at a time when it was still doubtful whether he would make the effort to familiarise himself with and assimilate them that would be necessary to include them in an 'expository' part of his thesis. I had entrusted him with detailed handwritten notes, with detailed statements, demonstration outlines and so on', and I am still waiting for him to send them back to me (\*\*). Of course, the subject of the thesis itself was not to expose the

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(\*) (16 June) Saavedra must not have seen fit to send me this book, of which I have no copy, but it is possible that I held it in my hands in the 1970s. I had retained the memory, but nothing more, that he had done a careful job that was perfectly usable as it stood, but I couldn't pinpoint the exact source of the printing. It had been present, in particular, when I wrote the note "La table rase" (n° 67, and in particular p. 252-253), where I comment on this "mystery" of a Deligne "Recopying" practically the thesis that Saavedra had done with me.

(\*\*) The mystery of the composition of this jury was elucidated in an entirely unforeseen way in the seventh and last of the notes of the "sixth Clou" (n° 176), of which I will say no more here. . .

(\*\*\*) For a correction, see the note quoted in the previous b. de p. note.

(\*) But in the meantime, this 'soul' has been enriched by 'Anabelian' yoga, which is mentioned to some extent in 'The Outline of a Programme'. (On the subject of this text, see Introduction 3 'Compass and Luggage'. It will also be included in volume 3 of Reflections).

(\*\*) I used to distribute my handwritten notes left and right among my students, according to their age and their level of education.

and one of the first things they had to learn was how to decipher my handwriting. It was always understood that I wanted them to return my notes to me as soon as they had finished using them - but I don't think this wish was ever respected. This is just one of the many signs that

ideas of another, whose motivations completely escaped him. The aim was to explain an intrinsic "useful" characterisation of "tensorial" categories that I shall call here "de Galois-Poincaré" (\*\*), i.e. a category that admits a description "à la Galois-Poincaré-Grothendieck", in terms of linear representations of a (pro)algebraic affine sheaf on the base ring  $k = \text{End}(1)$  of the category in question. When the latter is a body, I had indicated such a condition by means of the so-called 'rigidity' property (in the terminology I had introduced), and I seem to remember that I had written a complete proof of this (as early as my first thoughts on the motivic Galois group, in 1964/65) (\*). I had to show him the principle, but I refrained from giving him my written notes on the subject, since it was up to him, and not me, to learn his future trade by doing the work himself. If my memories are correct, the only question that remained open for me was to identify the natural domain of validity of such a theory à la Galois-Poincaré, as regards the hypothesis to be made about the base ring  $k$ , being interested in particular in the case where

this would be a ring such as  $\mathbb{Z}$  (because of applications to pattern theory).

Of all the students I had before I left, Saavedra, the very last to arrive (\*\*), was also the least well prepared, and (initially at least) the least motivated to 'give it a go'. That's why I didn't really expect him to go beyond the very limited technical problem I'd given him, which required only the most modest knowledge (a bit of diagram language, linear algebra, flat descent, sheaf language, and nothing more). The more delicate questions which are the subject of Chapters IV to VI

I was in no way feared by my pupils, but I was seen more as the "good guy", demanding in terms of work, of course, but otherwise accommodating as no other...

(\*\*\*) So as not to call them "Grothendieck categories"! However, among the many categories (and other new notions) that I had the honour of introducing and naming (and which, for this reason, do not bear my name), if there is\*any\*for whom this name would be appropriate, out of simple decency I would be tempted to write, it is this one! (Apart from the topos, whose name seems perfect to me as it is...) As for the name 'Tannakian categories' surreptitiously slipped in by a brilliant ex-student (and complacently adopted by a unanimous Congregation), this is nothing more and nothing less than a mystification - as I explain in detail below. (See the note following 'He who knows how to wait...', n° 176<sub>3</sub>.)

(\*) I didn't want to take the time to check this in my notes on the motivic Galois group. (or rather, what's left of it, which I didn't give to Saavedra). In any case, I'll come back to this in volume 3 of Reflections, probably in the chapter entitled 'Les motifs mes amours'.

(\*\*) if I remember correctly, Saavedra asked to work with me in 1968 or 69, for a year or two. before my sudden departure from the mathematics scene.

of his book (filtrations of fibre functors, polarisation structures on a Galois-Poincaré category over R and a list of such categories that are "polarisable", applications to categories of patterns and to many variants) required knowledge that was a little advanced.

"I had hoped at most that he would perhaps include in his work a summary (more or less dictated to him by me) of the important points of the theory which had not been included in a formal work of exposition. I was only disabused of this notion last week, and realise that Saavedra has produced a truly impressive piece of work in record time (\*). This work has culminated in a book presenting a detailed and careful, even impeccable and perfectly usable presentation of the geometric-algebraic formalism that I developed in the 1960s. From this point of view, therefore, I feel that he has done a useful and in every way honourable job, and the 'surprise' I mentioned earlier was indeed 'a good surprise'.

This work consisted, very precisely, in putting into 'canonical' and publishable form (according to the rigorous criteria that were still mine at the time) a set of ideas, statements and demonstrations that had been supplied by me. It is part of a mathematician's job to do this kind of work of exposition, whether of one's own ideas and results, or those of others. Unlike many of my colleagues, I don't think that such work should be counted as a negligible quantity when it comes to assessing the quality of a thesis or any other publication, and even when it comes to awarding the title of 'doctor' in mathematics to the person who does it - in other words, to consider him or her as a mathematician in his or her own right. On the other hand, it seems to me essential that a certain elementary ethic of the profession be respected, and that where a job consists of exposing and developing the ideas of others, the matter be clearly indicated, so as not to leave any doubt in this regard.

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(\*\*\*) Above all, what was needed was a thorough knowledge of the structure theory of reductive algebraic groups, of their classification on the field of reals, plus familiarity with a whole range of notions such as motifs, crystals, F-crystals, stratified modules, local systems (for someone who had at most a vague knowledge of the singular fundamental group of a topological space), plus Hodge theory, and some delicate 'polarisation' properties, which had never been made explicit in the literature but remained 'between the lines' in the current reference texts.

(\*) For a more in-depth look at this "record", and its (obvious) explanation, see the note "Monsieur Verdoux - ou le cavalier servant" (n° 176 ).<sup>5</sup>

ambiguity.

In this case, however, there is nothing in the whole volume, apart from three lines of vague and perfunctory 'thanks' lost at the end of a brilliant introduction (\*\*), to make the reader suspect that my modest self had anything to do with any of the themes developed in it, starting with the one that is the very subject of the book. I'd have thought I'd returned to the day of my first encounter with the memorable volume - Exhumation of the Motives (exactly one year ago today)! My name appears practically nowhere in the volume, except on two or three occasions, when formal references are needed and none are available that are not from my pen.

This is by no means the only effect of *embarrassment*, for not seeming to recognise clearly that the author is 'only' setting out someone else's ideas and results - which (especially in this case) is not bad when the work is done intelligently. But I've been able to see, from a number of 'little details' that don't deceive, that this is by no means just a bit of 'mowing' to burnish one's image a little, before disappearing into the wings. It really is a *funeral for a funeral's sake*. To give just one example - God knows I spent days and weeks explaining at great length to Saavedra, who had just arrived and knew nothing about anything, the notions of crystal,  $F$ -crystal (replacing the missing  $p$ -adic 'coefficients' in car.  $p > 0$ , making it possible to define  $L$  . . ), stratified moduli (and their relations with local systems), and finally a minimum of pattern yoga (taking as a provisional heuristic basis the standard conjectures); all this to make him understand, through a wide range of examples, where I was going with these Galois-Poincaré categories, and for the case (we never knew but...) that he would find the courage and perseverance to include at least, beyond the planned "minimum programme", a chapter of typical examples. As he knew very well, without my having to explain it to him at length, these are crucial geometrical notions which do not go back to Adam and Eve; it was none other than myself who explained them to him.

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(\*\*) This introduction consisted essentially in copying verbatim the four main statements that I had indicated to Saavedra as being the 'pillars' of the Galois-Poincaré yoga to be developed (excluding the questions linked to filtrations on fibre functors, which were difficult to summarise in a single lapidary statement); but by increasing one of these statements, the one that was supposed to constitute the 'minimum programme' of his thesis, by a monumental and obvious error, which made it trivially false! This is discussed in the next note ("He who knows how to wait...", no.<sup>o</sup> 176<sub>3</sub> ), and above all in the note already quoted "Monsieur Verdoux - ou le cavalier servant" (no.<sup>o</sup> 176<sub>5</sub>) and the one that follows it "Les basses besognes" (no.<sup>o</sup> 176<sub>6</sub>).

who had introduced them over the previous five or ten years, to serve as tools for a certain vision (even if it went over his head, as it went over the head of all my students except one (\*)). But my name does not appear either where he introduces and develops these notions (in Chapter VI devoted to examples), or in the part of the text devoted to the development of the theory of which he pretends to be the author. However, I find it hard to imagine Saavedra imagining that the reader, however ill-informed he may be and even if he is quite prepared to believe him to be the father of these categories (which he generously calls 'Tannakian'), would go so far as to think that it was this same Saavedra who invented the *F*-crystals, motifs and other gadgets of the 'Tannakian' (sic) panoply for the sake of the cause. If these notions are treated as if they've just been improvised, or picked up at the nearest orphanage, then I recognise a *style* that I know only too well from my year-long tour of L'Enterrement...

Mebkhout had brought me the volume in question, delighted to be able to show me the case of one of my pupils who, at least, had been 'honest' (\*) He had been dazzled, visually, by the three lines of thanks at the end of the introduction, He was visually dazzled by the three lines of thanks at the end of the introduction - it's true that in 1972 it was no longer common to thank a certain deceased person, and since then it's been more the tone of a persiflage or a joke that has become the order of the day with more than one of my ex-students, if not complete silence. The fact remains that this time I am entitled to 'profound gratitude', for 'having introduced the author to this subject', and for my 'advice and encouragement... which were indispensable in bringing this work to a successful conclusion....' (\*\*). This is what is known as paying lip service, when simple honesty in the presentation of

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(\*) Who stopped himself from burying it, as soon as the master's back was turned...

(\*) (16 June) He was absolutely sorry that it had failed, and did his best to win me over.

- It reminds me of the case of Kawai (see b. de p. (\*) page 1078), or that of Beilinson, whom Mebkhout found "more honest" than Bernstein (see page 1072) - like Diogenes with his lantern, but this time looking for an honest mathematician in the "gang" of those who dabble in the decidedly ill-famed subject of cohomology of all kinds...

(\*\*) These 'thanks' are a joke, given the circumstances: you'd think I'd 'introduced' you to me. the author to the 'sujet' of functions of a complex variable, or to any other classical subject of the same water. In fact, the 'subject' in question *did not exist* when I spoke about it to a Saavedra in need of a thesis, except in a vision that had developed in me in symbiosis with that of the motifs, and in my handwritten notes that gave it shape. I have written about the birth and development of this vision in the note "Souvenir d'un rêve - ou la naissance des motifs", and about the casual disregard with which one of those

his work would have seemed to me a more convincing way of expressing 'recognition', at a time when the Burial was well under way.

(<sup>176</sup> 3) In fact, it was enough for me to hold this book in my hands to realise that before the memorable "SGA 4 1/2- SGA 5 operation", there was not a single episode in the whole of the Burial, which was of a scope comparable to that of this volume LN 265, with the an- odin name "Tannakian Categories". The previous episodes (\*) all confined themselves to a more or less discreet 'reaping', concealing the filiation of certain important ideas. Here, a crucial part of my vision of 'arithmetical geometry' has been 'hijacked', as it were; and this, by means of the one who may have seemed the most 'insignificant' of all my students!

It is true that, behind this one, I clearly recognise, in a style that does not deceive, the person pulling the strings - and who, moreover, figures prominently among those to whom my former pupil lavishes his thanks (\*\*). The only *name* given to the volume by Saavedra's pen and to the crucial notion I had introduced is a subtle act of *dispossession*.<sup>11</sup> It would not be surpassed, in its lapidary effectiveness, until five years later, by the sole virtue of yet another *name*, given to another volume, but this time by the pen of Deligne himself (\*\*\*)�.

If the name "SGA 4 1/2" given to a certain saw-cut volume is a genius imposture, the name "Tannakian category" is a *mystification*, just as genius. Even in the case of a "trivial" or "neutral" Galois-Poincaré category, equivalent to that of the representa-

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who were my students (and under the complacent eye of all) wipes the slate clean of these roots, in the note that follows it "L'Enterrement - ou le Nouveau père" (notes n° s 51, 52).

(16 June) Saavedra's thanks are all the more of a 'joke', since the author never bothered to send me even a copy of his book and his bogus thanks. Having completed my tour of the 'Tannakian categories (sic)' operation, I now understand all the better how my ex-student had no reason to be proud of his 'work'-sic, and that he was in no hurry to see me take note of it. And as things seemed at the time and up until two years ago, it seemed that there was little chance\* that the workman would ever see it....

(\*) The "episodes" in question are briefly outlined in the note "Burial...". (n° 168 (ii)), making part of the suite of notes devoted to the "Motifs" operation.

(\*\*) On the 'mathematical' side of things, these people are (in order of appearance) myself (out of alphabetical order, that was nice), Berthelot and Deligne.

(\*\*\*) As will become clear below (in the note "Monsieur Verdoux - or the cavalier servant", already in French) quoted), there is at the very least a strong presumption that instead of reading here "but this time from the pen of Deligne in person", it would be lawful to read "and *also* from the pen of Deligne in person"....

In the case of finite-dimensional linear transformations of a scheme into affine groups  $G$  over a field  $k$ , the yoga that I had developed is typically "Grothendieckian", inspired as it is by the ana- logical yoga that I had developed in the case of the fundamental group of a topological space, a scheme or (more generally) a topos. The idea of defining the fundamental group as the group of automorphisms of a fibre functor on the category of coverings of a "space" or "topos", and the idea (which was just as crazy, because it was new and therefore unusual) of working systematically with the category of *not necessarily connected* projective coverings, had at the time attracted a lot of sarcasm. I never bothered, knowing full well that none of these jokers, who thought they knew Galois or Poincaré's theory because they had learned it at school, had really understood it - and to this day none of them could take even *the first elementary steps* in the Galois theory of coverings of a (let's say) somewhat general scheme (\*), without repeating verbatim the work I did on this subject, and the formulation I gave of the Galois-Poincaré theory of coverings in terms of category equivalence (\*\*).

And similarly, the idea of reconstructing an affine group diagram (over a field, to fix ideas) from the "abstract" category of its finite-dimensional linear representations, provided with its natural multiplicative structure and its natural "fibre functor" "oblivion of the operations of  $G$ ", as the *diagram in groups of the automorphisms of this functor* - this idea is not due to Tannaka (who never asked for so much), nor to my modest ex-student Saavedra, nor to my most brilliant student Deligne (to my great regret - but he wasn't around yet), but it's a typically 'Grothendieckian' idea. And the same goes for the fact that we thus find a perfect correspondence between affine group schemes over  $k$ , and  $k$ -rigid tensorial categories with a fibre functor over  $k$ . And the same goes for the idea that, if by chance (as tends to be the case for categories of patterns on a field of non-zero characteristic) we have a rigid tensorial category which (by misfortune, or by extra good fortune...) does *not* have the advantage of possessing a fibre functor, that the "group

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(\*) "So-so general" could be interpreted here, precisely, as "a non-normal scheme". Before me, the fundamental group of an algebraic variety had only been introduced (by Lang and Serre) in the case of normal varieties, by describing it as a suitable quotient of the "absolute" profinite Galois group of its function field,  $\underline{\text{Gal}}(K/\bar{K})$ .

(\*\*) Today, this way of formulating the relationship between the fundamental group and coverings, even in the particular "school" case (so to speak) of ordinary topological spaces (locally simply arc-connected) is beginning to be seen everywhere, without any reference to the ancestor, need I say.... .

algebraic *sheaf*' should then be replaced by an 'algebraic *sheaf*'. This idea was spelt out at length at a time when the young Deligne had not yet heard the word "sheaf" in mathematics, and had never yet dreamt of anything like it. Here too, when Giraud took it upon himself in the 1960s to develop an arsenal of non-commutative cohomological algebra in dimension  $/= 2$ , using fields, sheaves and links (\*), there was no shortage of sniggering. This is the kind of thing that nowadays, and for a long time now, Deligne and his ilk have been calling a 'gangue of nonsense'. These sniggers didn't bother me (\*\*), I knew where I was going - and it was with 'delight' (as I write elsewhere) but without any real surprise, that I saw this 'gangue' capture with perfect finesse delicate and profound relationships that I knew no other 'language' would be able to capture.

That said, when the same sneerers one day realise that they have missed a 'cream pie', whether it's the categories that some are quick to christen 'tannaki- ennes' (while waiting for something better...), or a certain 'correspondence' or 'relation' or 'con- struction' (a little neo-Grothendieckian around the edges) that is euphemistically dismissed or christened 'tannaki- ennes.'), or a certain 'correspondence' or 'relation' or 'con- struction' (a bit neo-Grothendieckian around the edges) that is euphemistically dispatched or christened 'Riemann-Hilbert' (also waiting for something better...). ï (\*\*\*) - then everyone rushes in and it's a race to see who can play the genius inventor. That was the mathematical 'spirit of the age' in the seventies and eighties of this century. ...

What is certain, in any case, is that it would not have been a Saavedra who would have had the idea of calling these categories (which I had explained to him at length) by the truly ge-

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(\*) This suggestive terminology was introduced by Giraud, in place of a provisional terminology (a bit haphazard) that I had been using since 1955 (such as "fibred categories of a local nature" and other unwelcome names for concepts whose fundamental nature required terse and striking names).

(16 June) On the first page of the introduction to his book, Saavedra talks about the "formalism for non-commutative holographic algebra *introduced* by Giraud". This is one of the many places where I've been able to sense someone smarter than the author of this book, who has 'held his hand'... the same person who likes to talk about 'derived categories' only to add '*introduced* by Verdier' (when he knows perfectly well, in both cases, where he stands... ).

(\*\*) But Giraud si - who distanced himself without return from the theme he had pursued with me, when he began it just. On this subject, see the note "Co-heirs... ." (in particular pp. 386-387), and the following note .. and the chainsaw" (notes n° s 91, 92).

(\*\*\*) On the subject of this last "while waiting for something better", see the whole "Colloque Pervers" package, and in particular

the notes "Le prestidigitateur" and "Marchés de dupes - ou le théâtre de marionnettes" (n° s 75<sup>2</sup>, and 171<sub>2</sub> (e), the latter being part of the long note "La maffia" n° 171 ).<sub>2</sub>

nial of 'Tannakian categories'. Left to his own devices, he would never have dared to change the terminology he had inherited from me without at least asking for my agreement - and that was the least he could do! What's more, the unfortunate man already had enough work to do to bring himself up to speed on what was essential if he wanted to complete even part of the ambitious writing programme I had submitted to him (\*), without having to go digging through the literature and read Tannaka and what have you, which he had certainly never heard of when he was still working with me (\*\*).

The name is 'brilliant' because of the subtle combination of two qualities that might seem contradictory. The first is that, to a superficial observer, the name doesn't sound totally crazy. "Everyone" vaguely remembers that there is such a thing as "Tannaka duality" in which multiplicative structure plays a role - and it does sound a bit like what happens with those famous  $\otimes$ -categories that a certain Saavedra (who's that?) calls "tannakian"; so go for "tannakian", why not!

But for those who know how to wait, things take on a life of their own. Thirteen years have gone by since then, and instead of a book by an unknown author whom nobody has ever seen, there has been for the last three years a far more prestigious reference, in the brilliant volume LN 900, from the pen of none other than Deligne, and a man called Milne working in tandem, these well-known authors develop ab ovo the whole formalism of the categories that they, too, call tannaki- ennes. Clearly, this is a fundamental notion, used for years by people like Langlands, Deligne, Serre and others, and with a bright future ahead of it, no one would believe that it was a certain Saavedra, quoted two or three times in passing in this article, who was the author of this crucial notion, and of the highly refined formalism to which it gives rise. The very tone of the article by the two brilliant authors, taking up the subject with all the maes-

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(\*) He completed this programme in the record time of barely two years, from the time of my departure, when the programme had hardly even begun (beyond a start on the basic schematic techniques). Even with the support of a Deligne (who had not shown any interest in this student before I left), this performance is quite simply a prodigy - which 'prodigy' is examined a little more closely in the note 'Monsieur Verdoux - ou le cavalier servant' (n° 176).<sup>5</sup>

(\*\*) I would remind you that Saavedra worked with me for just a year or two before I left (around 1968), 1969), after which I lost track of him almost entirely. His background at that time was no more or less extensive than that of any other 3° cycle student from the Third World (or from one of our provincial faculties).

tria that we know of the principal author, leaves no doubt on this subject (\*). Not to mention the fact that they find such a gross error in the theory presented in Saavedra's book (which even forces them to start from a completely different definition, which finally seems to be the right one (\*\*)) that we are justified in wondering whether this unfortunate Saavedra (to whom someone - and we can guess who... - had once tried to explain what he was talking about) had really understood what he was talking about. And Milne, brilliant though he is, who had the honour of co-authoring with the prestigious Deligne an article developing a visibly fundamental idea, would not have the idea that he could be considered the father or even the co-father of it; nor would Beilinson or Bernstein claim that they invented (or even co-invented....) the famous "relation which should have found its place in these notes..." which they had the honour of co-signing with the same prestigious Deligne, after the latter had been kind enough to point them in the direction of a Kazhdan-Lusztig demonstration... And *who would seriously* believe that this famous Tannaka, who lent his name (without being consulted) to designate this fundamental notion, *really had* anything to do with it? Nor would he be the one to come and claim, assuming he is still alive, the day when it will be clear to everyone who is the *real father* of this notion, and of the whole theory of perfect delicacy that goes with it. For those who might have the slightest doubt on this subject, all they have to do is go through Tannaka's work, or if his patience is too much, the work on 'Tannaka's duality', to realise that it really has nothing to do with anything.... .

Here again, once a few milestones have been set, all we have to do is let time take its course. Clearly, this theory, which will increasingly reveal itself as the technical means of a new *philosophy* for linking geometry and arithmetic, is destined to come increasingly to the forefront of the mathematical scene in the coming years. Five years from now, ten years from now, no one will have the slightest idea of referring to a certain book by an unknown author on this subject, when the man who undoubtedly held his hand has taken the trouble to write the necessary exposition, with the assistance of a brilliant collaborator, to form the heart of the no less brilliant volume in which the notion of pattern is finally developed on solid ground. (A volume in which he

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(\*) On the article in question, see in particular the notes "L'Enterrement - ou le Nouveau père" (no.° 52, especially p. 214) and "La table rase" (no. 67, especially pp. 252-253).

(\*\*) On the subject of this feat by Deligne (assisted by Milne acting as an extra), see the beginning of the oft-quoted note "Monsieur Verdoux - ou le cavalier servant" (page 1176).

It seemed more charitable, moreover, not to mention the usual conjectural 'gangue of nonsense' on this theme, which obviously went beyond him, of a vague and rough precursor, long since forgotten. ... ) it will become second nature to quote 'Tannakian categories' by P. Deligne and J. S Milne in the same way as one would quote FAC or GAGA (de Serre) or the SGA (the well-known anonymous seminar at the IHES, known as 'du Bois Marie'). And in so doing, there will be no ambiguity whatsoever in anyone's mind as to the authorship of these innovative ideas - which certainly does not lie with co-author Milne, and even less with Tannaka, or even with a certain rigorously unknown author (a man called Saavedra), mentioned two or three times in passing in their article, for having written (in the introduction to a volume written by him) an 'excellent summary' (with a few reservations) on the subject.

But we would not expect the father of the theory to do violence to his well-known modesty, to the extent of calling 'Deligne's categories' (or 'Deligne's correspondence', in a completely different field...) what, by all accounts and by the unanimous consensus of the 'good' people who make decisions in these matters, should well and truly be called that...

(<sup>176</sup> 4) (20 April) Yesterday's reflection made me see with new eyes something that last year, when I was just getting into Burial, had left me dumbstruck: ". . . this seemingly absurd thing: Deligne "redoing" Saavedra's thesis, ten years later! It all started on 19 April last year, when I discovered the 'memorable volume' LN 900, in which (among other beautiful things) Saavedra's thesis is reproduced almost verbatim (\*). I return to it a week later in the note 'La table rase'. By then I had come to the 'intimate conviction' that the *meaning* behind this nonsense was the desire of the brilliant Deligne (acting as Saavedra's scribe) to

"to give himself the illusory feeling of liberation from something he surely felt to be a painful obligation: to have to refer constantly to the very person he was trying to supplant and deny, or even to another who referred to him".

But last week, when I took the trouble for the first time to leaf through the work of this 'so-and-so', I was surprised to find that he didn't think at all of 'referring to me' (apart from the three lines of 'profound gratitude'-obviously rubbish!

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(\*) See the notes cited in the penultimate footnote.

intended to give the impression). As a result, my 'firm belief' of a year ago became flawed - there must have been something in it, surely, but it was still a mystery: it was hardly the three lines in question, which no reader would dream of unearthing at the end of the introduction, that motivated a Deligne to play copyist to the most obscure pupil of a master long dead! Not to mention the fact that at the end of the introduction I appear almost in one breath with him and Berthelot, who are entitled (in the same way as me, one would say (\*)) to thanks for their "help and advice which they generously gave during this work" . . .

This 'mystery' became completely clear during yesterday's reflection, without my having to look for it, and without my even having to think about it. Thinking about it again, after I'd stopped writing, various associations surfaced - they must already have been there when I was writing, without my even being aware of it, and guiding my pen without my knowing it. I was struck by a similarity not only of style, but of *patented process* of appropriation, across the three major 'operations' in L'Enterrement (of the four in which Deligne himself is the principal (if not sole) 'beneficiary'). This is the process that might be called 'the temporary substitute father', introduced surreptitiously into the mathematical racket to conceal real paternity, while the person of my friend pierre remains temporarily in the shadows. Once the natural father has been completely eliminated from the scene to everyone's satisfaction, the substitute father is himself retracted as if he had never existed, and the *real father*, modest and smiling, appears on the scene, without even having to say that it's him; because for the one who has quietly known how to pull the strings and who has known how to wait, things happen of their own accord without any resistance whatsoever: the unanimous agreement of the entire Congregation has already invested him with the role that is his by right.

This process only began to dawn on me a few days ago, as I retraced the misadventures of my friend Zoghman through the various episodes of Operation IV, the so-called 'service unknown'. The 'surrogate father' in this case (for a certain 'correspondence'...) was *Kashiwara* - I can't say whether he fell out of the sky, providentially and by the greatest of coincidences, or whether the future real father delicately made him understand that this result of an unknown person, who was hanging around without a father worthy of the name, would be a great advantage for him.

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(\*) With the difference that I 'introduced him to the subject' (sic), and that he 'owes a large part of his mathematical training to me' (that's really too much of an honour).

name, was by no means to be despised (\*). The fact remains that our friend Pierre was able to play perfectly on a supposed ambiguity of paternity, fabricated from scratch by the peremptory consensus of 'experts', even before the significance of the new thing was generally recognised. The surrogate father Kashiwara appeared as early as March 1980 (\*\*), if not already at the Colloque des Mouches six months earlier; he was retracted without trace (and without too much formality, it would seem) at the memorable colloquium in June 1981, fifteen months later. Here, it was done with perfect dexterity, with the introduction of two others, this time let's call them 'presumptive co-paternal' (and purely formal) Beilinson and Bernstein, who entered the scene as a simple clause of style - 'thumb', when of course no one would imagine that it was either of them who would have fathered the child (even if both of them did benefit from it . . . ).

The analogy with 'Operation Motifs' is truly striking 1 While the authorship of what could be presented as the 'nonsense' of all that came to be known about motifs was still too notorious (especially in the early 1970s) to be open to manoeuvring, there were *two crucial aspects* of the yoga of motifs which had never yet been the subject of a single published line, even if only in allusive form. One of these, the 'yoga of the weights', had been appropriated by the Mega-father as early as 1970 without a hint of a wrinkle - what had been omitted was in any case only 'conjectural' and worth no more than a token allusion. The other part, on the other hand, had been perfectly worked out by the second half of the 1960s, and there was nothing conjectural about it at all. A vague, slightly out-of-touch student was supposed to give a presentation on at least the mechanics of starting yoga - not a technically arduous task, but one which (up until around the time of the 'death' of the natural and unwanted father, a t l e a s t ) seemed rather beyond the unfortunate man. It was this student, Saavedra, who was the ready-made surrogate father, sufficiently credible, thanks to the provisional guarantee of the one who remained behind the scenes, to win the assent of a Congregation which was not prepared to accept him.

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(\*) (16 June) It would seem that the initiative for the pick-pocket operations on Mebkhout's work did indeed fall to the enterprising Kashiwara, and this as early as 1978, just a few months after Mebkhout had sent him Chapter III of his thesis, which he had just completed. On this subject, see the note "La maffia" part (b) ("premiers ennuis - ou les caïds d'outre-Pacifique"), b. de p. note (\*) p. 1060.

(\*\*) (16 June) In fact, it had already started to show its face two years earlier - see previous note by b. de p. The episode of March 1980 is that of the Goulaouic-Schwartz seminar, referred to in the note quoted, as well as in the note "Carte blanche pour le pillage - ou les Hautes Œuvres" (n° 171<sub>4</sub>, in particular pages 1088-1090).

But at the same time (and this is the point), this 'father' is clearly not a 'force to be reckoned with'. When the time comes, it would never occur to anyone, and probably to Saavedra least of all (\*), to put forward the supposition that he might be the father of a new philosophy - a supposition that is quite simply preposterous if you care to consider it for even a moment... . Here, the evacuation of the surrogate father, who had had his day, did not take place until ten years later, with the publication of the memorable LN 900 in 1982. It has to be said that between 1972 (the introduction of the 'surrogate father' in Operation I, known as 'The Motives') and 1980 (the appearance of the equally providential surrogate father in Operation IV, known as 'The Service Unknown'), a lot of water had passed under the bridge, and there was no longer any need to beat about the bush! Remarkably, here too, a 'token co-patent' is introduced, to make the transition 'smoothly' (and without anyone seeming to stand out) between the surrogate paternity (the paternity of a bungler, in short...) and *the real one*. And I'm sure that Milne didn't see the invisible wires that manoeuvred him to someone else's will any more than Beilinson and Bernstein bothered to see them. Everyone has had their crumbs, and everyone (at least those who have a say) has every reason to be fully satisfied.

All this made me think again last night about the third major operation for the direct benefit of the "future father of all azimuths", the "Spread Cohomology" operation. I had previously been able to convince myself that the initial motivation for this operation (\*\*) was the appropriation of a certain *formula of fixed points*, due to the fact that one could present a certain "formula of L-functions" with undesirable paternity as a trivial corollary of the said formula. The problem was that the trace formula in question was tainted by the *same* undesirable paternity. Fortunately, there was also another possible father, a good friend of his (Verdier, not to name him), who had even made two formulas, one too general (but heuristically crucial), the other a little narrow but still sufficient-.

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(\*) (16 June) At the end of the 'deal' that must have been struck between him, Saavedra, and a Deligne (temporarily) in the wings (ready to reappear when the time was ripe...), Saavedra's 'share' was a state doctorate thesis in his pocket and the relative notoriety acquired by an author of the prestigious 'Lecture Notes' series. - which was to set him off on a career in his own country, far from the arid pursuits of mathematics that he had only glimpsed from afar... .

(\*\*) On this subject, see the group of notes entitled "The formula" (n° s 169<sub>5</sub> - 169<sub>9</sub>). This initial statement has been considerably-

See in particular the notes "L'Éloge Funèbre (1) - ou les compliments" (n° 104) and the note "Les joyaux" (n°

170 (iii)).

istant to 'style' what we wanted. But buddy or not, it's certainly not the buddy, nor the unwanted deceased, who is *the* appropriate 'father' here, even though it's *the* key formula for '*the*' famous conjecture (\*). Given the notoriety, alas, of the formula for L functions and its unfortunate paternity, the delicate point here was not the friend (friends always come to an arrangement in the end...), but the deceased. To make matters worse, his demonstration of the 'corollary' was published in black and white in a Bourbaki seminar in 1964, but at a time (fortunately) when the routine case (er, I'm sorry, the crucial case, I meant M, of this formula (or of the trace formula, it's kif kif, but you mustn't say that... . (\*\*)) had not yet had time to be checked.

Here, the manipulation consisted in using the friend in question to pretend to be the father of his ultra-general formula (which was the exact truth, except that he never bothered to demonstrate it...), but at the same time slipping in a confusion with the *explicit* formula demonstrated by the cumbersome deceased (a formula to which no allusion is made at any point), and *debunking* the ultra-general formula (as conjectural, incomplete and, to put it bluntly, unusable). This was a way of drowning a fish, and of depriving the reader of any desire to go and look in a certain SGA 5 seminar (which, incidentally, he is made to 'forget') for what he might have to say on the matter. As for the explicit formula (a little narrow around the edges, but perfectly valid) of the friend, by mutual agreement there is no more mention of it either, except for an ambiguous and purely formal reference, drowned at the end of a stringy and discouraging text, which no reader in the world will have had the courage to read to the end. To sum up, then, we can say that the 'surrogate father' (Verdier in this case) did indeed intervene, but not so much through his tacit agreement to 'paternity' over a result (that of the deceased) that we are here trying to *evade completely*, but rather by his connivance in a game of scrambling-debunking two 'children' of whom he is indeed the father, in order to conceal in the fray the third child, of an unacknowledged father, an orphan whom no one is able, or above all cares, to find (\*). In this manipulation, Illusie plays

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(\*) This is, of course, Weil's conjecture. On this subject, see the note "La Conjecture" (n° 169).<sup>4</sup>

(\*\*) These two formulae are in fact each an immediate corollary of the other. As my authorship of one of them (the formula for L functions) was notorious, Deligne managed (in the memorable text called "SGA 4 1/2") to present it as a corollary of the other, doing moreover the impossible to give the appearance of being the father of the latter, by tricks of conjuring infinitely more difficult than my modest demonstration (and key statement) for the said formula. See the group of formulae already cited, for this tour de force that is undoubtedly unique in the annals of our venerable Science (notes n° s 169<sub>5</sub> - 169).<sup>9</sup>

a supporting role, somewhat similar to that of the 'presumptive co-fathers' from earlier - except that his paternity, no more than that of Verdier, is never supposed to relate to the sacrosanct formula of traces for *Frobenius*, the only one that counts and reserved (with all due dexterity, of course) for Deligne alone, but that it too relates to the unmentionable child that it is a question of concealing - something in which Illusie collaborates with that exemplary devotion that characterises him.

(<sup>176</sup> 5) But I would like to come back to Saavedra's 'thesis'. It was around the time of my departure from the mathematical scene, at the beginning of 1970 (if I remember correctly), that Saavedra finally seemed to be really 'hooked' on his work, after a year or two during which he had not seemed too determined. He then told me that he had worked out a formulation and a proof of the initial statement that I had proposed to him, in such a way as to apply to the case of a ring of base  $k$  of *any kind*. He even gave me a sketch of a demonstration, which I had to listen to with a slightly distracted ear. Almost all my energy was taken up with the change in my life that I was going through at the time. Without thinking at the time to check carefully what Saavedra was telling me, I had the impression that he had finally got going, and that he was now going to be able to manage on his own. Perhaps I was in a bit of a hurry to take my desires for realities, at a time when my availability for a real research direction had become almost nil. (\*\*). After that I had no sign of him, as far as I can remember (\*\*\*) . Until last week I assumed that he must have completed the minimum programme I had proposed to him, and perhaps gone a little further by dealing with the case of motifs (according to what Deligne had written to me last August, with his annotated bibliography on motifs).

I have only just realised that *this is not the case*. After three or four years spent on the subject, the unfortunate man has found a way to make a gross error in the very *definition* of what he calls a 'Tannakian category' (the definition by intrinsic properties,

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(\*) See on this subject the note "Les prestidigitateurs - ou la formule envolée" (n° 169<sub>8</sub>) - and also the note from

b. de p. (\*\*) page 1121 in the note "L'album de famille" showing how successful the escamotage-envolage efforts of the good Samaritans Deligne and Illusie have been.

(\*\*) In comparison, at least, with the availability that I had before I left; but not with the availability that I can see in most of my colleagues who are in charge of research.

(\*\*\*) My memory fails me a little here - see note no.° 176<sub>7</sub> for unexpected revelations on this subject.

I mean (\*)), the point of which was to prove that it implies the "Galoisian" description in terms of representations of a suitable sheaf. Theorem 3 which he states in the introduction (this introduction in which he is at least supposed to *state* the four essential theorems of the theory, as I had given them to him) is therefore *trivially false*. Deligne and Milne make a point of pointing out the monumental error, proposing as a "new" definition of the categories studied the description in terms of sheaves (which it is obvious a priori is the right one, even if it means modifying the intrinsic description if necessary...), and seriously questioning whether "Saavedra's" definition (once the idiotic error has been removed) really implies "theirs" (sic) (\*\*\*) - which was exactly the subject that was supposed to constitute Saavedra's thesis work!

The situation is pure Father Ubu! And in thirty-six ways at once. Thus, what was the subject of the work proposed to Saavedra, the only part which required an original contribution, however modest (to find the good intrinsic conditions for a Galois-Poincaré category on as general a base ring as possible) was not treated even in the case (which I think I had treated a long time ago (\*\*\*\*) when I met Saavedra) where the base ring  $k = \text{End}(1)$  is a *body*! Saavedra's "thesis" work thus consisted, very exactly, in piously copying the part of the theory (beyond the start of Grothendieckian yoga), above a basic body, which had already been entirely completed by me, and in presenting, instead of the work which was a prerequisite for everything that was to follow, a cannulated definition and a "demonstration" of a false theorem, a demonstration reduced (as Deligne makes a point of pointing out - loc. cit. p. 160) to a simple

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(\*) The error stems from a confusion in Saavedra's mind about what I meant by the *basic ring* of a tensorial category; it is not just any ring with respect to which the said category is "linear", and the tensor product is "bilinear", but the canonical ring  $\text{End}(1)$  (where 1 is the unit object of the category). When I explained the B. A. BA of the theory, he must have been so 'out of it' that it must have gone completely over his head, and sunk into oblivion. Deligne, who seems to have more or less taken over from Saavedra (obviously with an idea of his own in the back of his head. . . ), was careful not to get him to put things right. This allowed him (ten years later) to discreetly bring down the Saavedrian house of cards, and to appear as the Saviour Angel and (this time again) as the true Father that everyone was waiting for....

(\*\*) Loc. cit. page 160 (I'm not making this up!).

(\*\*\*\*) This was in 1964 or 65, so seven or eight years before Saavedra's famous 'thesis'-sic, and seventeen or eighteen years before a Deligne-Milne tandem came to the rescue, *not to do* this modest work either - the only 'original' work I had expected from the most modest of my students. ...

vicious circle!

And that's not all. The thesis doesn't stand up - and the thesis jury doesn't notice a thing! I guess none of the members had a very good grasp of what it was all about. But that didn't encourage any of them to let me know that at least one of them was in a position to give a valid guarantee of the seriousness of the work they were gravely pretending to judge (\*). If the defence did take place, and without my being involved, it could only have been thanks to the support of Deligne, who (as Saavedra's acknowledgements make clear) must have followed his work to some extent, once I had practically disappeared from the scene (\*\*).

It seems unimaginable to me, then, that Deligne should not have realised this error, he of whom I know the vivacity and acuity down to the smallest detail - and there is no question here of 'small detail'! Of course, I had told him in all its finesse about the yoga I had achieved, and it's simply not possible that among the very first things I explained to him there wasn't this counter-example which he and Milne pretend to bring out here as the latest novelty, and which was known to me from the very beginnings of my thinking on yoga (which I'm finally going to call 'Grothendieckian', instead of referring to Galois-Poincaré, who don't ask for much...). If he has allowed such a gross error to persist in the 'thesis' (sic) of his 'protégé' (resic), so as to be able purely and simply to discredit the 'substitute father' (quite provisional) as soon as he sees fit, it is surely not without good reasons. Yesterday's reflection makes these reasons quite obvious. It may be said that I am exaggerating, and that the 'help and advice' Saavedra refers to does not necessarily mean that Deligne took the trouble to read with any care the four statements in the introduction that summarise the essence of the theory (\*). These statements were, of course, familiar to him long before he made his acquaintance. It would then have been a simple oversight to endorse a work without having at least taken the trouble to check, for the space of a quarter of an hour, the correctness of the main statements announced in the introduction.

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(\*) The composition of this lamentable jury will eventually be revealed (to the reader who has resisted until then) in the final note 176<sub>7</sub> of the 'Sixth Nail' to my coffin. ...

(\*\*) This sudden interest on the part of a Deligne in an obscure student in need of a thesis did not appear until recently,

one wonders why, only after the death of the natural (and unwanted...) father of the theory that the aforementioned student (obviously overwhelmed by the task...) was supposed to expound.

(\*) Apart from the results on the filtration of fibre fusers, which are more technical and more difficult to compress.

into one striking statement.

the introduction. But in fact there is no doubt in my mind that Deligne must have really taken the trouble. After all, this work *was not just any work*, presented by a slightly clueless student in need of a thesis. Deligne was in the best position after me (and even before Serre) to grasp the full significance of the formalism that was being presented, as forming a crucial part of the unwritten (or at least unpublished) legacy left by the late master, if he, the brilliant Deligne, the elitist to a fault, took the trouble here to follow the work of someone who was obviously mediocre, it was certainly not for his own good and with the aim of helping him to obtain what, according to the current consensus (and all the more so, according to the criteria of exactingness taken to their extreme degree, which he prides himself on professing) is a *bogus thesis*.

Once the word has been uttered, we are immediately confronted with a strange contradiction. On the one hand, such a monumental error, from someone who is supposed to have invested himself full-time in the subject for years, that it's hard not to interpret it as a sign of fundamental incapacity - it would seem that the very problem that was posed, even in its merely technical aspect (which wasn't all that rocket science, though), simply hadn't been grasped at the time of the defence, and at the time of publication of the book in question. On the other hand, this same student, after spending a year or two with me without doing much, suddenly acquires, *in less than two years*, a mathematical culture that may rightly seem impressive: structural theory of algebraic groups, both on general fields and on the field of reals, theory of zinc strand diagrams, Hodge theory, patterns... Not only that - but although I don't remember ever having read a mathematical text written by him, even just a few pages long, and knowing full well how difficult it is (especially for students of modest means) to learn to write maths - I was struck, when looking through the book published under his name, by the exceptional quality of his 'writing'. The thought had occurred to me that, technically speaking at least, this text, which is obviously intended to be a standard reference text on a par with the EGA and SGA texts, could have been written by me, or by Deligne, or by one of the four or five other students I have had, all remarkably gifted, who are used to the task of presenting a set of interwoven ideas and facts in a precise, complete and elegant form.

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(\*\*) On the subject of these tunes, and the appropriation technique they serve, see the note "Appropriation et mépris" (n° 59).<sup>2</sup>

and complex. I am well aware that, even less than a mathematical culture, such writing virtuosity is not something that can be improvised (except in the case of people with exceptional gifts, such as this same Deligne and a few others), and that it can only be acquired (if at all) after many years of practice. It took me more than ten years to acquire it, even though I had a very strong contact with the substance I was trying to express. This contact was, of course, in no way comparable to that of Saavedra for the subject of his thesis, which he still did not understand after writing on the subject, and which turned out to be (at least until 1982...) *1a* 'good reference' for a delicate and crucial formalism.

Decidedly, there are two things here that simply don't 'fit' with each other.... .

The thought that occurred to me last night, and which now comes back with the force of evidence, once I take the trouble to recount the situation to myself in black and white, is this: it's unthinkable that it was Saavedra, whom I knew well and whose possibilities and, above all, limitations I am well aware of - it's unthinkable, on reflection, that he was the author of this brilliant book, setting out, admittedly in its exclusively technical aspect but in an exhaustive and (in this respect) very thorough manner, the foundations of a 'philosophy' that is entirely beyond him. Perhaps the first three chapters, two of which consist mainly of basic generalities that everyone already knew, and the third of which presents Saavedra's completely cannulated version of the central notion of the book - these chapters, therefore, which were supposed to constitute the 'minimum programme' that he never completed - perhaps these are entirely Saavedra's own work. The central chapter III, however canonical, is sufficient to give an idea of what we were getting at - namely, the "Grothendieckian" (not to mention his name), or "Gerbian", vision of certain categories, a vision that gives meaning to the subsequent chapters IV to VI. Once we have accepted the description by sheaves (wisely taken as a *definition* of the so-called 'Tannakian' categories in Deligne and Milne's doubly pirate text), it is these last three chapters that constitute the heart of the formalism that we had to appropriate. I presume that these chapters were written in toto by Deligne, or perhaps partly by him, partly by Berthelot; and in much greater detail than the notes I had given to Saavedra, so that all he had to do was copy them out verbatim, if he was even asked to go to the trouble of this formality. He must have felt like a 'winner', because he was being given the 'gift' of a thesis and the title to go with it, even though he had to do his own work.

to feel that what he had done himself (and even under the illusion that it made sense) was probably a bit meagre for a doctoral thesis. And Deligne (disguised as a Samaritan again...) wins: here was the reference that was needed, if not for now at least for 'later' (for those who know how to wait...), and where the undesirable name no longer appeared, for all practical purposes at least.

To add to the joy, I would like to add that the man called Saavedra seems to have disappeared from circulation without a trace. Last year, in anticipation of the (imminent) dispatch of the printed and bound copies of *Récoltes et Semailles*, I leafed through the *Annuaire International des Mathématiciens*, which is a big one - everyone is listed (and that's what the directory is for), with the sole exception of the person concerned, who is not listed under Saavedra or Rivano (or even Neantro, which I looked at out of conscience). As a result, the story takes on the air of a dark police intrigue. One shudders to imagine the smiling, affable Deligne, like a second Monsieur Verdoux (alias Landru), once he had achieved his torturous ends with this 'good reference' to his liking (four years before that of his friend Verdier! (\*)) - one shudders, I say, to see him make the 'evidence' of his diabolical plot disappear, namely the unfortunate Neantro Saavedra Rivano in person, by having him burned for a long time in a cosy fireplace in the Ormails (\*\*), specially designed for such purposes.

I reassured myself that I hadn't heard that either Kashiwara or Verdier had disappeared from this world - in fact, I had Verdier on the phone just the day before yesterday, to ask him (without much conviction and without success, it seems to me) if he could give me some news about another 'disappeared' person, whom everyone is talking about and whom apparently no-one has ever seen - I mean, Jouanolou's thesis. I still don't know much more about that thesis, but at least it seems that Verdier is still alive, as much of an 'exhibit' as he is - and I'm confident that the same is true of Neantro Saavedra Rivano.

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(\*) On this subject, see the note entitled (appropriately enough) "Les bonnes références", n° 82.

(\*\*) 'Les Ormails' is the name of the residential part of the IHES (Institut des Hautes Etudes Scientifiques), where our friend Pierre - alias Monsieur Verdoux-alias Landru (and disguised as a cavalier servant) - has taken over at just the right moment from a certain deceased, ousted from the place and sent to oblivion by the kind of coup-mine de-rien my friend has a secret for. The residential part consists of a dozen family pavilions, and a larger building made up of comfortable studio flats, each of which will surely soon have its own individual, all-purpose fireplace. ...

(<sup>176</sup> 6) With all that, I haven't even finished going round the ubu aspects of the history of Saavedra's thesis - I'm definitely collecting them, theses and theses like no other! I had reached the presumption (not to say, the intimate conviction) that if Deligne (assisted by an eager and voluntary collaborator) pretended to make a serious copy of Saavedra's thesis ten years after it had been defended, he was undoubtedly only 'taking back' what he had 'lent' to him for a time (the time it took Saavedra to pass his thesis and disappear), and that this was therefore only a fair return - except that what he had 'lent' for a time, he had 'borrowed' from the deceased, never named. But since it's not customary to give back to the deceased what one borrows from them (that's all it takes 1), all's for the best on that score too.

The best thing about all this is that even after a second ex-student came through (the brightest of all those I've had, to boot), the humble problem I'd given Saavedra, which had been my starting point more than twenty years ago and the first thing I believe I had solved from that moment, in the case where the defining ring of the  $\otimes$ -category under consideration is a body - this humble problem is still not "solved" at the present time, even in that case! Deligne merely pointed out Saavedra's gross error (spotted surely more than ten years ago, but he was biding his time...). While copying 128 pages of the previous reference text, he did not bother to repair the error. Why should he have gone to such trouble - when the goal he had set himself had clearly been achieved? To do so, he would have had to have had *more* in him than just an appetite for appropriation; he would have had to have had a keen interest, a *respect* for the mathematical substance he was dealing with, and a vision that went beyond the prospect of immediate 'gain'.

If, around the years 64-65, I took the trouble to draw up a "Grothendieckian" yoga for the  $\otimes$ -categories that could be represented in terms of "algebraic sheaves", instead of contenting myself with those that could be described by a scheme in groups, it was because in the example that "motivated" me most, that of motifs over a body, it was well known (by an argument of Serre's

$p > 0$ , there is *no* fibre functor "rational on Q" (or even on R). This *forced me*, then, to express the theory in terms of something as "unserious" as the formalism of sheaves and links, and at the same time

time, of course, to find intrinsic criteria of a simple algebraic nature, ensuring that this 'Galoisian' or 'Grothendieckian' vision practically 'always' worked, and in any case at very little cost. The characterisation I had come up with (and, if I'm not mistaken,

proved), by the existence of a fibre functor on an extension of the field  $k'$  of the base field  $k$ , is still not established in the literature, twenty years later! Even today, in terms of what has been written by the Saavedras, the Delignes and their ilk, even if we admit everything we want about a formalism of "motivic cohomology classes" over a (let's say) finite field, it has still not been established (not in the literature, at least) that the category of (let's say) semi-simple motives over such a field is "Grothendieckian" (or "Tannakian", as these gentlemen say). That's  $418 + 128 = 546$  pages of text, from the pen of Saavedra (assisted by a Deligne and a Berthelot), then Deligne and Milne, and all this for not even managing to find what had been my starting point twenty years ago, convincing me that 'motivic Galois groups' *existed*.

Yes, why would Deligne have bothered, when he had long since forgotten the vision, when the credit he was seeking had already been earned anyway, and when the bodies he was working on to develop his theory of motives (which has nothing to do with that of a certain deceased person...) are all bodies of zero characteristic - so that his famous so-called 'Tannakian' categories are all 'neutral' (or 'trivial'). In that case, there was certainly no point in making a big fuss about sheaves and the like, which from then on was just window-dressing. There was no point, except *to appropriate the letter of something whose soul and spirit have been forgotten*.

And I see that the epilogue to this breathtaking and lamentable story is that, as with the B. A. BA of the vision of motifs buried for fifteen years, it's the old man who, having barely finished the tour of the brilliant Burial and its prowess, is going to do this little job that none of his students after his 'death' have yet had the heart to do. After all, they have been far too busy playing master to have the time, even if only for a few days, to be a *servant* (\*).

(<sup>176</sup> 7) (19 June) It was exactly two months ago today that I set about writing the above notes (dated 19 and 20 April), with the ready-made name "The Sixth".

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(\*) I've been a bit hasty here, pretending to lump all my students together with the brightest among them. I apologise in advance to any of them who do not feel flattered to find themselves in such brilliant company! In any case, I'm happy to remember Giraud taking on the task (which fell to him unexpectedly) of reading Contou-Carrère's thesis, in a spirit of 'service', that's for sure, to Contou-Carrère and to me at least, and perhaps also to the mathematical community; on this subject, see the last paragraph of the note 'Jésus et les douze apôtres' (n° 19, page 151).

nail (to the coffin)" (n° s 176<sub>1</sub> , at 176<sub>6</sub> , not including this one, which is part of the lot). Zoghman Mebkhou had just brought me Saavedra's book the week before - and it only took one glance to realise what it was all about.

I have to admit that this discovery was a thrill, scarcely less so than that of the 'memorable volume' of exhumations of the motifs (Lecture Notes n° 900), one year earlier to the day. To put it another way, last year's emotion reappeared, in a way revived by the discovery of an 'operation' intimately linked to this exhumation; an operation (as was obvious from the outset) that had prepared it, and on a comparable scale. I was then seized again, not to say suffocated, by this feeling of sheer impudence - *the same* impudence (this too was clear from the outset, by many unmistakable signs), attacking something intimately linked to me, something that no other person in the world had carried and nurtured for so long... It was so strong, bordering on anguish, that I was astonished myself.

The spontaneous reaction, and the natural outlet, would have been to do as I did last year - to express my emotion while it was still fresh, and thus get to the heart of this new part of my burial by those who were close to me. I held back, however (\*), because I needed a minimum of availability for Mebkhou's visit, not to mention the fact that he had things to say to me which I felt, even if they didn't affect me in such a neuralgic way, were just as 'neuralgic' for him, in any case, and just as significant for the Burial. What's more, I felt it was important to make a note of the things I'd just learned from him that I wasn't yet familiar with, while they were still fresh\* in my mind - whereas the ins and outs of this famous book burial were unlikely to escape me -, which is why, the day after my friend's departure, I set about (from 15 to 18 April) recounting his misadventures, in the group of notes (n° s 171<sub>1</sub> to 171<sub>4</sub> ) that now form the end of the Apotheosis.

In other words, before I got to the famous 'sixth nail', I'd had time to get my bearings. To tell the truth, looking back over the first few pages now, I can find no trace in my sarcastic (and a tad aloof) description of the new pot-aux-roses of the emotion that had first seized me, to the point of making me spend a sleepless night, at a time when I had

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(\*) I still wrote four or five pages in the emotion of the moment, but there's hardly any trace of it left in the text I wrote nine days later, on 19 April.

But I was in dire need of sleep, and I could feel the 'weight of the past'! It was the tenth of June, three days after I'd put the famous 'full stop' under Burial - and it was off to a flying start! Of course, I had no idea just how much it meant to me. restarted - that there were still three hundred pages (give or take a few) left to write! When I finished with the sixth of the notes ("Les basses besognes") making up the "Sixième clou", I thought I had come full circle, and of the "Quatre opérations" too at the same time - apart from about ten pages (for operations III and IV) to be retyped and the footnotes added. In a few days' time, I thought I'd be able to hand over the entire manuscript of Burial II for typing.

However, in the days that followed (perhaps even the day after or the day after I thought I'd finished the last 'Clou') there was an unexpected turn of events, which I'll come back to. Here again, my spontaneous reaction would have been to start straight away. If I waited another two months before doing so, it wasn't because I didn't feel like it, of course. But there were more pressing things to prepare for the typing. On rereading the Four Operations from the beginning, it became clear that there was a great need to flesh out the text here and there - and the rest is history!

So today (and barring any further unforeseen events - knock on wood!) is finally the day when I put the *real* finishing touches to Burial, practically speaking I mean: the day when I write the very last pages, which are supposed to form part of my reflections on Burial, within Harvest and Sowing at least. After that, all that's left to do is write this 'Letter' that's supposed to take the place of a foreword to Harvest and Sowing - after which I'm thinking of taking a few well-deserved and much-needed days off...

A few days after writing the six previous notes, I learned of the verdict of Saavedra's thesis jury - the same jury that I showered with well-deserved sarcasm in the penultimate note 'Monsieur Verdoux - ou le cavalier servant'. The thesis was defended on 25 February 1972 at the Faculté des Sciences d'Orsay, before a jury made up of J. *Demazure* (rapporteur), *Castelle* and A. *Grothendieck*.

For a "coup de théâtre", it was a coup de théâtre! The coronation of Ubu! I found it hard to believe this information from an official source, even though I hadn't the slightest recollection of having attended such a thesis defence. The story of Monsieur Verdoux-Landru was getting even more complicated! I telephoned Demazure at the drop of a hat,

if he remembered being on a thesis jury with me for a man called Saavedra. Demazure didn't remember much either, but he remembered enough to assure me that the defence had indeed taken place (although he couldn't really say when or how), and that we'd both been there, along with Castelle (whose name I couldn't even remember...). He didn't know much more than that, except that he'd been the thesis rapporteur. I'm the one who told him that the thesis, officially, would have consisted of a 25-page text (which must have made his job as rapporteur easier, I imagine). So it was he who was surprised. He promised to send me a copy of the thesis. I'd have been interested to know what it looked like, but I'm still waiting for it.

— Apparently (according to what Demazure finally told me a few weeks later) this thesis could not be found. In any case, apparently he has no trace of it in his papers any more than I do. But that's just a detail...

It made me look sharp! With all the hot swigs I'd treated myself to about the jury, visibly inept, "pretending docently to judge" a piece of work they "must not have understood very well what it was all about" 1 You can imagine that I had a mad desire to repackage these sarcasms, to save the furniture in short, to keep my composure - but no, that would have been cheating. There's enough cheating as it is in this whole Funeral, without me putting any more effort into it. Once again, the sarcasm was entirely justified - now that I know the composition of the jury, I can even say that it was I, above all others, who fully deserved the sarcasm. After all, the main thing that Demazure and Castelle had to remember was that Saavedra had prepared this thesis with me, or at least that he had started it with me, on a subject that I had given him. I was supposed to be in on it, and they trusted me. For all we know, these 25 pages that Demazure is supposed to have reported may have made sense - and even if the same monumental blunder was there, in a simple summary of a theory, Demazure, who wasn't in the loop and who trusted me, had no chance of noticing.

As for me, having practically given up maths for the last two years, apart from my courses, this defence, which I was probably rushing off to, between a course at Orsay and some meeting of Survivre et Vivre or some public discussion (if there was one) on atomic waste stored nearby (at Saclay), must have been nothing more or less than a simple administrative formality. What's certain is that I hadn't followed Saavedra's work for two years, any more than I had followed anyone else's work - and that I had no doubt that he was right.

that Saavedra's work made sense. I can no longer say exactly where this conviction came from. Unlike all the other students I had had up to that point, I had no direct presumption, based on work already done with me, of Saavedra's seriousness. Would I have taken my academic responsibilities in those days so lightly that I would have trusted him on his word, so to speak? If the text of the book (published the same year), of which the 25-page thesis is undoubtedly a summary, was already ready at the time and served to give me an idea, it is true that 'at a glance' it looked so good that it may not even have occurred to me to check the part of the work that was supposed to be Saavedra's personal contribution. It is also possible and even probable (but I have no memory of this) that I relied on the opinion of Deligne, who, after I had left, followed the work (\*).

In both cases, I have to admit that I am equally responsible for having awarded the title of Doctor of Science on the basis of a thesis which, twenty-three years later, appears to be a *bogus thesis*, to use the expression of the note already quoted. But the fact that I myself was unwittingly an instrument in this deception, and bear responsibility for having given my (light-hearted) guarantee, does not make it any less of a deception. It only makes it all the more brilliant. After all, the real motivation (for the person pulling the strings) was certainly not to allow a vague PhD student in distress to have a title on the cheap, before changing jobs and disappearing behind the scenes - but rather to allow someone who was in no way clueless to take ownership, delicately and under the radar, of a certain vision born in me and brought to fruition before he had even heard (in mathematics) words like 'sheaf' or 'pattern'. It was thanks to my sudden and intense activity for the survival of the species and other fine and most urgent causes (from which this same ex-student and friend had told me he had to distance himself, because of his complete and absolute dedication to mathematics alone (\*)), at a time when my energy was fully absorbed elsewhere, that my brilliant pupil and friend succeeded in this truly unique sleight of hand, in making me the instrument of my own dispossession! In the state I was in at the time, completely disconnected from my former mathematical interests and placing blind trust in the mathematical sciences, I was able to make myself the instrument of my own dispossession.

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(\*) I don't even remember that Deligne was involved in Saavedra's work. This is something I learnt in April, looking at the introduction to Saavedra's book.

(\*) On this subject, see the note "Brothers and spouses - or the double signature" (n° 134), in particular pages 614-615.

to those of my students, led by Deligne, who since the end of the SGA 5 seminar had already started to play a little game of their own, any name (for example) that we might have concocted for his famous categories, which I only remembered from a very long way back, I would have said yes and amen 1 Just as I said yes and amen to Verdier telling me that there would be no book on new-style homological algebra, or to Deligne telling me that half of the SGA 7 seminar we had done together was suddenly going to change authorship. rait pas de livre sur l'algèbre homologique nouveau style, ou a Deligne me annonçant qu'une moitié du séminaire SGA 7 qu'on avait fait ensemble allait soudain changer de paternité. . .

But the fact that the person who is paying the price for a scam gives his benign and unsuspecting consent does not change the nature of the swindle, except that it is coupled with a breach of trust. And the fact that the Serre and other augurs are also in on it and give it their unreserved blessing. (\*\*), gives the whole thing an unusual dimension - that of the corruption of an entire milieu and an entire era - without making it honourable, however brilliant it may be, or removing one iota of its indecency.

As surprises never come on their own, just a few days after I had the revelation of the composition of the jury for my ex-student Saavedra's thesis, I also had the appropriate information for Jouanolou's thesis, also a rather special thesis, and about which I have had occasion to say a few words here and there in my reflections (\*). No more than Saavedra, he had never bothered to send me a copy of his famous thesis ('which everyone quotes (since the Colloque Pervers) and which no one has ever seen'), so I ended up writing him a rather dry letter (dated 25 April) to ask him a number of questions about the strange vicissitudes of this thesis. He replied practically by return, on 1 May, evasively as far as the substantive questions were concerned (since it was 'always very painful to go back over the past'), but with information that could not have been more precise as far as the administrative details were concerned: the thesis was defended on 3 July 1969 at the IHES (Paris), before a jury chaired by P. Samuel, with the following examiners

J. Dixmier, A. Grothendieck, J. L. Verdier. My correspondent added, with a touch of mischief: "As far as I could judge, all the members of the jury were present 1" (something that was also confirmed to me by J. L. Verdier, whom I spoke to on the phone about this matter).

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(\*\*) For this most explicit blessing, see the note "L'album de famille", part d. ("l'Enterrement").  
— or the natural slope").

(\*) This thesis was discussed in the sub-note<sup>o</sup> 85<sub>1</sub> (p. 349) to the note "Solidarity", and also in the note "Joint

heirs. . ." (n° 91), pp.387- 88. See also the section "The student and the Programme" (n° 25).

afterwards).

Once again, I had not the slightest recollection of this thesis defence, which apparently also took place on the sly (sorry to have to damage my image in this way!) (\*\*). If I thought that the defence had taken place in Strasbourg (and therefore placed this defence at the beginning of the seventies, knowing that Jouanolou had a post in Strasbourg in those years), it was undoubtedly because of a cryptic reference by J. L. Verdier to this thesis (in a Bourbaki presentation of February 1975, n° 464), quoted as "J. P. Jouanolou Thesis, Fac. Se. Strasbourg" (without date or title). However, like me, he had been a member of the jury - would his memory be as faulty as mine, or rather, capricious, in placing the IHP (Institut Henri Poincaré) where the defence took place, in Strasbourg? Com- prenne qui pourra!

The same Verdier was kind enough to send me his own copy of the thesis. At first I thought, looking at this packet of 208 loose sheets (\*), that it was a photocopy of a draft, which I remembered holding i n m y h a n d s and commenting on in detail, when Jouanolou was working with me on this thesis that was dragging on and on. But Verdier confirmed that this was indeed the definitive copy of the unfortunate thesis, which apparently never had the honour of being printed in more than three or four copies (mine, with my annotations, must have gone back into Jouanolou's hands, and I never saw it again...), nor of being bound.

The slightly more detailed explanations that Jouanolou was kind enough to give me later (in a letter dated 3 June), plus the phone call to Verdier, enabled me to get back into the swing of things. Jouanolou had obviously reached a 'saturation point' for his thesis work, which he had been pursuing half-heartedly from the start (but without my bothering to get a clear picture of the situation (\*\*)). In 1969, he must have reached such a blocking point that he would have been unable to resume his work even a little, to take into account my numerous observations. I then had to

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(\*\*) The thesis defence took place at a time, I think, when I had already 'dropped out' of maths to take an interest in biology (and more specifically, molecular biology).

(\*) At the Service des Thèses de la Sorbonne, a 215-page thesis has been submitted - apparently it is missing. six pages to the Verdier copy. For all we know, the copy deposited with the Service is the only complete one in the world - and a stapled one at that, I'm assured. They must have a binding service for foundling theses, which arrive in pieces...

(\*\*) See the aforementioned section "The student and the Programme", n° 25.

face the facts and 'let it run'. In any case, when I looked at it again, it seemed to me that this text represented a serious and usable work of formatting, even if it is far from perfect - it was clearly better than 'better than nothing', and could be passed off as providing an indispensable reference text, in the absence of any other that would have fully satisfied me (\*\*\*)�.

Of course, it wouldn't have occurred to me ('even in my dreams') that Jouanolou would take his revenge, in his own way, for the lack of conviction with which he had pursued this work with me, by scuttling it himself and erasing practically all trace of this famous 'reference' that I was so keen to have! Once again, it's a 'reversal of fortune' that I'd be wrong to complain about (even though I've got plenty of reasons to do so!). In my relationship with a. Jouanolou, what counted for me was to find in him the 'arms' to push the wheels of a certain cart of imposing dimensions. I took it for granted that he, Jouanolou, was a stakeholder in *my* plans, but I never stopped to consider the insistent signs that this was not the case. It's true, of course, that Jouanolou himself had chosen to come and work with me - he was sure he'd enjoy working with a prestigious 'boss', without suspecting what he was getting into...), and it was he too who freely chose his subject of work, from the wide range of subjects on which I was prepared to support him (subjects all linked, of course, to the same 'trolley' which, deep down, probably didn't mean anything to him). To put it another way: like everyone else, Jouanolou was grappling with certain contradictions within himself, in terms of his own desires and choices, in this case in his work.

My own contradiction lay not in my relationship to my work, but in such a polarisation on my tasks that I was incapable of seeing in my students anything other than welcome arms, and of imagining that any of them could be divided in the work they did with me. With the additional hindsight that the long reflection on Burial has given me, I realise that Jouanolou was far from the only one of my students to be 'divided' in one way or another in this work. But he represents an extreme case, in that he is the only one among them who was unable to identify with the task he had chosen, and whose work was carried out without conviction or joy. My responsibility in this

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(\*\*\*) In any case, today it is still the only text in the world that presents the theory of A-adic coefficients, derived category version - and an unobtainable text to boot, to add to the joy. The chainsaw has been there...

situation is that I didn't agree to really take note of it, preferring to put what should be secondary (the accomplishment of *my* tasks) *before* what is essential (that the task 'chosen' by the pupil be truly *his* too, and pursued with joy).

That's probably why Jouanolou is also the only one of my ex-students in whom I've ever felt a grudge (which never says its name, of course). Cultivating such a grudge is an outlet and a diversion, which doesn't get you anywhere, of course, except to avoid your own problems (and you rarely look any further). That doesn't change the fact that it's well-founded, and that I can't complain if today (twenty years later) I'm reaping some of the rewards.

To find myself confronted, one after the other, less than two months ago, with the unusual episodes of Saavedra's thesis, and then Jouanolou's, made it clear to me that, as I had just glimpsed in the first part of *Récoltes et Semailles*, even before I left and in the years immediately following, all was not well (as I took for granted 1) between my students and myself. Thus, of the twelve theses that were passed by the students who worked with me at the level of a state doctorate thesis, *four* of them were blatantly 'burial theses' of the master 1 They followed each other over a period of five years, between 1967 and 1972, and two of these burial theses took place before I left. The first was that of Verdier in 1967, a thesis reduced to a 28-page summary, a prelude to the burial of the new homological algebra that I had introduced, and that Verdier had taken on the task of developing. It has already been discussed in some detail (\*), so there is no point in going over it again. The second was that of Jouanolou in 1969, which marked the burial of the formalism of A-adic cohomology, from the point of view (obviously crucial for the six operations) of derived and triangulated categories (for which Verdier was supposed to provide the basic reference). The third was Deligne's thesis in 1970 (?), a brilliant thesis if ever there was one, and also deeply rooted in the ideas that he got from me (\*\*), without my name even being mentioned! The fourth is Saavedra's thesis, which has just been discussed at length, where

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(\*) On this subject, see in particular the notes "Thèse à crédit et assurance tous risques" and "Gloire à gogo - ou l'ambiguïté" (n° s 81, 170 (ii)).

(\*\*) This is Deligne's work "Hodge Theory II". I give details of the roots of this work in the yoga of motives and in my vision of "coefficient theories" (including a theory of "Hodge coefficients"), in the note "Dotting the I's" (n° 164), in particular pages 739-740, as well as the sub-note n° 164 (p. 805-806). Like M. Raynaud and C. Contou-Carrer. e, Deligne chose the topics he wanted to work on, and in particular the one for his thesis, without waiting for me to suggest one, and has continued this work of

another than the presumed author (\*\*\*) exposes, with the technical mastery we know him for, the ideas and results of a third on the motivic Galois group (via a complete theory of the so-called "Tannakian" categories, and of four 1s) without making any allusion to my modest and late person!

These four burial operations (which prelude the capitalized 'Four Operations' 1) are visibly linked in many ways (\*). They follow each other in the space of less than five years, beginning the very year after the end of the SGA 5 seminar. This seminar seems to have been the starting point and rallying point for the fossilising dispositions in my former students, and this long before I left! That these predate my departure is a remarkable circumstance, concerning this 'second plane' of the Burial formed by all my ex-pupils 'before' - a circumstance that I have not yet really been able to integrate into an overall understanding. It's this 'second plan' that, at the moment, seems to me to be the least well understood of the three. But now is not the time to start thinking about it again. No doubt the coming months will bring me many new elements, from my former students themselves. At that point, it will be time to assemble them into a living picture of the 'second plan'.

There is a fifth thesis (\*\*) which for me is part of the series of theses- Burial, but a thesis 'after', and even ten years after the previous series. It's Contou-Carrère's, written in December 1982, and special in more ways than one. It differs from the four previous ones in that Contou-

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entirely independently, without even telling me about it until it was practically completed. This does not alter the fact that his work (on mixed Hodge structures) is more deeply rooted in my ideas than is the case with Raynaud and Contou-Carrère, who mainly use the language and techniques that I contributed, whereas the problematic pursued by each of them is entirely original.

It's true that (depending on which way the wind is blowing these days) ideas can blow in the wind, especially if they're not published out of hand (as Serre has just peremptorily explained to me, just a few days ago). ...

(\*\*\*) at least that's the conviction I arrived at in the penultimate note "Monsieur Verdoux - ou le cavalier servant" (n° 1765).

(\*) It would of course be interesting to explore these links further - but as I say a few lines further on, now is not the time.

(\*\*) Out of a total of fourteen theses, written by the fourteen students (both 'before' and 'after') who have worked with me on a state doctorate thesis. So that's more than *one out of every three theses that I've worked on* - which isn't bad at all!

Carrère, in order to please the people who count and to be forgiven for having been more or less my pupil, did not spare him from Verdier (whom he had thought it wise to choose as his thesis supervisor (\*\*\*)) unexpectedly pretending to 'sink' him without warning.

- Whereupon, for want of anything better, he fell back on me again. It wasn't necessary for me to act as thesis supervisor, given that Contou-Carrère had found his theme and developed his methods on his own, and that I hadn't followed his work, and that it was set in a context (that of schemes in reductive groups) that I'd somewhat lost sight of. Nevertheless, the initial idea of his work, namely a certain method of resolving "equivariant" singularities for the adhesions of Schubert cycles, was directly inspired by an idea that I had explained to him in detail (around 1975 or 76), concerning a resolution of the canonical and simultaneous singularities of the adhesions of orbits, for the adjoint representation of a reductive group on itself (\*). Needless to say, Contou-Carrère, who has long since sensed how the wind blows in the beautiful world to which he has the legitimate desire to accede, does not breathe a word about this filiation. Where would we go if we were to mention again such imponderables as an *idea* (not yet published), supposedly *sparking off* another (or asking you for a bit...) - except, of course, when the person we are honouring ourselves with quoting is one of those whose name enhances the brilliance of the work presented

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(\*\*\*) At a time, moreover, when I still believed (according to what Contou-Carrère himself assured me) that I was his official thesis director. I didn't learn of the existence of a 'parallel' thesis director (in a pair where I was supposed to be the 'back-up' thesis director, just in case...) until Contou-Carrère was obliged to fall back on me, and at the same time (given the situation, which had become a bit too shitty) to reveal to me the role played by Verdier. It's not surprising that, with such incredible shenanigans going on over the years, Contou-Carrère ended up practically ceasing to do maths any more. It has to be said that he's not the only one. ...

(\*) Towards the end of the 1960s, I was intrigued by Brieskorn's fine work on singularities. (surface) singularities, and their links to certain systems of simple roots (those where the roots are all of the same length), and I had asked myself the (absurd, needless to say) question of finding a direct description of a rational singularity, in terms of the simple algebraic group corresponding to its diagram of rootsThat's how I arrived at a very simple (and even obvious, to say the least) geometric description of the resolution of the singularities in question, using Killing couples, with a whole set of conjectures at the end that I've since forgotten a bit, and that I told in the past to anyone who would listen. But as I haven't published anything, and according to the new axioms that Serre has just kindly explained to me, it's the first one to pick up the prize that gets awarded - and I've noticed that there are some who pick up a lot like that, of course. It's very useful sometimes to change axioms...

(In which case, moreover, it is entirely superfluous to specify why we are thanking him, which can only be justified...).

END OF THE "FOUR OPERATIONS (ON A CORPSE)".

(<sup>176</sup><sup>✉</sup>) (25 March) Last night, I spent several hours in bed getting back into the swing of "pattern yoga", instead of falling asleep peacefully as I should. And then again, instead of going back to my notes, I spent another hour or two scribbling down diagrams of implications for the intrinsic conditions known to me on a class of De Rham cohomology (of a non-singular projective variety over a zero-square body, say) for it to be "algebraic". All in all, I found *twelve* variants of the Hodge and Tate conjectures (\*). At the same time, I was able to convince myself that we should have more or less what we need to define "the" (triangulated) category of motives

on a finite-type scheme over  $\mathbb{Z}$ , or at least a very tight approximation of it (at (assuming that it is not yet the right one), provided that we have a theory of the "mysterious functor", which I postulated towards the end of the 1960s (\*\*).

This is not the place to dwell on this subject, of course. But I do feel that now is as good a time as any, given the lamentable state of neglect in which I see the motivic theme fifteen years after leaving it in dubious hands, to sketch out some of the main ideas I had arrived at a short while ago. I don't have the heart to wait any longer, the time to find the leisure (once "A la Poursuite des Champs" has been completed) to write "*the*" systematic book that should be written; this detailed account of a *dream*, as the first major step towards making the dream take hold.

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(\*) (27 March) Each of these twelve variants should give rise, for any basic pattern of null characteristic  $X$ , to a "category of coefficients" of a corresponding type on  $X$  (where the notion of "type of coefficients" is that discussed in the note "Melody at the tomb - or sufficiency", n° 167). If the conjecture envisaged is true, this category of coefficients should contain that of the patterns on  $X$  as a full (triangulated) sub-category (the conjecture being none other than this same assertion, in the particular case where  $X$  is the spectrum of a body...). For more details, I refer you to the part of volume 3 of the Réflexions that will be devoted to the theory of motives ("Motives, my loves").

This also means that these twelve variants of well-known conjectures give rise to as many different notions (a priori at least) of a notion of 'pattern' over a body of zero characteristic. In future, this will allow eleven of my friend Pierre's emulators to 'discover' their own notion of pattern, while pretending to ignore those of the others and especially (as has been the custom for the last fifteen years...) a certain deceased (known above all for his predilection for useless details...).

(\*\*) This question of the "mysterious functor", establishing the "missing link" between cohomology crystalline in *p-square* (via the notion of filtered  $F$ -crystal,  $F$  as "Frobenius"), and  $p$ -adic cohomology in null square, a question which is obviously crucial for our understanding of the cohomology of algebraic varieties, has still not been seriously addressed, almost twenty years after I raised it in the clearest terms.

...

in the soil of carefully matured (and published...) formulations, and let it blossom according to its own nature. In addition to a first milestone already planned and announced for this book of 'mathematical fiction', namely a sketch of the algebraic formalism of duality known as the 'six operations', I shall therefore be attaching to volume 3 of the Réflexions (\*) a short work in which I intend to pose some crucial questions relating to algebraic motives and cycles. I was sorry to see them rot in a tomb, and I can't wait to see them come back into the light of day and once again take part in the rhythm of the seasons... .

It's been more than five weeks since my thoughts returned to L'Enterrement, and they've stayed with me ever since. This is no doubt why the thought of 'orphans', left to fend for themselves in a sick world, has recently come back to me with some insistence. The last note in which one of these orphans is mentioned in detail is "La mélodie au tombeau - ou la suffisance" (n° 167), on a theme very close to that of the motivic reflection of last night and earlier (which I have just mentioned). That was a month ago to the day, the day before I was to embark (without yet suspecting what was in store for me) on a note to be called (it had already been decided in advance) 'The Four Operations'. In the end, it turned out to be sixteen notes instead of one, I thought I'd never get round to it - but I did, in fact, get round to it, all those long-winded 'operations' (\*\*)!

And right now I want to get back to these orphans, to at least call each of them by their name, it might do them some good, and it will certainly do me some good. The first time I spoke about them was a year ago, in the note of that very name, 'My orphans', from the end of March last year, in a breath with the note that follows it, 'Refus d'un héritage - ou le prix d'une contradiction' (notes n° s 46, 47). When I wrote these notes and gave them these names, as if guided by an obscure prescience, I still had no idea of the extent to which the things I had left behind had indeed been orphans - in a stronger and more poignant sense than I could have imagined even in a dream; nor of the extent of this 'contradiction', of which I had been aware for so long.

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(\*) As my publication plans currently stand, the first four parts of Harvest and Sowing (ending with the third and final part of Burial) are to form volumes 1 and 2 of Reflections. Volume 3 will consist of the fifth part of R and S (reading notes on C. G. Jung's autobiography) and a number of shorter texts, most of which were announced in the Introduction. The first volume of 'A la Poursuite des Champs' is therefore planned as the fourth volume of the Réflexions.

(\*\*) (9 May) Barely two weeks after I wrote these lines, new facts emerged at the last minute, are relaunching the 'four operations' survey, which has already been expanded by a good twenty new notes and sub-notes!

I made an initial, tentative observation. And this memory immediately reminds me of another, from the month before, when I saw myself writing, as if it were someone else, more penetrating than me, writing through my hand: "*you can't fight corruption*". It was while writing the section "The world without love" (n° 19). I still remember that when I saw the word "*corruption*" in black and white, I was initially taken aback. Some 'reasonable' person in me scolded me: really, you're not using the spoon - 'corruption' is a big word, don't kid yourself! You'd better change your tune!

I must have thought about it for a few moments, maybe minutes. Then I knew I wasn't going to change that 'big' word, nor was I going to add a note to explain that the word had escaped me in the rush of the pen, and that I shouldn't take it too seriously. Someone deep inside me, more perceptive than the 'me' who decides on 'reasonable' labels, knew what these 'whiffs' of this world that had come back to me here and there meant, even before I had taken the trouble to try and recount them to myself (\*) . .

I also remember well the precise moment when the reflection of that day suddenly changed quality, when this *other* in me took over to write, it was just after evoking the affectionate warmth that had surrounded my first years in the mathematical world, thanks to the welcome I had received from my elders, and even from their families: the Schwartzes, the Dieudonné, the Godement... The change comes when I continue with "Obviously, for many young mathematicians today, it is being cut off... from any current of affection, of warmth... that clips the wings of work and deprives it of a deeper meaning than that of a dull and uncertain livelihood...". - and when, at the same time, this *world without love* suddenly appeared and came to life before my eyes, once again calling out to me...

Last year, without having to look for it, I came up with the name 'my orphans', for what I had left behind when I left (declared 'dead' by the relatives to whom I had entrusted them... ). It's probably because this name expressed a simple and tangible *reality*: what I had 'left' or 'entrusted' were not 'objects' or 'property', but *living things*. When I think of them, I always think of them as living things, vigorous and fertile, made to grow, to blossom and to conceive and engender other things.

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(\*) I give an account of this, first in March last year in the section 'The note - or the new ethic' n° 33), then two months later, after the discovery of the Burial, in the much more circumstantial set of notes forming Cortège X or 'Funeral Van' (in the company of the Gravedigger), notes 93-97.

alive, vigorous and fruitful. If I do have a feeling of 'wealth' that I have left behind, it is not the wealth of the banker, but that of the gardener, or that of the bricklayer, whose hands have created these exuberant gardens and spacious, welcoming houses. This feeling of something precious (even fragile) links me above all to the *notions*, the *questions*, the *great themes* that I know are fruitful, and that I had left in younger hands - things that still need work and care; much more than to the finely-tuned tools that I had fashioned, or the 'houses' that I had finished building and fitting out (\*). Others than myself will be busy cooking and lounging about as they please; if one turns out to be too small, they will enlarge it to suit their needs, just as I myself have often had to enlarge and enlarge again, in places where it had once seemed that I was 'thinking big'. But it's through *what remains unfinished*, through the building sites that had just started on splendid sites and with these beautiful stones (and already the workmen have left, having taken away what they liked and damaged the rest. . . .) - it's through this that we can see the future. ) - this is where my past as a mathematician continues to have a hold on me. It is these abandoned *building sites*, which I now find looted and dilapidated, that I would now like to review.

(<sup>177</sup>) (27 March) Yesterday was taken up with housekeeping. I had to reread the first fifty pages of the third and final part of L'Enterrement, and hand them over for typing. It took me no less than five hours, with a few minor adjustments of expression here and there, and a few more footnotes. The typing for 'The key to yin and yang' is just about finished. After the unbelievable trouble I had with the typing of that part (\*\*), I ended up using the services of a secretary at the University, who does the work outside her official job. My troubles are over. Thank goodness

- she does a conscientious and efficient job, about thirty impec pages a week. We'll get there in the end. It's about time we did!

Apart from that, the question of a shaped construction of the triangulated category of patterns on a finite type scheme based on the absolute Z kept running through my head - I still spent most of the night thinking about it in bed, instead of sleeping - watch out! It had seemed

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(\*) On the subject of the impulse within me to "build houses" (mathematics), see the note "Yin the servant, and the new masters" (n° 135).

(\*\*) On the subject of these "troubles" (to put it mildly), see the beginning of the note "Prayer and conflict" (n° 161), as well as those in the note "Jung - or the cycle of 'evil' and 'good'", which opens the fifth and final part of Harvest and Sowing.

first of all that the idea I had would only work for schemes of zero characteristic (of finite type over the field  $\mathbb{Q}$ , let's say), already on the basis of  $\text{Spec } \mathbb{Z}$  itself it didn't seem to work. Then I remembered that I had determined in principle the structure of the category of patterns on a finite body, in the sixties. Assuming that I had clarified the work I had done then, I finally see the principle appearing of at least a complete description in the general case, rather screwed up it must be said, but by no means unapproachable it seems to me. The only new ingredient compared to my ideas of the sixties is Mebkhout's philosophy, expressed in his 'theorem of the good God' of strange memory. Apart from that, I use the theory of the "mysterious functor" as a hypothetical ingredient. If this is not available now, it is certainly not because it is 'unaffordable' (to use an expression I have already encountered (\*)), but because the people I have known to work on the cohomology of algebraic varieties have lost, even in mathematics, the sense of essential things, being too absorbed by a funeral that requires all their care...

To be fair, Deligne's work on Weil's conjectures, in "Weil I" and especially "Weil II", will surely come in handy when it comes to constructing the six operations on the categories of coefficients that are supposed to express the motives. The fact remains, however, that it took a 'confused' and crumbling defunct to have the idea, after fifteen years, of getting out of the padded coffin in which his dear pupils and heirs had taken to assigning him, a man who knew nothing and who had forgotten as much as to say what little he had known, so that the problem of the description of the category of motifs above a basic pattern  $S$  *could* only be *posed* in full, and at the same time and as if by chance, so that the principle at least of a construction in form that takes into account all the known structural elements associated with a motif) could finally be clearly explained (\*).

After the "memorable volume" of 1982 on motifs, it would seem that the "magot motifs",

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(\*) This is the peremptory term with which my brilliant ex-student Deligne liked to bury the 'standard conjectures' - which, as a result, none of my bold contemporaries dared to tackle for almost twenty years! For a full quotation, see the note "L'Éloge Funèbre (1) - ou les compliments" (n° 104).

(\*) As I announced in yesterday's reflection, I'm thinking of including this description in the volume next in the Reflections, with a (very brief) overall sketch of the 'vast array of motifs' - judging that the trickery of occult motifs has gone on long enough. I would like to point out right now that the principle of construction envisaged does not depend on any kind of conjecture about algebraic cycles, such as 'Hodge' or 'Tate' (or one of the twelve variants mentioned yesterday).

which for ten or twelve years had been the reserved and secret domain of one person, has become a common hoard for three or four, who communicate with each other with the air of conspirators, or like Grand Initiates of some secret and ultra-selective sect, it takes only a few days to put a few simple questions in black and white and submit them for everyone's attention, and a few weeks if you want to define them with some care, clearly indicating which ingredients you have, and which others need to be developed. If, in the fifteen years since 1970, and in the three years since the "memorable volume", neither one of them, first of all, nor any of the few afterwards, has wanted to take these few days of their admittedly precious time, let alone weeks, it is surely for excellent reasons, which none of them has bothered to fathom. But this atmosphere which they like to maintain, and this spirit in which they keep themselves, are in themselves already a degradation of an adventure of discovery, which has become a simple means of elevating themselves above others, if not of despising them. Such an atmosphere is likely to spread corruption, and it is the antithesis of creation, even though those who indulge in it would be the most brilliant of geniuses. By remaining in such a state of mind - that of the avaricious man who hoards his treasures - they cut themselves off from the creative force within themselves, just as they take pleasure in stifling it in others.

(<sup>178</sup>) (30 March) The day before yesterday was my fifty-seventh birthday, and I took a bit of a break. I just did a bit of typing for the end of "The Key to Yin and Yang", which I continued yesterday. It's a relaxing and pleasant job - provided, at least, that the person doing the typing also puts some effort into it, and that a text in which I put all my effort doesn't come back disfigured. In this case, I treated myself to a two-day recreation, carefully rereading about fifty pages on the net, to detect here and there another comma that's out of place. ...

My work energy is not at its zenith. For weeks now, a sadness inside me has been warning me that there are more essential things awaiting me than bringing these notes I'm writing to their natural end. I'm writing as if against the current, and yet I know that, barring accidents and force majeure, I won't stop until I've finally put the finishing touches to Burial. But the fact of compressing and exiling this sadness, which is now as heavy as a stone, of not giving it a voice in these notes (except allusively and in passing at this very moment), is a pretty clear sign that since

For some time now, my thoughts have no longer had the quality of 'meditation'. It's part of the division between the person who writes (without stopping to put his whole self into it (\*)!), and the person who lives and feels (without stopping, however, to 'reflect' on what he's experiencing and become impregnated with its meaning). I feel that it's high time to reach this 'final point' (without rushing through what little remains to be seen and said. . . ), and to return to myself...

As well as working on the notes, there's something else that's been distracting me these last few days, and that's the resumption, as if in spite of myself, of mathematical reflection. In the last few days I've realised that a theory of motifs, with all the scope I saw for it twenty years ago, is by no means as far 'on the horizon' as I had thought. It could even be that a 'fully adult' theory, with the complete formalism of the six operations (plus biduality), is only a matter of a few years' work, for someone who puts all his energy into it (without degrading his creative energy by fossicking). It also seems to me that there are two 'keys' (\*\*) to the explicit description of 'the' cate-

theory of patterns on a scheme, let's say of finite type on the absolute basis  $\mathbb{Z}$  (a case in which we should

(\*) And yet, in the previous paragraph I have just written (without any inner reservations) that I 'put all my energy' into the texts I entrusted to the typesetter. Just goes to show that the same words (or almost the same words...), depending on the context, can have a different meaning or indicate a different nuance.

(\*\*) There is, however, a third "key", which I am not mentioning here because the problem in question seems to me (rightly or wrongly) less tricky. It concerns the correct definition of the "De Rham-Mebkhout coefficients" (initially without filtrations or  $F$ -structures) above, say, a smooth scheme on the absolute basis  $\mathbb{Z}$ . This definition should also provide the key to 'the' correct definition of the general crystalline coefficients for  $p > 0$ , which my dear ex-students (led by Berthelot this time) have still not been able or willing to find.

When, in June '83 (two years ago) Mebkhout was explaining to me his 'philosophy' around the theorem of the good God, I had the impression that his 'purely algebraic' description (of the 'De Rham' type) for the category of constructible discrete coefficients (over  $\mathbb{C}$ ) of a smooth scheme over the field  $\mathbb{C}$  of complexes. This was a dual of the approach (never published) followed by Deligne in the seminar (already mentioned elsewhere) he gave at the IHES in 1969/70 (unless I'm mistaken), using connection promodules. I assume that the transition from one point of view to the other is made by the dualising functor  $\underline{\text{RHom}}(\cdot, \underline{\mathcal{O}_X})$  with respect to the structural bundle of the scheme under consideration, which transforms  $\square_X$ -modules of finite type (which can be considered as " $\underline{\mathcal{O}_X}$ -modules with no consistency") into of an integrable connection) into "pro-coherent" modules (also provided with an integrable connection). The advantage of Mebkhout's point of view is that it provides a simple and deep algebraic expression ( $M$  - consistency, holonomy, regularity) for the "good coefficients", which Deligne lacked. The advantage of Deligne's point of view is that it provides an equivalence (instead of an anti-equivalence) with the

transcendental coefficients that need to be expressed, and that it lends itself better to the expression of the multiplica- structure.

can always be reduced). On the one hand, there is the theory of the "mysterious functor", with sufficient generality and flexibility to move on to the appropriate triangulated categories, making it possible to link De Rham - Mebkhout coefficients and ordinary  $p$ -adic coefficients (in null form). On the other hand, there is the question of the explicit construction of the category of motives over a *finite* field  $k$  (by a "purely algebraic" construction, preferably, without reference to algebraic geometry over  $k$ ), and moreover, of the "motivic cohomology" functor going from separate schemes of finite type over  $k$  (and to begin with, projective and smooth schemes) to this category. I had constructed the latter to near equivalence, heuristically using Weil's conjectures and those of Tate (\*). I have no doubt that this construction is correct. The work that remains to be done is undoubtedly much more delicate,

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tive (tensor product) for the category of coefficients under consideration. I suspect that in practice, it will often be better to work on both tables at the same time, since they are mutually dual. Deligne's interpretation seems to me to be closer to a direct geometric intuition, via that of a module (or promodule) with an integrable connection. This is expressed in particular by the fact that (if the base field is  $\mathbb{C}$ ) a constructible bundle of Cvectoriels corresponds to a promodule with a unique connection, instead of a complex of such promodules. This is why (to my great regret, as you can guess...) I predict that it is his point of view (which he buried without regret, as if to bury the problem of coefficients bequeathed by the disowned master...) that will be best suited to developing the formalism of the six variances, and as the third key ingredient in the construction of categories of patterns.

(9 May) On this subject, see also the sub-note "and the hindrance", n° 171(viii), *as well as* "The five photos" (n° 171 (ix)). (\*) If I remember correctly, I confined myself at the time to describing the category of semi-simple motifs. A variant

The immediate construction (following the same principle) also gives a plausible candidate for the category of patterns that are not necessarily semi-simple. When I speak here of "motifs", I am in fact referring to "isomotives" or motifs with isogeny. But by using the " $A$ -adic realisation" functors for any prime number  $A$ , we can reconstitute from there the category of not-iso motives (where the Hom will therefore be modules of finite type over  $\mathbb{Z}$ , not over  $\mathbb{Q}$ ).

When I say that my construction made heuristic use of Tate's conjecture, it should not be taken literally. If it is true that there exist (over a finite field, in this case), on a smooth projective scheme, cohomology classes that are "motivic" (in a sense that has yet to be determined) without being "algebraic" (i.e. without coming from algebraic cycles), then there is reason to re-state Tate's conjecture (just like Hodge's conjecture, this time over  $\mathbb{C}$ ) by replacing "algebraic classes" by "motivic classes". Assuming that we do indeed manage (as I suggest below) to define the canonical cohomological functor (and presumed "universal" in a suitable sense) on the category of projective and smooth schemes on the finite field  $k$ , to the category (known as "semi-simple patterns on  $k$ ") already constructed, this will ipso facto provide a definition of  
in the form of cohomology classes which we will call "motivic", such as the elements of  $\text{Hom}(T^i, H^\bullet(X_w))$

(in dimension  $2i$ ), where  $T$  is Tate's object, and  $H_{\text{wor}}^{\bullet}$  is the hypothetical functor considered.

consists in "pinning" this category in terms of the given finite field  $k$ , and above all, in defining the "motivic cohomology" functor, if only on the category of abelian schemes on  $k$  (which should be enough to "pin" the category we are looking for...). This second problem seems to me to be less technical, more directly "geometrical", than that of the mysterious functor. Moreover, it seems to me to be *la* key to a solution of the standard conjectures (\*) and hence also to the irritating questions of completeness that arise in cohomological theory with characteristic  $p > 0$ . For all these reasons, this question has a powerful attraction for me!

This is the third evening that I've gone back to the notes, with the idea of quickly reviewing the themes that seem to me to be the most burning, among those left behind by my students and by everyone else when I left the mathematics scene fifteen years ago (\*\*). This time I'm finally going to do it!

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*Project 1: Topos.* I mention them here mainly for the record, having given a rather detailed account of them in the note "My orphans" (n° 46). Given the disdain with which some of my former students, led by Deligne, have treated this crucial unifying notion, it has been condemned to a marginal existence since I left. As I pointed out in the note cited above, topoi and multiplicities of all kinds are to be found at every step in geometry - but we can of course do without seeing them, just as we did without seeing groups of symmetries, sets or the number zero for thousands of years.

the construction of this functor currently seems to me to be the most crucial question of all, for the actual (and no longer hypothetical as in the sixties) construction of a theory of patterns.

(\*) The term "standard conjecture" is not to be taken literally here, nor is "Tate's conjecture". in the previous b. de p. note. Rather, in the statement of these conjectures, it would be appropriate to broaden the class of cycles considered (initially reduced to algebraic cycles only). In the "definitive" expression of the "readjusted" standard conjectures (and even though they would be valid as they stand), the "algebraic" cohomology classes will still be replaced by "motivic" classes. I'll come back to standard conjectures in more detail, in "Motives, my loves" (in volume 3 of Reflections).

(\*\*) For a very brief overview of these themes, see last year's note "My orphans" (n° 45).

In the first two volumes of SGA 4 (the famous 'gangue de non-sensé' referred to by Deligne in the introduction to the first presentation of the brilliant volume entitled 'SGA 4 1/2'), a flexible and delicate language concerning topos was developed with great care, 'sticking' intimately to topological intuition. This is the natural culmination of the language and intuitions around the notion of 'faisceau' introduced by Leray; this second stage (or 'second breath') in the development of intuition and the 'faisceautic' tool seems to me to be comparable in scope to the first (finding its provisional expression in Godement's well-known book). It was this vision that made the appearance of the cohomological tools -adic and crystalline - possible, before it was buried sine die by the very people who pretended to appropriate these tools.

The developments in SGA 4 about topos do not pretend to be complete and definitive, but I think they are more than sufficient for most immediate geometrical uses of the topocentric view. Like general topology or ordinary fact theory, 'general topocentric topology' does not seem to me to pose any really profound questions of its own. It is a carefully developed language, at the service of a certain extension of the topological and geometrical intuition of forms, which is dictated to us by things themselves. For me, the discredit in which this vision has been held, and the *derision that has been heaped* upon it, are among the great disgraces of the mathematical world of the 70s and 80s.

This is not a "dilapidated building site" that needs to be brought back to life, but a fully completed and installed house that those who lived there and were called to make it a place to work and live have chosen to leave, by firing the worker who built it. The house is spacious and healthy, and everything is in its place, just as it was the day the workman left to go about his business. If it needs anything, it's not the work of his hands, or anyone else's. Perhaps the worker's own act of respect, for the things that his hands have made with love and that he knows to be beautiful, will dissipate the fumes of violence and contempt, and make welcoming again what was made to welcome.

*Project 2: Cohomological language.* This involved firstly the language of derived categories, and secondly the points of view that I had introduced for non-commutative cohomology, both in the second half of the 1950s.

The first current was supposed to be the subject of Verdier's famous "thesis", and Verdier's own burial of his thesis (\*) was at the same time the burial of the point of view of derived categories in homological algebra. Verdier had played a crucial role in the flowering of the cohomological theme in algebraic geometry in the 1960s, particularly with regard to the duality formalism and the development of fixed point formulae (of the Lefschetz-Verdier type). Practical needs had revealed the inadequacy of the framework of triangulated categories developed by Verdier in the early 1960s, a framework that has not always been renewed as it should have been.

On the current "non-commutative" side, we have a good basic work with Giraud's thesis, but this is limited to a 1-field formalism, lending itself to a direct geometric expression of cohomological objects up to dimension 2 only. The question of developing a non-commutative cohomological formalism in terms of n-fields and n-gerbes, urgently suggested by many examples, ran up against serious conceptual difficulties. Given the disaffection or, to put it better, the general contempt into which questions of foundations have fallen in a certain beau monde, these difficulties were never tackled until I got to grips with them a little over two years ago (\*\*).

I now see the two currents coming together in a new discipline, which I have proposed elsewhere (\*) to call *topological algebra*, a synthesis of traditional homological algebra (in the style of derived categories, of course), homotopic algebra, the formalism (still in limbo) of *n-categories*, *n-groupoids* and idiosyncratic fields and sheaves, and finally the vision of topos, which now provides the most "purely algebraic" framework.

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(\*) On this subject, see the note "Thèse à crédit et assurance tous risques" (n° 81), and "Gloire a gogo - ou l'ambiguïté" (n° 170(ii)).

(\*\*) This is the reflection in my letter to Daniel Quillen of February 1983, in which I discovered how to "jump with both feet" above the gaping "purgatory" of increasingly tightly screwed compatibility relations, which seem to be creeping into the description in the form of n-categories (not strict, or n-fields as I now call them), for increasing  $n$ . *The case of  $n = 2$  is already no easy matter, and nobody, I believe, has yet found the courage to explain all of them for  $n = 3$ .* The case of  $n = 2$  is already no picnic, and nobody, I believe, has yet found the courage to explain them all for  $n = 3$ . This letter became (as I'll remind you below) the 'kick-off' for the long journey 'In Pursuit of the Fields', which began the following month on the basis of the thinking that had begun.

This letter was not deemed worthy of being read by the addressee, nor of receiving a reply. I eventually received a comment from the person concerned more than a year later, on which I comment in the section 'The weight of a past' (n° 50). (Cf. p. 136, second paragraph).

(\*) See sub-note no. 136<sub>1</sub> to the note "Yin the Servant - or generosity" (especially p. 638).

The initial ideas for such a synthesis had already been brought together in the 1960s. The initial ideas for such a synthesis were already in place in the 1960s, including that of the *derivateur*, which was to replace the inadequate notion of a triangulated category, and which also applied to "non-additive" contexts. Certain important developments in homotopic algebra, such as the notions of homotopic limits and colimits developed by Bousfield and Kan in the early seventies without their being aware of my ideas (treated as Grothendieckian bombinages by my dear students), are in line with them,

Two years ago, I began to sketch out a blueprint for the work I see ahead, with my letter to Daniel Quillen (\*\*). This was the starting point for writing 'A la Poursuite des Champs', the first volume of which ('Histoire de Modèles') is practically finished, and will probably appear as volume 4 in Réflexions. I anticipate that it will take me another volume, if not two, and one or two years of work, to complete this preliminary exploration of an extremely rich substance, which twenty years on I still seem to be the only one to grasp, so this is indeed a project that has been abandoned for some fifteen years, but which has come back to life under my hands for almost a year. The writing of *Esquisse d'un Programme*, followed by *Récoltes et Semailles*, interrupted this work, which I nevertheless intend to resume and bring to a successful conclusion, as soon as I have finished writing *R. et S.* and the texts (all of limited size) which, with the last part of *R. et S.*, are to make up volume 3 of Réflexions.

*Project 3: Six operations, biduality.* This is the point of view that I introduced into the duality formalism a la Poincaré or a la Serre, with discrete or continuous coefficients. The name 'six operations' that I introduced has been carefully eradicated by my cohomologist students. They confine themselves to using here and there those that suit them, while writing off the structure that they form as a whole (with the biduality formalism), and above all, the irreplaceable thread that the point of view provides (in particular for defining good "categories of coefficients", cf. below). In the more than twenty years that this formalism has existed and proved its worth, no one who has been 'in the know' has taken the trouble (except in papers intended to remain secret and of which I have no knowledge) to identify the algebraic 'form' common to the many situations in which such a 'catch-all' duality is available, expressed in a formalism of six operations

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(\*\*) On the subject of this letter, see in particular the section entitled "The weight of a past" (n° 50, page 136, 2nd paragraph).

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It's clear that this is not strictly speaking a 'derelict site' (since The work of formalisation to be done here is derisory), but rather of a fertile point of view systematically avoided (as was that of topos). This abandonment has undoubtedly had a lot to do with the lamentable state of stagnation that I observe (with a few exceptions (\*\*)) on the subject of the cohomology of algebraic varieties, especially in comparison with the vigorous development that I had given it between 1955 and 1970.

As I already announced in the Introduction (I 8, 'The end of a secret'), following Harvest and Sow (\*\*\*)<sup>1</sup>, I intend to include a short sketch of the essential features of the 'six operations' formalism. Thanks to the care of my students, its very existence is now unknown to all, with the sole exception of those who were directly involved in one or other of the two seminars SGA 4 (1963/64) and SGA 5 (1965/66)<sup>2</sup> (\*), and who have obviously forgotten it. In this way I will have done what I can to restore to favour (if there are workers on the lookout for good tools) a perfectly effective tool, and a fruitful point of view which, in the cohomological theme, constantly leads us straight to the crucial problems.

The three abandoned 'building sites' (or houses, or tools...) that I have just reviewed are more concerned with a common *algebraic language* for expressing the most diverse geometric situations, than with a particular geometric situation, such as cohesion.

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(\*) (9 May) In one of the first lectures of SGA 5, I had taken great care to explain at length this form, which was to be like the driving nerve of the whole seminar to come, this lecture, the most crucial of all in SGA 5, has disappeared from the massacre edition. There is no trace of any allusion to its existence in the whole of volume 1. See b. de p. (\*) page 942 in the note "The ancestor" (n° 171(i)).

(\*\*) The "few exceptions" are mainly (before 1981) the two important works Weil I, II by Deligne, and some sporadic results in crystalline cohomology, and in Dieudonné theory of Barsotti-Tate groups on general bases of car.  $p > 0$  (which I had initiated around 1969). As I have pointed out elsewhere, there has been a revival in the wake of the theorem of the good God - Mebkhout (one still as ignored as the other...), in particular with the theory of Mebkhout beams (wrongly called 'perverse' instead of 'right'...), developed by Deligne et al.

(\*\*\*) I would remind you that this is volume 3 of the Reflections, which in principle also contains the last part of Harvesting and sowing.

(\*) These are also the two seminars, as if by chance, that the text which presents itself as "central" and is called (oh irony!) "SGA 4 1/2" recommends above all not to read. ...

(29 May) For the scope of the vision of the six operations, see the note "Unnecessary details... . "(n° 170 (v)), part (b) ("Machines for doing nothing. . .")

mology of algebraic varieties. If in the second area, the one I call 'topological algebra', I sometimes come across questions that are undoubtedly profound (such as those linked to the homotopy groups of spheres), it is by accident, and not by deliberate design. My main motivation, again, was and remains that of developing algebraic tools of sufficient generality and flexibility for the development of this *arithmetical geometry* still in its infancy, which I have spent fifteen long, good years of my life carrying, giving birth to and nurturing, starting from the embryo that was Weil's conjectures. It is in this geometry that we find the geometrical substance itself, which for all these years has been at the very heart of my love affair with mathematics, and remains so today. It is this substance that will now be discussed in the three 'most burning' themes that I have yet to review.

*Area 4: "the problem of coefficients".* This problem was already present in the very formulation of Weil's conjectures (\*\*). It was at the centre of my interest in cohomology throughout the 1960s. It was clearly stated, with all the necessary generality and precision, for the main types of coefficients then glimpsed (\*\*\*)�. I discuss this problem, which is obviously crucial to an understanding of the cohomology of algebraic varieties, in my first return to my work and the act of respect that is the note "My orphans" (no.° 46), and I return to this subject in the note "Melody at the tomb - or sufficiency" (no.° 167). There are two essential threads: on the one hand, the formalism of the six operations and biduality, which we have just been discussing. On the other hand, the need to find adequate generalisations, above a more or less general basic scheme, of the types of "coefficients" already known above a basic field, which intervene (even if only tacitly) in the description of the cohomological functors already known on the category of projective and smooth schemes on this field: A-adic cohomology, crystalline, de Rham, or finally (when  $k = C$ , field of complexes) Betti cohomology or Hodge.

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(\*\*) On this subject, see the beginning of the note "Les manœuvres" (n° 169), where I comment on the initial problem of Weil's conjectures.

(29 May) This beginning became a note entitled "The context of Weil's conjectures" (n° 169 (i)).

(\*\*\*) It does not seem that any new types of coefficients have appeared, compared with those I predicted in the second half of the 1960s.

I don't think it would be an exaggeration to say that this problem contains in germ (\*), both the "Hodge-Deligne theory" "in full maturity" which is still waiting to emerge, and the "De Rham-Mebkhout theory of coefficients" which is also waiting (\*\*); and it is for one and the same reason that both theories are still in their infancy, instead of the mature state that the theory of A-adic coefficients (for A prime with respect to characteristics) had acquired in a year or two: it is the eagerness of my co-mological students, led by Deligne, to bury the problematic bequeathed by the master, at the same time as the master himself.

However fragmentary the steps taken by Deligne on the one hand (with all the facilities of the spoilt child of science), and by Mebkhout on the other (in the most complete isolation imposed on him by those best placed to welcome him), they nonetheless provide valuable guidelines for identifying certain crucial categories of coefficients. These important contributions were present in rt; one mind while writing the note already quoted "La mélodie au tombeau". Since then, I have

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(\*) In making this observation, I have no intention of minimising the originality or importance of Deligne's and Mebkhout's contributions, any more than I intend to diminish the originality and importance of my own contribution to the birth and initial impetus of arithmetical geometry, by noting that it 'was already in germ' in Weil's conjectures.

(\*\*) It can be said, more or less, that the contributions in question by Deligne first (around 1969) and of Mebkhout then (after 1975) answer the problem of defining suitable "De Rham coefficients" (which would make it possible to insert the ordinary De Rham cohomology of smooth schemes, in a formalism of the six variances), in two very different directions. Deligne defines a "good" category of coefficients over the scheme  $\text{Spec}(\mathbb{C})$  only, and the functors  $Rf_!, Rf_*$  in the case of the structural morphism  $X \rightarrow \text{Spec}(\mathbb{C})$  of a. separate scheme of finite type on , and for constant coefficients (alas!) on  $X$ . Mebkhout defines a "good" category of coefficients, valid in principle for any separate  $X$  of finite type over a field of zero characteristic  $K$  - but he does not go so far as to define functors  $Rf_!$  and  $Rf_*$  for a morphism  $f: X \rightarrow Y$  of such schemes over  $K$ , and to develop a duality theorem for  $Rf_!$  and  $L f^*$  (except for  $Y = \text{Spec}(K)$  - and even then, only in the transcendental context, undoubtedly much more difficult, of complex analytic varieties). Another limitation of the theory developed so far by Mebkhout (in an atmosphere that could not be more discouraging, it has to be said) is that it is now only done for smooth  $X$  (for want, I presume, of systematically using the crystalline point of view, which provides a satisfactory substitute for the bundle of rings of differential operators, so convenient in the smooth case).

For desolate sites, these are desolate sites 1 they speak eloquently of the systematic disaffection of my ex-students (and of those marked by the ascendancy that they can exercise) with regard to the main ideas that I had introduced, and developed in certain directions, during the sixties.

I plunged a little deeper into the 'yoga coefficients and motifs' that had already emerged in the sixties, and I now have a more precise and complete picture. I also plan to return to the problem of coefficients (and that of patterns at the same time) in volume 3 of *Reflections*, following the sketch of the formalism of the six variances.

Suffice it to say that I see essentially three types of fundamental coefficients (\*), on a more or less arbitrary base  $X$ ; the *A-adique* coefficients (any prime number, the *De Rham-Mebkhout* coefficients (\*\*)) (interesting

especially for  $X$  of finite type over a basic scheme  $S$ , the most important cases being those where  $S$  is the spectrum of the rings  $\mathbb{Z}$ ,  $\mathbb{Q}$ , or  $\mathbb{C}$ ), and finally the Betti coefficients (for  $X$  of finite type over  $\mathbb{C}$ ). Only the third of these categories seems to me to be determined at present without any

hypothetical element. In order to define the former (if only for  $X$  of finite type on the absolute basis  $\mathbb{Z}$ ), or to describe its relations with the latter, the existence of a theory of the mysterious functor (which I postulated at the end of the 1960s, a problem which seems to have been solved in the last few years) would have to be considered.

to have sunk with the rest. ...) seems to me to be the crucial ingredient, to which I'll have to return in more detail at a later date.

*Project 5: Motifs.* I have already spoken in some detail about the burial of the motifs by my friend Pierre Deligne, with the blessing of the entire Congregation, so that there is no need to dwell on the subject again here. Instead, I would like to highlight a new fact which has just come to my attention, and which should have come to light fifteen or twenty years ago

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(\*) If I speak of "fundamental" types of coefficients, it is to suggest by this name that all the other important types of coefficients that I can now glimpse must be able to be described in terms of these, either by "combining" them in a suitable way, or by adding suitable structural enrichments, or both, among the structural enrichments envisaged on the De Rham-Mebkhout coefficients, there is (in addition to the "filtration by weights", which seems "internal" to the category of coefficients envisaged), a "De Rham filtration" which plays a leading role in motivic applications. It is possible that this additional structure will only make sense (from the point of view of a six-operation formalism) when combined with a Betti-like "discrete" structure, which should make it possible to formulate the correct properties that this filtration must satisfy. I intend to return to these questions in more detail in "Les motifs mes amours" (in vol. 3 of *Réflexions*).

(\*\*) I would remind you that for this type of De Rham-Mebkhout coefficients, I now see two variants Mebkhout's and Deligne's, which I hesitate to call 'Deligne's', even though he repudiated her!

(29 May) For comments on the repudiated child, see the note ". . and hindrance" (n° 171 (viii)). For details of De Rham's coefficients, see the note "The five pictures (crystals and  $\mathbb{Q}$ -Modules)" n° 171 (ix).

already. Until a month ago, the construction "in form" of the category of patterns on top of a more or less general basic scheme (a scheme of finite type over  $\mathbb{Z}$  let's say, or only over the spectrum of an algebraically closed field. . . ) seemed to me to be something decided-

It's a state of mind that's probably tenaciously inherited from the distant past. This state of mind was undoubtedly a tenacious legacy of the already distant days, when motivic reflection had begun on foundations that could not have been more hypothetical, when the formalism of  $A$ -adic cohomology was not yet available. There is also this 'extenuating circumstance' for me, which is that my tasks of writing foundations for things that were within reach absorbed so much of my energy between 1958 and 1970, that my motivic reflections (and others, on themes that seemed like 'luxuries' compared to my pressing tasks at the time) were constantly reduced to a minimum. Whatever the case, I was left with the impression that the problems of coefficients were the things that were ready to be done straight away (but by others, since I was already busy elsewhere . . . ), while the patterns, for the moment, were just good enough for a 'mathematics-fiction' book, if I'd found the time to write it, surely things would have changed very quickly, if I'd actually started writing it, instead of toiling away on tasks that nobody in the world had the heart to continue, whereas everyone is quite happy to use what I've done... .

In any case, I've come to realise something that's obvious in itself once you get down to it: as long as you take the trouble to describe coefficients that are sufficiently 'fine', i.e. that take into account all the connected structures associated with a pattern, you end up describing *the pattern itself*. Or perhaps more correctly, we end up describing a category, which will contain the (triangulated) category of motives as a *full sub-category* (which is already not bad) - just as the category of motives over the field of complexes appears (if we accept a fairly strong version of Hodge's conjecture) as a full sub-category of the category of Hodge-Deligne structures. As for characterising exactly, in "algebraic" terms directly adapted to the coefficients with which we are working, exactly what this full sub-category *is*, i.e. exactly *which* coefficients "are motives", here we fall into questions that are likely to be much trickier. These are the questions concerning the compatibilities between various geometric-arithmetic structures associated with a pattern (compatibilities which I have made

already alluded to, I think, in the above-mentioned note "La mélodie au tombeau"). The solution to these problems (which seem to me irrelevant to the effective construction of a 'theory of motives') may well be 'a hundred years from now'. In any case, experience shows us again and again that such prognostications (about the more or less 'unworkable' nature of a question) make little sense, except to discourage those whose courage is lacking...

(1 April) A few more comments on the formalism of the '*Galois group* (or *fundamental motivic group*)'. This notion (which I identified and began to develop in 1964, before I had the honour of knowing my future ex-student Pierre Deligne) gives rise to intuitions and a formalism of great precision and finesse. Its existence and its essential features are independent of the particular construction that would have been adopted for the notion of a pattern on a body (or of a 'smooth' pattern on any diagram), as long as this satisfies a few reasonable conditions. I had entrusted Neantro Saavedra with the task of putting into publishable form, in as general a context as possible, the dictionary that I had drawn up around 1964 between, on the one hand, geometry in categories that I called "rigid tensorial" ( $k$ -linear categories with a "ten-soriel product" operation satisfying suitable conditions,  $k$  being here a *body*), and on the other hand the theory of linear representations of pro-algebraic groups over  $k$  (or, more precisely and more generally, of "pro-algebraic sheaves" over  $k$ ). He completed this task in his thesis, published in Lecture Notes in 1972 (LN 265) (\*). I had taken this dictionary further (especially as regards the translation of filtered or graded structures, etc.), but it was not enough.

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(\*) (10 May) Since these lines were written, I have had the opportunity to acquaint myself with the book in question, a copy of which the author had not seen fit to send me. I was able to see that in this book, Saavedra is the brilliant inventor of the new philosophy that is set out in it, faithfully following the notes that I had given him, and without practically mentioning my name (neither for the concepts introduced in this book and for the crucial results, nor for already known concepts such as that of crystal, stratified module or pattern). The very name 'Tannakian category', which he has renamed the main notion, is such a brilliant mystification that he surely did not invent it himself any more than he invented the theory he presents himself as the author of. This 'parternity' has, moreover, been quite provisional, and my friend Pierre has already taken it upon himself, ten years after the publication of the volume, to do what is necessary to ensure that it returns (according to everyone's expectations) to the person already designated for this purpose. For details of this brilliant operation on a corpse (the first and only one on such a scale, before the "SGA 4 1/2- SGA 5" operation carried out in the same imitable style), see the series of notes entitled "The sixth nail in the coffin" (n° s<sub>1761</sub> to 1767).

on certain fibre functors, or that of a notion of "polarisation" associated with a tannakian category), than is done in Saavedra's thesis (\*\*), or in the "memorable vol- ume" LN 900 (where Saavedra's thesis is redone and the notion of motivic Galois group is at the centre of the problem, without my name being more pronounced on this subject than on any other concerning motives).

I would also point out that the first step in the determination (with near equivalence) of the category of motives over a finite field, which was discussed earlier (\*\*\*) , was the determination of the motivic Galois group of the said finite field, which must be commutative (being generated topologically by the Frobenius element), and is in fact an extension of

of  $Z^\wedge$  (generated by Frobenius) by a certain algebraic pro-tore on  $\mathbb{Q}$  (\*). The second step was the description of the element of  $H^2(\mathbb{Q}, T)$  which (according to Giraud's theory) classifies the

$G$ -gerbus of fibre functors (\*\*).

As expressed in the note "Souvenir d'un rêve - ou la naissance des motifs" (n° 51), I came across the motivic Galois group while looking for the link between the  $A$ -adic representations, for variable  $A$ , of a profinite Galois group  $\text{Gal}(K/\bar{K})$  in the  $A$ -adic modules, obtained for example by taking the  $H^i(X_{K,0A}^-)$  where  $X$  is a smooth projective scheme on

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(\*\*) (10 May) This presumption turned out to be wrong. It was due to my conviction that Saavedra would not in any way be able to 'complete' the programme I had indicated to him, even though his mastery of the point of view of 'linear representations of pro-algebraic sheaves' seemed for a long time to be beyond him, and his mathematical baggage was extremely limited. Given Saavedra's far from exceptional means, it is unthinkable to me that in the less than two years between my departure (when he had no notion of cohomology or the structure of algebraic groups) and the publication of the book, he would have had the opportunity to assimilate (and to do so perfectly, as is shown by the way the book is kept) the whole host of notions with which it juggles. On this subject, see the note 'Monsieur Verdoux - ou le cavalier servant' in the aforementioned series of notes 'Le sixième clou au cercueil'.

(\*\*\*) (10 May) I note that this determination, too, appears in Saavedra's inexhaustible book (no allusion to myself, need I say). It uses the cohomological theory of the global class field (determination of the group  $H^2(\mathbb{Q}, T)$ , where  $T$  is a group of multiplicative type on  $\mathbb{Q}$ ) - so this is also one of the things that my ex-student (with apparently superhuman means) would have assimilated in less than two years. ...

(\*) This is the motivic Galois group which classifies the *semi-simple* patterns - To obtain the patterns In the general case, its product must be made by the additive group  $\square_a$  on  $\mathbb{Q}$ .

(\*\*) The crucial point is that this class becomes zero (thanks to the existence of the " $A$ -adic cohomology"

fibre functors) in all places  $A \neq p = \text{car. } k$ , and the existence of the crystalline fibre functor gives us sufficient information about the fate of this class in the missing place  $p$ .

$X$  and  $i$  an integer (or possibly, a suitable submodule thereof). Serre looked at the image of the Galois group in  $\text{Aut}(V(A))$  for all  $A$ , which is a reductive  $A$ -adic Lie group, and it seemed that its structure (in the sense of Lie theory) was independent of  $A$ . It was while looking for the underlying reason for this phenomenon (which is itself still hypothetical to this day), by relating it to Tate's conjectures, that I discovered the notion of motivic Galois group, following on from that of "motive" and "motivic cohomology".

If there was one simple and profound thing that I brought to light, and if there was one creative act in my life as a mathematician, it was the birth of this crucial notion, linking geometry and arithmetic. That's also why, on that memorable 19 April last year, I was suffocated by a feeling of unimaginable *impudence*, seeing this thing appropriated with such superb casualness, like the latest trifle that someone had just improvised in the corner of a technical paragraph: look, it's as stupid as cabbage, all you have to do is apply proposition 4.7.3 of our modest article setting out the theory of Tannakian categories... (\*\*\*)). This is how mathematics is done in the 1980s, after brilliant precedents in the 1970s (\*).

But I'm getting off the subject, all right - I was supposed to be giving a tour of a building site, not sentiment. I'd just like to point out that, as in the case of the profinite fundamental group, if  $X$  is a geometrically connected scheme over a field  $k$ , there is a distinction to be made between the motivic fundamental group of the scheme  $X$  itself and the "*geometric*" motivic fundamental group. The two do not coincide, *even* if  $k$  is algebraically closed, because the motivic fundamental group of  $k$  is not trivial (it is connected, but no more).

!). We must therefore introduce the "*geometric*" motivic fundamental group of  $X$ , which is supposed (among other things) to establish a link between the various  $A$ -adic Lie groups associated (as quotients) with the geometric profinite fundamental group  $\varprojlim_1(X_k)$ . It is defined as the kernel of the natural homomorphism

$$\varprojlim_1^{\text{mot}} \square(X) \rightarrow \varprojlim_1^{\text{mot}} (\text{Spec}(k))$$

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(\*\*\*) As I was writing these lines, it occurred to me to associate them with the very similar way of introducing the definition of the function L with coefficients in an  $A$ -adic bundle, without reference to anyone and as the last of the banalities that the same brilliant author would have just improvised. On this subject, see the sub-note "... and nonsense" (n° 1696) to the note "Manoeuvres" (n° 169), p. 891.

(\*) And even as far back as the 1960s - see the note "L'éviction" (n° 63).

(relating to the choice of a functor-fibre on the category of smooth patterns on  $X$ ).

The point I wanted to make is that this core, which could be described as

${}_{\text{mot}}^{\text{mot}} \square(X/k)$ , should be the first step towards the construction of a "motivic (geometric) homotopy type of  $X$  over  $k$ ", to which I have already alluded in passing earlier (\*\*). The formal description of this "homotopy type" (\*\*\*) , whose "cohomology" should be none other than the motivic cohomology of  $X$ , is part of the interesting conceptual work in perspective on the "motives" task, in a direction decidedly different from (and to a large extent, no doubt independent of) the central task, which is that of the actual construction of the categories of motives and the formalism of the six operations for them.

*Job 6: Standard conjectures.* As I explained in a previous footnote (note (\*) p.1202), these conjectures can be understood in two different senses. First, in the literal sense, as I formulated them at the Bombay Colloquium in 1967 (\*). In this form, they seem to me to summarise the most crucial questions which now arise in the theory of algebraic cycles, at least from the point of view of the so-called "homological" equivalence for these cycles.

When I formulated these conjectures, my main motivation was not, however, directed towards cycles for their own sake, but towards the means they provide (perhaps...) for constructing a theory of semi-simple patterns on a body, satisfying the desiderata that should have been "common knowledge" for fifteen or twenty years (and which nevertheless remain occult...). In volume 3 of the Réflexions, I shall indicate various weakened variants of these conjectures, which would suffice to construct such a theory (and of which the weakest is practically necessary and sufficient for this purpose). As I have already pointed out elsewhere, even though

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(\*\*) In the note "Requiem pour vague squelette" (n° 165).

(\*\*\*) As a type of object, I expect this to be a type of relative homotopy (in the sense of Illusie) in the "extension" topos (in the sense of Giraud) of the topos fpqc of  $\text{Spec}(C)$  associated with the sheaf (on this topos fpqc) of functor-fibres on the category of smooth patterns on  $X$ . The relative cohomology (on the basic topos just described) of this type of homotopy is quasi-coherent (and even "coherent"), and can be identified with the motivic cohomology of  $X$  over  $K$ . Using a complex point of  $X$  (the case where  $K$  has zero square) to have a Betti fibre functor, the corresponding type of homotopy-fibre must be canonically isomorphic to the Q-type of homotopy (neglecting torsion phenomena...) associated by transcendental way with  $X \otimes C$ , at least when  $X \otimes C$  is 1-connected.

(\*) Algebraic Geometry, Bombay 1968, Oxford University Press (1969).

that the conjecture in its initial form would be valid on a given field  $k$  (for  $k$  finite, for example, or even for all  $k$ ), this would not in itself mean that the classes of cohomology that we should call "motivic" (\*\*\*) (and which we can hope will make true various conjectures, of the Hodge and Tate type for example) are necessarily algebraic. If we were to discover one day that there are non-algebraic classes of motivic cohomology, this would probably mean that the importance of algebraic cycles in the theory of motives, i.e. in the arithmetic-geometric study of the cohomology of algebraic varieties, would be less than I had reason to believe at the beginning of the theory. The fact remains that the effective construction of a theory of motives that I now foresee is independent a priori of current conjectures (of the Hodge, Tate, or "standard" type) about algebraic cycles.

This does not prevent the standard conjectures and their variants on the one hand, and those of Hodge, Tate and their many variants on the other, conjectures which involve in particular statements of *existence* of algebraic cycles (i.e. of algebraicity of cohomology classes), or (in modified versions) statements of existence of so-called "motivic" cohomology classes, from being intimately connected to one another, and from being closely linked to one another. of algebraicity of cohomology classes), or (in modified versions) statements of existence of so-called "motivic" cohomology classes, are intimately linked to each other, as well as to the description of the main "types of coefficients", and, in the limit, to that of the category of motives itself (\*).

Here again, the work of decanting, putting things in order and providing information, which needed to be done nearly twenty years ago, has not been done (or, more importantly, made public) by those who preferred to do it themselves.

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(\*\*\*) I think I can propose a reasonable definition of motivic cohomology classes on a smooth projective algebraic variety, at least when the basis field is of characteristic zero. For the general case, the crucial case (discussed above) is that of a finite basis field. Modulo the description of motivic classes in the latter case, I think I can put forward "the" correct definition of motivic classes. Compare with the comments to b. de p. (\*) on page 1202.

(\*) This does not contradict the statement I have just made, namely that the construction I foresee of the category of motives (over a body, let's say) is "independent" (i.e. "technically" or "logically" independent) of the various conjectures considered. These "intimate links" that I am talking about (which mean, for example, that the twelve variants that I have seen to conjectures of the Hodge and d3 Tate type suggest as many different types of cohomological "coefficients") are of a heuristic nature, and not a technical one - just like the link between the (baptized "conjectural") Lefschetz-Verdier formula, and the trace formula for the Frobenius correspondence. In the latter case, this essential heuristic link, which is *not* a link of logical dependence, was duly emphasised in the two sub-notes 'Real maths...', '... and 'nonsense'" (n° s 169<sub>5</sub>, 169<sub>6</sub>) to

the note "Les manœuvres".

to this day still bury fertile ideas (when they are not published) or debunk them (when they are), and reserve for themselves the benefit (immediate) and the credit (later), rather than informing and making available to everyone fascinating issues that are crucial to our understanding of the links between geometry, topology and arithmetic. I see that what is lacking here is by no means competence or even brilliant gifts, but simple honesty, and also a certain *decency* in the relationship with a 'scientific community' that dispenses prestige and power, among those who do not feel bound\* by the slightest obligation, by the slightest 'return' in the form of even the slightest attitude of 'service'. This is why, even though I lost touch with the subject more than fifteen years ago and am no longer 'in the loop' as far as anything is concerned, I am nevertheless going to make the effort to get back into the swing of things with which I was once familiar, at least to do my best, in volume 3 of the Réflexions, to make up for the omissions of those younger and more gifted than myself, and to do in the end what they were not generous enough to do.

La I believe I have come full circle to those 'building sites' which seem to me at present (and already since the moment of my departure from the mathematical scene) to be 'the most burning', with a view to building this 'arithmetical geometry' whose foundations I laid throughout the sixties. In no way do I mean to say that I have summarily covered *all the* substantial questions that perhaps only I can see and that are close to my heart. As far as I know, they are still at the point where I left them when I left the mathematical scene, and many of them have not even had the pleasure of being made explicit in the literature. These include the *discrete Riemann-Roch conjecture* in the schematic framework (\*). There is also the generalisation of the theory *of the local and global geometric class field* into a *duality* statement which is essentially "geometric" in nature (while giving the classical "arithmetic" statements as corollaries). This is discussed in letters to Larry Breen in 1976, reproduced as an appendix to chap. I of 'A la Poursuite des Champs' (which will therefore appear in vol. 4 of Réflexions). In these statements the main work in perspective will be in a careful description of the categories of

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(\*) This conjecture is explained for the first time, it seems, in sub-note n° 87<sub>1</sub> of the suggestively-named note 'The massacre' - since the conjecture is one of the things massacred in SGA 5, which disappeared without even a trace of a *name* in the Illusie edition.

"coefficients" in which we work. An important role is played by a certain au- toduality, discovered by Serre (\*\*), in the category of unipotent algebraic groups to within radical isogeny, above a k-field of car.  $p > 0$  (an autoduality which is still unknown, it seems to me, apart from the handful of people I have told about it). The question of generalising such statements to higher dimensions is (for me at least) a complete mystery (but Milne would have some light in the case of an algebraic superside...).

These questions of duality go back, I believe, to the end of the fifties, when I had also embarked on the construction of a "*Jacobian*" complex (of chains) of proalgebraic groups, associated with a scheme of finite type over a body (to begin with...), in terms of suitable "local Jacobians" associated with these various local rings, in analogy with the "residual" or "dualising" complex that I had constructed a few years earlier in coherent dual- ity. All these questions of duality had been relegated to second place in the sixties, by the tasks of developing the 'nonsense' of stale and A-adic co- homology and the language of topos. A certain part of my programme, relating to relative local and global Jacobians, was completed around 1977 (without any mention of myself) by C. Contou-Carrère, who was quick to pack up in view of the welcome he received from Deligne and Raynaud (\*). Today it takes a certain amount of courage to take up and develop ideas which bear my mark too clearly (although one would do one's best to hide it). The only one who has persisted in doing so is Zoghman Mebkhout, and the fate that befell him, culminating in the prowess of the Colloque Pervers, clearly shows the risk involved.

If I wanted to make a list of the beautiful questions that I discovered between 1955 and 1970 (and about which I've spoken to many people here and there), I'd have to go on for days, and probably even weeks if I wanted to be a little explicit and go into the ins and outs. This is not the place to do it, and I doubt I ever will, not to mention the fact that if one day (who knows!) I want a young mathematician to get involved in one of these issues, just to get his hands dirty and make a name for himself, it would be better for him to rediscover it.

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(\*\*) In addition to Serre's beautiful idea, I was also influenced by the "geometric" point of view introduced by Lang in the geometric global class body, and by Serre in the local class body.

(\*) See the note "Cercueil 3 - ou les jacobiniennes un peu trop relatives" (n° 95), and the sub-note n° 95<sub>1</sub>, at about some of Contou-Carrère's misadventures in the great mathematical world.

rather than run the risk of being labelled.

Beware of the Perverse Colloquiums that the future holds... .

(<sup>179</sup>) (2 April) For the past five weeks (since 26 February, with the note 'Silence', opening the series of notes grouped together under the name 'The Four Operations') I have been reviewing the main facts of a 'material' or (somewhat) 'technical' nature concerning Burial. In 'The Four Operations', I had confined myself to the 'swindle' aspect in the strict sense of the term - the one where the 'threshold' mentioned in the note of the same name (n° 172) is crossed, which separates *bad dispositions* (expressed by 'automatic rejection' reflexes, often in spite of the most elementary mathematical instinct) from blatant bad *faith* and outright plagiarism. In the section I have just written, 'Les chantiers désolés', I find myself confronted above all with the 'first level' of Burial, below the 'threshold' - the burial of a vast vision and powerful ideas, which of course nobody is obliged to take up, and which everyone is entitled to ignore or forget - even if it means 'burying themselves', by condemning their work (or at least the part of that work directly affected by the rejected vision) to more or less complete sterility.

I feel like I've finally come full circle! As for the (abandoned) 'tour des chantiers', it has given me a more detailed apprehension of the Burial of my work, while at the same time getting me back in touch, if only a little, with themes I'd lost sight of over the last fifteen years. Above all, it gave me a clear idea of the urgency of what I intend to put down in black and white in the next volumes of Réflexions. My aim will certainly no longer be to lay meticulous foundations for sciences in the making - that's something I've done enough of, and if no one else can be found to give themselves to such a task, as I once did, so much the worse for each and every one of us! Instead, my aim will be to highlight certain key ideas, in the service of an overall vision born between 1955 and 1970, and which I find today (thanks mainly to the efforts of some of my students, and with the support of all of them) either forgotten, or ridiculed, or shamelessly appropriated and mutilated and stripped of the essence of their force. By taking them up again today, I am at last loosening the reins on an impulse for knowledge within me that, during the sixties, I had often kept to a minimum, for the benefit of endless tasks of

"service'. Those days are gone - and yet I know that in this new phase of my mathematical passion, the impulse to serve is no less present than it once was. I will 'serve' no less than I once did this ideal 'community' of minds hungry for knowledge (\*), which continues to give my mathematical investments a deeper meaning than that of a personal hobby and a means of self-aggrandisement.

In these investments, 'the boss' is certainly no more absent than in the past. Confronted with malice and derision from the very people who had been 'close to me' in the mathematical world, wounded many times in a basic sense of decency by those I had loved and trusted unreservedly, I have this irrepressible urge, in the face of those who have lost the feeling of respect, to *show my respect for myself*, through respect for these living, vigorous and beautiful things that I have brought into the light of day with my hands. Perhaps the best testimony I can give to this respect is to make myself the servant of these things, for a few years out of the precious years that still remain to me. So the mathematical reflections that I intend to develop over the next few years, in the continuation of Réflexions, will still be, at the same time as the resumption of a *child's game* and the *gift of a service*, an *act of respect*.

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(\*) I first wrote about the 'mathematical community' in the first part of Harvest and Sowing, in the section entitled 'The "mathematical community": fiction and reality' (no.° 10). By referring here to an "ideal community of minds eager to know", it might seem that I am once again falling back on something, the fictional character of which had become clear in the section quoted. But in Part VIII of Futility and Renewal, I had already been led for the first time in my life (better late than never. . . ) to recognise a collective dimension in my own 'adventure of knowledge', at the mathematical level (on this subject, see the two sections 'L'aventure solitaire' and 'Le poids d'un passé', n° s 47, 50, and more particularly, pages 134, 135). It is also clear that the 'community' (or 'collectivity') that lives this collective adventure is of a completely different nature from any sociological entity, embodied in a given *environment* at a given *time*, with a given 'mentality', or (today) with a given power structure and class interests. This 'ideal community' to which I refer, 'without frontiers in space or time', is no less 'real' to me than the sociological entity. It is more essential, in the sense that it is this community (as I write in the rest of the same sentence) that 'continues to give my mathematical investments a deeper meaning than that of a personal pastime and a means of self-aggrandisement'. It is no more 'fictional' than I am myself, and I feel part of it, more lucidly than I used to. The 'fiction' consisted not in the perception of the existence of such a 'community', but in the confusion between it and a milieu with which I had identified myself.

Before putting the finishing touches to the Burial, I'd like to take a brief look beyond the 'material facts' at what this reflection has taught me. I'll start by looking at what it has taught me about other people, and end with what it has taught me about myself.

The most striking fact, of all those that have come to light in the course of this reflection, is the *degradation of morals and minds* in the mathematical world of the 70s and 80s. This degradation is expressed, among other things, by a hundred and thousand 'little things', such as those that have come back to me in spurts over the past eight or nine years - 'little things' that are nonetheless sufficiently disconcerting to prompt the reflections in the first part of *Récoltes et Semailles* and its main question: how (and when) did things come to this? And what was my role and what is my place in this insidious and implacable deterioration that I see today?

This degradation culminates in operations such as ""SGA 4 1/2" - SGA 5" or the (even more incredible) Pervers Colloquium, far surpassing in cynicism and contempt anything I could have imagined, even the day before I unwittingly discovered them.

This is not the place to go back over these 'nothings' (more than one of which has been mentioned in passing in my reflections, here and there), nor over the major operations (served by the minor manoeuvres). The spirit that expresses itself in both, the 'nothings' and the vast swindles, is the same. The 'threshold' that can sometimes be drawn between the acceptable and the villainous is itself very fragile and very artificial, a sort of safeguard that, in any case, nobody (it seems) cares about any more. I have no regrets, through this funeral in which my person is crucially involved, that I have had the opportunity to take a closer look than ever, perhaps, at this spirit, which is certainly the privilege neither of this funeral alone (set in motion in honour of my modest person) nor of the world of mathematicians alone. I can only say that I am not aware of this spirit having reigned in that world, or in any other science, at any time other than our own. This is one of many signs, no doubt, of the final stage in the decomposition of a civilisation and of what, in spite of everything, continued to give it meaning.

Over the last few days, my thoughts have more than once dwelt on the strange coincidence that my departure from the mathematical scene, more than fifteen years ago, came as a shock to me because of a certain corruption in the scientific world, to which I had long chosen to turn a blind eye (while believing I was staying away from it). I was confronted with it

suddenly, in the very institution where I intended to end my days (\*). This was a case of the almost universal self-interested connivance of scientists with the military apparatus. This insidious military stranglehold on the world of science as a whole is also a recent phenomenon, having only emerged (at least on the scale we now know) since the last world war. Admittedly, if this 'shock' disrupted my planned trajectory (planned by myself and by everyone else) to the point of triggering my departure without return from a world with which I had identified until then (with one tacit reservation. . . ), it was because I had a pressing and urgent need for renewal, which I only became aware of with hindsight. Afterwards, I tended to play down what had been the particular occasion that triggered this unusual departure. However, I also know how immense (and invisible) are the forces of inertia that tend to keep us indefinitely on the same 'trajectory', and that oppose inner renewal - and that also makes me realise the power of the inner shock it took to tear myself away from a trajectory as solidly mapped out as mine was.

What I'm getting at is that the 'special occasion' that triggered my departure is not without *meaning*. In any case, this meaning was very strongly present in the first few months, and probably even throughout the first year, after my departure. Subsequently, under the influx of new impressions and in the very dynamic of this first tumultuous renewal, it was natural for this sense to recede into the background and eventually disappear from my sight. But even though I cease to perceive this 'sense' of my past or present actions and their fruits, this sense has not disappeared for all that. And my return to mathematical activity, with the more detailed contact it implies with the world I left behind, has unexpectedly brought me back to that forgotten past. For one of the very first fruits of this 'return' (a return just as unexpected as my departure a short while ago...) was the discovery, in this world that had once been mine, of another corruption that I don't think I had ever known. If I try to give a name to this new thing, it comes to me: *the loss of respect*. I've felt it painfully more than once in recent years, when I saw "one of those I had loved crush so crudely another whom I now love, and in whom he recognises me". In the course of reflecting on L'Enterrement, I came across it more than once again, and in more virulent tones, this time directed against

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(\*) On this subject, see the note "The salutary uprooting" (n° 42), and also "Brothers and spouses - or the double signature" and its sub-note (n° s 134, 1341).

I was angry at some of the things I had brought into being with my own hands, or at some successor who had dared to draw inspiration from them. At such times, I have come to know... truly the 'breath' and 'smell' of this spirit, where the sense of respect has been lost. But I also know very well that this spirit 'does not only breathe around my home', even though it is through its breath on me and on those I care for that I truly 'know' it - just as you know the taste of bitter fruit only by eating it. Today this spirit has become the spirit of the times...

And I can see that these two corruptions, the one that triggered my departure and the one that awaited me on my 'return', are not unrelated. If I try to put into words this diffuse feeling of a link, I'd say that in the easy attitude of scientists towards the seductions of military money (to mention only that aspect) and the conveniences it offers, I detect a lack of self-respect, both at individual and collective level (\*). And it is in the loss of self-respect that I recognise the root of the loss of respect for others, and for the living work that has come from their hands or those of the Creator.

I don't claim to have 'understood' either the one or the other 'corruption'. On the one hand, there is the 'spirit of the times', whose particular dynamic escapes almost entirely (it seems to me) individual action. This collective dynamic remains a total mystery to me, and one that I've never thought of trying to fathom. On the other hand, there is the way in which each individual being, endowed with his or her faculties of perception and creativity, and weighed down by all the weight of his or her particular conditioning, responds to this spirit of time and makes this response (knowingly or unknowingly) one of the crucial elements of his or her particular adventure.

In the course of my reflection, I tried at length to identify certain choices, and the forces at work behind those choices, in the case of the two main protagonists of Burial the deceased, and the principal Funeral Officer (\*\*). What's certain is that I've learnt a few things along the way, but by no means have I succeeded in my task. I can even say that I have certainly *not* succeeded entirely, as far as my protagonist is concerned. I've put together

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(\*) I'm sorry to run the risk of offending some of my old friends who have adopted this 'easy attitude', without, of course, feeling any lack of self-respect! Moreover, it is by no means certain that scientists in other eras, had they found themselves collectively faced with 'seductions' of the same order, would have reacted differently. Opportunity often knocks!

(\*\*) (22 June) A third 'main protagonist' finally appeared to me, at the 'last minute', in the note "L'album de famille" (n° 173), part c. (The one of all - or acquiescence), d. and e.

pieces of a jigsaw puzzle, I've put them together, and I'm convinced that the pieces are the right ones and that the assembly, more or less, is correct - but I still lack knowledge of the *whole*, it's still an assembly of pieces that, at present, remain *foreign to* me - foreign to my person and my experience, and by that very fact, misunderstood. The work I've done will undoubtedly help me, on other occasions, to recognise myself as best I can, to be careful where it's in my interest to be careful (and the older I get, the more I realise that it's often in my interest...). But all that still falls short of a true understanding. And I wonder whether in the end the effort made in this direction wasn't a delusion - or that the *goal* at least (that of 'understanding others' in such and such a conflict situation) wasn't a delusion (even though the *path* followed was rich in lessons...). I say to myself that to really understand the conflict in *this person* (or in any other to whom I've been closely linked and where I see similar contradictions erupt), is undoubtedly also, to *understand the conflit at all*. And I am well aware that such an understanding cannot come to me from a meditation on others (who forever escape my immediate knowledge), but only from a meditation on myself. If the long reflection 'The key to yin and yang' is to prove fertile, it is not through occasional escapes into other people's lives, but through looking back at my own life and my own experiences, and the understanding I had of them.

(<sup>180</sup>) (3 April) I don't feel inclined, finally, to try and give a retrospective in a few lines, or a few pages, of what has occurred to me about my main protagonist in L'Enterrement. As things stand, it seems to me that this would be little more than an exercise in style, and not the means for a renewal of a most fragmentary understanding. For the moment, I can't wait to get to the end of this reflection on L'Enterrement!

I am well aware, moreover, that this final point will not be the end of Burial itself. Surely the coming months, with the echoes of all sorts that will come to me from these notes, the fruits of solitude, will be rich in surprises and lessons that solitary reflection could not have brought me. Nor is it certain that all the surprises that come to me will have a bitter taste, and perhaps the very near future will also hold some joy for me - appreciated all the more because it will undoubtedly be rare; as I also had the joy, last year alone (a banner year!) of receiving letters full of warmth from three of my colleagues or friends of yesteryear whom I held in particular esteem or affection.

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As for the overall effect, however modest, of Harvest and Sowing on the "spirit" It is hardly necessary to say that I have no illusions about this. Perhaps, at the very most, the publication of these notes will put an end to some unprecedented iniquity, and bring about the readjustment of some glaring anomaly - and even then, I may be optimistic. And it is also possible that the unexpected reappearance of the deceased himself, thought to have been dead and done for ages, will put an end, or at least a more circumspect mute, to the muffled concert of derision that surrounded the work of his hands that he had left behind. And if this reappearance does not at the same time put an end to the fashionable boycott of a vision and of strong and fertile ideas, perhaps it will at least encourage some young mathematician, more generous than others, to draw inspiration from them without reserve (at the risk of displeasing) and to make them his own with respect.

And yet, if I wrote *Récoltes et Semailles*, it wasn't for any of these things, some of which may come later, who knows! I wrote it 'for me', of course, like everything else I write - as a means of understanding that I'm groping for. But at the same time, the thought of others, of those I have loved and left behind one day, as my adventure took me *elsewhere* - this thought hardly left me throughout the writing of *Récoltes et Semailles* (\*). These notes, at the same time as a reflection, and sometimes a meditation, were and remain for me a *gift to* those to whom, beyond myself, I am addressing myself. And I know, of course, that this gift may not be received by anyone but myself. But that doesn't mean I'll regret having given it. What's more, if it is not received today by some of those for whom it is intended, perhaps it will be tomorrow. This testimony, which is both spontaneous and carefully thought through, where each page and each word comes at its own time and in its own place, will be no less true tomorrow than it is today. But whether it is today or tomorrow, if there is one unexpected thing that will be welcomed with joy, it will be to learn that my gift has been received, if only by one person, who has recognised himself through me...

(<sup>181</sup>) No more than for the "foreground" of the Burial painting, I feel prompted to make a detailed retrospective of my insights and perplexities concerning the "foreground" of the Burial painting.

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(\*) These are letters from D. Mumford, I. M. Gelfand and J. Murre.

(\*) This thought is expressed more than once in Fatuity and Renewal (the first part of Harvest and Sowing). It may be less apparent in the following parts, but it is no less present.

two other planes, one formed by the "busy group of my pupils, carrying shovels and ropes", and the other by the "entire Congregation". On the subject of the latter, and its role in the Burial, I expressed myself in some detail in the note "Le Fossoyeur - ou la Congrégation toute entière" (n° 97) (\*\*). as for my perplexities concerning the role and motivations of my dear ex-students, they appear most clearly in the note "Silence" (n° 84), without however being seriously re-examined at any later stage of the reflection, so it is at this level, that of the "second plan" of the Burial painting, that my work leaves the most to be desired! (\*).

There was no work there comparable to that which I did in the note quoted "The Gravedigger...". This part of the picture is explored in greater depth in two subsequent notes, in the light of the dynamics of yin and yang: "La circonstance providentielle - ou l'Apothéose" and "Le désaveu (1) - ou le rappel" (n° s 151, 152).

This note "The Gravedigger - or the whole Congregation", which is the last of those written in the "first breath" of reflection on the Burial, is also undoubtedly its culmination. With the benefit of almost a year's hindsight, I am no longer convinced, however, that a certain collective motivation, which seemed fairly obvious, behind the Burial of my modest person (seen as an act of "retaliation for dissidence"), what makes me doubt it is that this motivation seems to me to be entirely absent, or else of derisory significance compared with the other forces at play, in the case of each of my pupils (\*\*). Now, one of the most striking facts in the whole Funeral is simply the 'unanimous agreement' that exists between its three successive 'plans', whose acts and omissions follow on from and complement each other (as if orchestrated by a common will of 'unfailing coherence'), as perfectly as in a funeral ceremony in the true sense of the word 1 In such remarkable unanimity, in such uniformity of inner disposition and action, we can also sense a common motivation, the same 'nerve' that drives everyone.

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(\*\*) (22 June) My still hazy perception of the Congregation has recently been given unexpected form in the aforementioned note "The family album" (n° 173), parts c., d., e.

(\*) (22 June) For a (modest) continuation of our thoughts on the 'second plane' of the painting, see ding the note of 19 June entitled "Five theses for a massacre - or filial piety" (n° 176).<sup>7</sup>

(\*\*) this fact appears in the reflection in the note "Patte é Velours - ou les sourires" (n° s 137), p. 644-645.

I don't mean to suggest that this 'diffuse resentment' that I've noticed here and there, caused by my 'dissidence' felt (superficially) as a desertion, and (more deeply) as an inadmissible challenge - that this resentment is null and void, and that it doesn't play a certain role. But I now doubt whether this role is decisive, whether it is *I to* this common 'nerve' - which would therefore be common to all, *except for* those whose role in the Burial was the most crucial of all! (Namely, those who were my students and thus the first trustees of a certain heritage).

This (apparently relatively rational) 'cause', which is my 'dissidence', seems to me to be out of all proportion, however, to the breath of violence that I felt in an operation such as the massacre of a 'splendid seminary', under the complacent eye of the Congregation; and out of all proportion, too, to the equally violent iniquity displayed in a Pervers symposium to the applause of the assembled crowd. Nor was it that I was an odious colleague or boss, and too feared for the accumulated animosity he provoked to be discharged while he was around; that it waited for him to be declared dead and buried before finally being discharged against him and against those in whom he was 'recognised' in the slightest. Nothing, in the echoes that reach me here and there, goes in the direction either of a *fear* that my person would have inspired and which would have found its belated revenge thereafter (\*), or of acts or behaviours that would have been held *against* me and that could have fuelled animosity or violence (which, however, never says its name).

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(\*) It is true that I spoke at length, in "Fatuité et Renouvellement", about the *fear* that surrounded the "man of notoriety", from a moment that I could not place, and of which I sometimes perceived signs around my person. But this was the diffuse fear associated with fame, not with myself - it disappeared as soon as any kind of personal contact had been established. I have the impression that in terms of personal contact, I was perceived more as 'the good guy' than as the person who would be feared.

It was no different, I'm convinced, even for the pupil mentioned in the section "The blunder - or twenty years later" (n° 27), in whom a certain 'stage fright' continued to manifest itself for quite a long time, with each new encounter. This stage fright appears to me today as the sign of a pervasive inner insecurity ('Unsicherheit'), which later found compensation and an outlet in attitudes of domination and contempt. Of his many pupils, the three I got to know were each severely tested by his apparently 'gratuitous' attitudes of malice. Clearly, the spirit that has taken hold and reigns just about everywhere in the mathematical world has encouraged the emergence of such aberrant behaviour, which in turn helps to shape this spirit and imprint on it the disconcerting mark of a hushed brutality... .

This is a typical situation for the kind of violence I have called 'gratuitous', or 'causeless', and it is surely no coincidence that this kind of violence ended up at the centre of my attention, in the long meditation 'The Key to Yin and Yang' (which itself forms the heart of Harvest and Sowing). I don't just know this violence from yesterday, and it wasn't in my life as a mathematician that I was confronted with it for the first time, face to face. And although I have sometimes forgotten its existence in the world of men, it was never for very long, because it soon enough took care to remind me of itself. And speaking of today - by a strange and (I admit) often unwelcome 'coincidence' (or at least, unwelcome...), I can't remember being confronted in my life with the familiar signs of such violence in such an insistent, repetitive, harassing way, as since my 'return to maths' and especially since the writing of *Récoltes et Semailles*; and even more strongly, in these very last months and weeks.

Surely there's an insistent message here, one that comes back to me again and again, and which will no doubt keep coming back until it's heard. I began to listen to it, in the final weeks of the long meditation on yin and yang - knowing that I hadn't yet reached the end of what it had to say to me. In the two months that have passed since then, a subterranean work must have continued in silence. It seems to me that what is essential and hidden (\*) has begun to decant into more apparent (or, at least, less difficult to admit) incidental things. The image of the 'dwarf and the giant' (provided by my friend Pierre) has continued to haunt me. Behind this image, I think I detect an archetype of considerable strength, which would be like the shadow, or one of the shadows, of the repression suffered in early childhood. Its role would be that of an outlet, and compensation, for the repression of the creative force, a repression long internalised in this "unexpressed conviction".

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(\*) When I wrote this line, I was aware that the term 'hidden' here was a stopgap, a kind of concession to 'Consensus'. I've often found, on discovering something I'd ignored all my life, that it wasn't 'hidden' at all, but on the contrary in plain sight, obvious, sometimes to the point of being obvious without my consenting to see it. This is usually the case when discovering something new, whether it's mathematical work or self-discovery. The cause of such blindness, of this blockage of the faculties of common sense or elementary intuition, is by no means a deficiency of these faculties. Rather, it lies in an almost insurmountable inertia on the part of the mind to deviate from the rut of well-established consensus - whether these are accepted in society as a whole, or in the more limited milieu of which we are a part, or even whether they are concluded and sealed in our innermost being alone, like the articles of a treaty that the 'boss' would have concluded with himself and for his own convenience alone...

of powerlessness"... In this prescient archetype, I think I sense a powerful driving force behind acts of gratuitous violence, striking at those perceived as 'giants', as bearers of untouched strength...

- acts triggered by no 'cause' other than a *propitious occasion*, when the risk involved seems nil or minimal.

Perhaps I've already said too much, when in these lines I've just touched on a tenuous and insistent intuition, signalling to me a work that must be done, and that remains before me. For this work, the Burial is only one of the materials, along with many others that come to me from my so-called 'private' life. This is not the place to pursue it, or even to broach it. Its place is not in notes intended for publication.

(<sup>182</sup>) (4 April) In this promised retrospective of what my reflection has taught me about others, my thoughts, as if in spite of myself, return insistently to my own person. This is a good sign for me - a sign of the strong need in me to return to what is essential. It's from knowing myself that I gain an understanding of others, and not the other way round. And on more than one occasion since I began meditating, the concern to 'understand others' has been a diversion from the essential task of getting to know myself.

Before deliberately coming back to myself (and against my impatience to get to the famous 'end point'!), I would like to include one more testimony that came to me recently, concerning my friend Pierre. It's the only testimony of its kind that I've heard since I left the mathematical scene. It sheds a very different light on my friend from those I know of elsewhere. It also reminds me once again, very opportunely, that reality is constantly more complex and richer than the images I can try to build up for myself (\*).

The testimony in question is not direct. It consists of the impressions of a meeting (more or less fortuitous) between a foreign mathematician and Deligne, about whom this colleague spoke.

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(\*) In no way do I mean to suggest that the effort we make (and that I myself constantly make) to form an image of reality, as 'faithful' as possible, and to adjust this image as we receive 'information' of all kinds - that this effort is futile or sterile. On the contrary, this is a highly effective dialectic for putting us in touch with reality and 'knowing' it. Only insofar as the image (burdened, by the nature of things, with its own inertia) remains entirely inert, frozen, does it also become an obstacle to apprehending reality, or to put it better: an effective *means of* thwarting our faculties of apprehension, and of 'evacuating' the knowledge we do have of reality.

(still hot, I presume) to my correspondent, who sent me the story in a letter. With the permission of my correspondent and of the colleague (whom I'll call 'z' in the following) who gave him the account, I'm giving here the translation of the part of the letter concerning this encounter. My correspondent assumes that the scene must have taken place in 1981 (NB that was also the year of the Pervers Colloquium, a colloquium that had not been discussed between my correspondent and myself).

"... One day Z. had gone to Bures for a conference, and found himself in a room ['the tea room'<sup>1</sup> at the IHES, obviously] where tea was served, and where there were a lot of mathematicians. The door opened and Deligne entered the room. Mr Z. recounts the scene quite vividly: he looked flabby, his arms were flailing, you could feel a certain isolation around him. All the others seemed to be staring at him, a bit like a rare bird, but no one knew what to say to him. Z. was sitting a bit apart, near the window, and Deligne, rather undecided, sat down next to him. Z. didn't really know what to say. Then the thought came to him of simply saying how extraordinary he found the set of ideas around "étale topology" etc., and the new ideas that you have contributed. [You', here and in what follows, means me, Grothendieck, whom my correspondent is addressing]. Immediately Deligne's eyes began to shine, he said to him, yes, this is one of the best things there is in mathematics; and how beautiful it was to listen to your (\*) lectures... and he said: just think about this and that. ... listing a lot of things that Z. didn't understand (according to what he told me himself), but he could see the enthusiasm that had suddenly appeared in his interlocutor. And Deligne added: what a pity you (\*)'ve withdrawn! He was sure that crystalline cohomology and many other things would not be in this rather boring state, but that they would now be standing constructions just like stellar cohomology, if you had really (\*) tackled them again. ... "

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(\*) As before, "you" here refers to me, Grothendieck.

Two things struck me about this story. There is the impression of isolation, which seems to have struck Mr Z a great deal. I would be at a loss to say whether this impression stems from a very particular moment in Deligne's life, or whether such isolation has come to permeate his relationships with all his fellow dogs. I have heard no other evidence of the latter.

The other striking thing, and also unique among the echoes that came back to me, was the sudden appearance of this enthusiasm, this warmth, at the mention of my name and a certain past. It was a past that he had long since decided to declare null and void. And the roots he had in that past too. And in that past, too, there was still a freshness of childhood, a freshness that he had banished from his life as an 'adult', as an important and admired man. It must have been fashionable for those around him not to allude to this past, to the time when he was just another student in love with a beautiful passion... - nor in the house of the well-to-do man, surrounded by stylish furniture, do they talk about modest, even hard-working beginnings...

And then this stranger, sitting next to him by the greatest of coincidences, suddenly began to talk warmly, as if it were the most natural thing in the world, about something no one ever talks about (not in front of him, at least...) 1 Surely, it was as if this selective and staid atmosphere had suddenly vanished, and this warmth of an unfamiliar person reawakened the same warmth in him, and - for the space of a moment - linked him a. to a distant, raw source, forever forgotten and lost...

(<sup>183</sup>) At last I come to the most personal part of this retrospective-balance begun over a month ago. It remains for me to briefly review what this reflection has taught me *about myself*.

The first thing that reflection led me to discover was a certain *past* - my past as a mathematician, which I had never before bothered to dwell on, even for a moment. Behind the apparent flatness of a clean-cut, untroubled surface, I once again saw the depths of everything that is commonly neglected, removed (as if by a subtle, well-aimed sweep) from the comfortable, conscious image that we are accustomed to forming of ourselves and of what surrounds us. Among the 'burrs' (or sweepings...) never examined, at least not in my life as a mathematician, there is the insidious, and sometimes invasive, action of fatuity in the relationship with such of my colleagues.

friends. This elitism (or 'meritocracy', as Chevalley and Guedj called it) must have hardened over the years. It crystallised into this 'sporting' attitude that I ended up discovering towards the end of the 'first breath' of reflection. Underneath its good-natured exterior, this attitude sanctioned a jealous possessiveness towards what was felt to be a 'preserve' for myself, and for those I was happy to welcome there, given their brilliant qualities.

Fortunately, these very 'patron' provisions do not exhaust the content of my relationship with my friends, colleagues and students in the mathematical world, or with mathematics itself, between 1948 and 1970 - far from it. Nevertheless, they constituted an insidious background note, which I never bothered to note until last year, in the first part (or 'first breath') of *Récoltes et Semailles*. This progressive discovery culminates in the section entitled 'La mathématique sportive' (n° 40). This seems to me to mark the moment of a qualitative change in thinking. I felt it at the time like *crossing a mountain pass*, which opened up a sudden view of a new panorama... Looking back over yet another year, I now see that first long period of my life as a mathematician among mathematicians, between 1948 and 1970, as a kind of *barter* of the 'birthright' that belongs to me (as it belongs to everyone), of living fully (if I so choose) a particular and unique adventure, in exchange for the 'lentil dish' of an identification (that I would have liked without reservation, without ever quite achieving it...) with a 'mathematical community'... with an idyllic and fictitious 'mathematical community', which at the same time offers comfortable advantages (\*). With this image, I don't claim to have said everything about that period, which is certainly too rich to be encapsulated in a cookie-cutter formula. But the image does seem to me to capture an important aspect that appeared for the first time in this first phase of reflection. This aspect reappears in the name "Fatuity and Renewal".

the 'ment' that this part of Harvest and Sowing took on (after the event).

The most personal and profound part of this first phase is formed by the last three "chapters" (\*\*) VI to VII: "Récoltes", "L'enfant s'amuse" and "L'aventure soli-

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(\*) This is the ambiguity referred to in a previous b. de p. note (note (\*) on p. 1219). (\*\*) Of course (and as I point out in the Introduction to R and S), these "chapters", grouping together sections linked by a common theme or by particular affinities, have been established after the event, a

tary'. In 'Récoltes', I first reconnect with certain moments in my life (not just my life as a mathematician this time) - moments charged with the power of renewal. It was as if, moved by an unknown force, by some secret and impetuous voice, I was trying to rediscover those same *innocent* dispositions, to cross the threshold that I still felt obscurely before me. Although I couldn't have predicted it at the time, of course, I still had to discover a possessive attitude towards mathematics itself. I continued to climb a slope, without haste or hesitation, as if my feet were following an invisible path that only they could 'see'. I knew, without having to tell myself, that it was taking me where I needed to go, as little by little, step by step, the mists cleared.

That's how I reached this new threshold in my journey, or rather this *pass*:

"... And I had the impression, as soon as I reached this point, of someone who arrives at a belvedere, from which he sees the unfolding of the landscape he has just travelled through, of which at each moment he could only perceive a portion. And now there is this perception of expanse and space, which is a liberation..."

As soon as I had passed this sensitive point in my reflection, it deepened into a meditation on myself. The very next day, I already felt the need to introduce the image of the 'boss' and the 'worker', aka the child, an image that had already become familiar to me over the last two or three years. But little did I know how useful it would prove to be in the reflection still to come, when for almost two months I had thought I was about to come to an end, only to return immediately to my mathematical notes with 'A la Poursuite des Champs'. !

In the four sections that make up the 'chapter' 'The child has fun', I am back in touch with certain aspects and events in my relationship with mathematics. I had already explored them at length almost three years earlier (between July and December 1981), but since then I had had plenty of time to forget them. My aim this time is above all to put myself in a position to explore the meaning of my unexpected return to a long-term mathematical investment, and to find a 'place' for myself between the two apparently mutually exclusive passions that now dominate my life: mathematics and meditation.

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once I had finished writing what was to be (only) the first part of Récoltes et Semailles. In Fatuity and Renewal, I occasionally refer to them as 'parts' of R and S (not to be confused with the five parts of 'Fatuity and Renewal', etc., into which the whole of my thinking from February 1984 to the present day has been grouped).

This mutual 'exclusion' of these two passions now seems to me to be less draconian than it was two years ago. In 'A la Poursuite des Champs', mathematical reflection sometimes gives way to, or even becomes the occasion for, a somewhat personal reflection, in which my person, as a being endowed with sensitivity and feelings, a curiosity (not just mathematical) and a destiny, is no longer entirely absent. And in the opposite direction, in this reflection on myself that is Harvest and Sowing, this very reflection puts me back in touch with old mathematical loves, and becomes the occasion here and there for the beginnings of mathematical reflection (\*).

It is possible that these possibilities of coexistence, or even symbiosis, between these two different ex-pressions of the drive for knowledge in me, must, by the very nature of things, remain fairly limited. But it was clear to me in any case, during last year's reflection (and even from the long meditation three years before that), that these two passions are by no means antagonistic in nature, or even different in essence. In the last part of my reflection, 'The Solitary Adventure', I try to pinpoint exactly how these passions differ, and the 'adventures' that they both open up for me. It was in the course of this questioning that I discovered an obvious fact that I had pretended to ignore all my life: that mathematics is a '*collective adventure*', and that my own mathematical adventure only takes on meaning through its links to the wider collective adventure of which it is a part.

To tell the truth, I only touched on this fact in passing, in the section entitled 'The solitary adventure', whereas my aim at the time was rather to put into words something t h a t w a s well known to me on the other hand, and which I continued to have difficulty in fully accepting: that meditation itself is a *solitary adventure*. This effort to formulate something 'known' was certainly not in vain, far from it! It has enabled me to deepen this knowledge, while at the same time helping me to discover the obvious and new fact (for me at least) of the link that connects me to *another* adventure (from which at that moment I would have liked, or someone or something in me would have liked, to distance myself... ), the mathematical adventure, which is a collective one.

The groundwork has now been laid for me to get to the heart of my perplexities the very next day, in the section entitled 'Observation of a division'. First of all, there is the fact that the

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(\*) (10 May) These 'food for thought' have already borne fruit in terms of my renewed understanding of certain themes that have been neglected for fifteen years.

"And even if he wants to delude himself (as is his nature), the only thing that can bring him substantial 'returns' is a collective adventure. "The child alone by nature is lonely"; it is the child alone who can be attracted by an adventure that no one else in the world wants, and a knowledge, tangible and very often obvious, that he will nevertheless not be able to share with anyone. And this is where the 'preference of the dull' in the case of *my* 'company' now lies, quite unhappily at the whim of the 'boss'.

This observation led to the discovery of a *division* within me, *the boss-child division*. It's the first time I've made such an observation in a state of extreme attention and rigour. It's not a *decree* that I've formulated in accordance with this or that 'way of seeing' or philosophy or whatever, and which would claim to be more or less universally valid, it's a simple *observation* in fact, resulting from a careful examination of a very particular case in point, that of my modest person, at a certain stage of my development. Perhaps this division will disappear one day, without the boss having to stop doing what's necessary, while leaving the worker-child to work as he pleases. That's not my concern today, nor should it be. One day at a time...

(5 April) It's true that this division was revealed to me nine years ago, on a riverbank, in a parable staged with overwhelming force. It was two days after I had discovered meditation, this long-ignored power within me, available to me at any time - and it was by getting to the bottom of the meaning of this dream that I rediscovered that in me which is not divided, the *other* in me, silent and invisible for so long, "a very dear person, believed dead for a long life...". The new thing, the essential thing that appeared then, was *not* the division, which I knew only too well, nor what the dream revealed to me with such force about the nature of this division, incarnating itself in two familiar and beloved beings, neither of whom had a name and who were *the same*, but it was this *reunion*, coming after four hours of intense meditation, like the intense labours of childbirth.

I knew then, and in the days and weeks that followed, that this reunion was not the end of the division. But thanks to them, I saw this division with new eyes - as something important, certainly, but all in all 'secondary' to another, more essential reality, that of an indivisible, indestructible *unity*, of that in me which I had rediscovered, and which later I recognised as being 'the child'. This double knowledge-

sance was keenly felt at the time. It became blunter in the years that followed, in the sense that knowledge of this 'accessory' division, which is nonetheless very real and tangible, tended to be overlooked. While 'the boss' had allowed himself to be lured into placing all his bets on meditation (the famous 'three-legged horse' . . . ), he was keen to suggest (without having the audacity, or the awkwardness, to ever say so in plain English. . . ) that, with the help of meditation, it would be possible to achieve a better balance between the two. ) that, with mediation and all that, division was now a thing of the past, that there were no more divisions at all, that there was barely a little blunder here and another there, OK we won't deny it, but that it was still almost as if there weren't any; just look at the dull worker so happy to have a good time and the boss-cake walking on tiptoe so as not to disturb him - the real idyll, I might add! I wonder if last year's reflection, the one before the turning point (with the 'sports mathematics'), especially where I'm doing a very unexpected retrospective on 'my passions' (in the section of the same name, n° 35), isn't still a bit in those tones, where the lighting is forcing a hint of rosé. . .

The fact remains that this 'observation of a division' put me right back in touch with a reality that I had tended to lose sight of for many years. At the same time, it gave me a new perspective, new eyes, on the division I had seen so clearly eight years earlier. I can say this without the slightest reservation or doubt, because I remember well that at the time of this 'realisation', there was no association with the episode of the reunion, and with what that episode had taught me about a certain division and its nature. This association only came to the fore when I resumed the thread of the previous day's notes. This just goes to show the extent to which the 'incidental' (and undesirable!) content of the knowledge that emerged during this episode was glossed over. This must have been all the easier because at the time, and after the crucial turning point of the reunion, there had been no reflection on this content, and the image (which emerged years later) of the 'boss' and the 'worker-child', perhaps best suited to expressing this content, was still lacking.

It now seems to me that it is this renewed 'realisation' of the division that represents the most important thing I have learned about myself in this first part of Harvest and Sowing. This observation is contained in a few lines in one of the shortest sections of this part of the reflection. You might think that if it had come to that, there might not have been any point in going on for a hundred and fifty pages about the arcane manifestations of

futility throughout my life as a mathematician. Nothing could be further from the truth, in terms of common sense. But it's also true that this 'common sense' is in no way suited to apprehending the delicate and profound paths of a work of discovery, whether it's a question of self-discovery, or the more crude (\*) work of mathematical discovery. I am firmly convinced that in this long reflection on Harvest and Sowing, everything comes in its own time and place, prepared and matured by all that has gone before.

(<sup>184</sup>) (6 April) With this brief observation of a division, towards the end of March last year (a little over a year ago), I thought at first that I had finished the Harvest and Sowing reflection. Little did I know that there would be five times as many pages to come! In the days that followed, I got busy with other things, and my thoughts began to return to mathematical themes. However, one 'little point', left hanging in the air, kept running through my head. Over and above a perplexity that might seem to be purely down to detail, I must have had the vague feeling that I hadn't really got to the bottom of the forces at work in the 'tipping' of the pattern towards a long-term mathematical investment. Or, if I had uncovered the essential springs, my understanding was still pale and fleeting, because I hadn't 'put my foot down' enough on the matter for it to penetrate further. This 'last little point' was to become the means by which I would return to what was still marked by an impression of vagueness. This resumption of reflection took place in the section that was then (and for another three weeks) supposed to close Harvest and Sowing, and which immediately took the name 'The Weight of a Past'. This name expresses the unexpected discovery of the *weight* of my past as a mathematician, as well as the strength of the link that continues to bind me to the collective adventure. And yet, what I glimpsed that day was only the modest\* tip of an iceberg, whose

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(\*) If the work of scientific discovery seems to me to be 'cruder' than that of self-discovery, it's for two reasons. On the one hand, it brings into play only our intellectual faculties, in other words a tiny part of our being (scientific work tends to make this part of our faculties hypertrophy, at the expense of the others and of the overall balance of the person, and ultimately to transform the person into a kind of computer monster).... On the other hand, the inner resistances (opposing the discovery of reality) brought into play by scientific work are more often than not out of all proportion to those opposing self-knowledge. This is also why the 'scientific adventure' is very rarely, and nowadays almost never, an 'adventure in truth' - an adventure, therefore, that calls on our capacity for humility and courage to accept an unwelcome truth, first in relation to ourselves, and then in relation to the outside world.

colossal submerged part would gradually appear, over the months and the whole year that followed. ...

This section, which brings this first breath of reflection to a close, is at the same time like a start and a call for the second. This 'weight of a past', obviously, has its roots in my attachment to a work, and even more than to the finished work, to the attachment to key ideas and visions whose fertility and power I feel well, whose fertility and power I 'know' intimately, and whose fertility and power I have realised, more or less confusedly, for years that they are nonetheless vegetating on thankless and arid ground, secretly and unspeakably hostile. . . So this reflection, 'The Weight of a Past', which reminds me of both the work and my links with it, becomes the occasion for a long note in which, for the first time since my 'departure', I express myself on the subject of this work and the fate that has befallen it. What had been felt in a vague way for ten or fifteen years finally took shape and manifested itself in words, sometimes hesitant to come, which, once written in black and white, clearly told me a message that until then I had avoided hearing. Later, given the length of this note written in one go, I subdivided it into two, with the names "My orphans" and "Refusal of an inheritance - or the price of a contradiction" (n° s 46, 47).

This double note can be seen as the kick-off to the reflection on L'Enterrement (\*). This was followed three weeks later, on 19 April, by the emotional response to the "memorable volume" LN 900, which marked the exhumation of the motifs under the leadership of the "new father" Deligne. This 'second wind' of reflection continued intensely until the end of May - mid-June, when it was brought to an end (just when I thought I was about to put the finishing touches to it, the real thing!) by the illness episode (\*).

This second wind is not, strictly speaking, a reflection on myself or my past, but rather an 'investigation' into the Burial that I had just discovered, as well as an effort to 'digest' the facts as best I could and as I went along.

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(\*) Unfortunately, this circumstance does not appear in the table of contents for Enterrement I (or La robe de l'Empereur de Chine), where the double-note in question forms Cortère II (Les orphelins), and not Cortège I (which is L'élève posthume). This is due to the order in which the references to the "notes" (n° s 44 to 47) follow one another within the final section "Le poids d'un, .. passé" (n° 50) of Fatuité et Renouvellement, the section on which these notes are supposed to comment.

(\*) On the subject of this episode of illness, see the two notes 'The incident - or body and mind' and 'The trap  
- or ease and exhaustion" (n° s 98, 99).

patent and yet (given, no doubt, my ineradicable naivety i) mind-boggling, incredible. If it taught me anything about myself, it was the strength of my attachment to my past and to my work. I was touched to the core, seeing the work torn into pieces, some pieces for the dustbin, others to be laughed at, and still others shamelessly appropriated as trifles for all and sundry... I knew then that I hadn't 'got off the merry-go-round' yet, as much as I had believed in the exultation that had followed the crossing of a certain 'pass' and the vast panorama that had then opened up before me (\*\*)! Or to put it another way, I was then able to measure the full *weight* of that past, and the full force of the egotistical mechanisms that continue to bind me to it. This has was a great surprise!

But there's something else about myself that I'm discovering in this second phase of reflection, which completes what I'd learned in the first. In the first phase, I had uncovered above all a certain 'other side' of an attitude of fatuity in myself, through attitudes of *exclusion* towards such colleagues or even friends whom, for one reason or another, I didn't consider to be part of the 'elite' world of which I felt myself to be a part (tacitly, of course!). *The other side* of the same coin is an attitude of *complacency* and ambiguity in my relationship with younger mathematicians (and in particular, with my students), whom I had co-opted as being, so to speak, part of 'my world'; either because of their brilliant means, or simply because I had accepted them as students and they were therefore perceived by me as being under my 'protection'. I began to put my finger on this attitude in the note "L'ascension" (n° 63') of 10 May, followed by the note "L'être à part" (n° 67<sup>¶</sup>) of 27 May, both devoted to my relationship with my brilliant young friend Pierre. This reflection was deepened in the note 'Ambiguity' (no.° 63<sup>¶</sup>) of 1 June, where it focused on my relationships with my students in general. It was here that I finally identified a certain ambiguity which, because it had never been identified by me and examined, had followed me until recent years. I was recently confronted with this ambiguity again, in a slightly different context, in the sub-note "Eviction (2)" (n° 169<sub>1</sub>) in the second part of this one, dated 16 March). I am led to note that the eviction of my person from the SGA Seminar (which represents the sum of an investment of ten years of my life) (\*), an eviction implemented by the care of

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(\*\*) This exultation is expressed in the section "Fini le manège!" (no.° 41), and is muted five or six weeks later in the note "Un pied dans le manège" (no.° 72).

especially from some of the closest of my former students, is simply the natural outcome of an ambiguous attitude that I had taken pleasure in maintaining with them, concerning their rightful place and mine in the work of the vast dimensions of SGA, in which one or other of them had invested the space of a year or two.

(<sup>185</sup>) It remains for me to review what the 'third breath' of reflection taught me about myself, beginning on 22 September last (after the end of the illness-episode) and about to come to an end (\*\*). I'm talking here, above all, about the reflections in 'The key to yin and yang', which is the part of Harvest and Sowing that seems to me to be the most personal and the most profound. When this attention seems to wander from time to time, to seemingly more general themes, or to linger on the person of my friend Pierre, it always returns to the centre, to the actor-observer, to the one who feels, perceives, questions and probes, as if drawn by an invisible force. Above all else, and without wishing to be, it is a *meditation on my life and myself*, approached through an unexpected medium: that of the funeral.

This is also the part of the reflection that seems to me to be the richest, the one from which I have learned the most. Many 'known' things have been placed in relation to each other, and things that were only glimpsed or sensed, or 'known' but neglected, drowned in the confused penumbra of everything, have begun to emerge from the shadows and reveal their weight and their contours. It was like a new opening, an invitation to a new great departure into the unknown - at a time when it had seemed that this famous 'long-term mathematical investment' was going to put an end to the work of self-discovery for years to come...

There is no question of going through the various stages in detail here

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(\*) For the latest episode in this eviction, see the note "Les Pompes Funèbres - "im Dienste der wissenschaft" (n° 175).

(\*\*) I am setting aside here the fifth part of R and S, which was originally a 'digression' within the Funeral Ceremony (and even within "The Key to Yin and Yang"). This part was not completed at the time of writing, and is not included in this retrospective on Harvest and Sowing.

(22 June) It became clear over the following weeks that the part of the reflection entitled 'The Four Operations' (or Burial (3)), following 'The Key to Yin and Yang', constitutes a 'fourth breath' of Harvest and Sowing, which is not included in this final retrospective.

of this long reflection, nor to make a 'list' of all that it has taught me. Instead, I'd like to say a few words about what seems to me to be the most important for my self-knowledge, as material for a maturation that continues over the days, months and years.

This reflection had begun in the spirit of a 'parenthesis' that I was opening (for the space of a note or two at the most . . .) to put the reader (and at the same time, myself) 'in the bath' of a dialectical yin-yang (or 'feminine-masculine') vision of things. The reason for opening such a parenthesis was the need to situate, in terms of an intuition of yin and yang, a striking impression given to me by examining a certain 'Funeral Eulogy' (\*): that of a deliberate intention to 'reverse' roles in an original yin-yang relationship. This 'parenthesis' opened on 2 October. It was only on 10 November, after a hundred pages of close reflection on the interplay of yin and yang in my life in particular and in existence in general, and (finally) in the game of mathematical discovery, that the moment finally seemed ripe to *at least formulate* (\*\*) this association of ideas that had appeared six months earlier, while waiting to be able to probe it with full knowledge of the facts, fourteen days later (\*\*\*)  
(And it was almost two months later, on 14 January, that the famous parenthesis on yin and yang finally closed, without my even realising for some time that it had already closed...)

Very quickly, and without having sought it or foreseen it, it was the 'conflict' in human life and in the person that became the focus of attention. The egotistical energy suddenly and powerfully mobilised by the discovery of the Burial, came as an unexpected extra force to confront me once again, and on the spot, with the 'mystery of conflict' that had been calling out to me for years (\*). Over the previous few years, this mystery had gradually come to the forefront of the things I wanted to probe and understand, as far as I could, without my ever having 'jumped the gun' and thrown myself fully into it. ...

Little by little, in the course of reflection, what has been the "core" of my life is revealed.

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(\*) For this 'Funeral Eulogy' (with its skilfully measured and administered compliments...) see the two notes of this name (n° s 104, 105), as well as the note 'Les joyaux' (n° s 170(iii)) which gives a partial summary.

(\*\*) In the note "Le renversement (3) - ou yin enterre yang" (n° 137).

(\*\*\*) At the beginning of the note "Patte de velours - ou les sourires" (n° 137).

(\*) This 'interpellation' began to be perceived especially after my long meditation on my parents, which continued between August 1979 and March 1980.

hard', the fearsome centre of this mystery, the very heart of the 'enigma of Evil': violence that can be called 'gratuitous', or 'causeless', violence for the sheer pleasure, one might say, of wounding, harming or devastating - a violence that never says its name, often hushed, under an air of innocent and affable ingenuity, and all the more effective in touching and ravaging - the 'claw in the velvet', delicate, vivid and merciless... It is this violence that our attention eventually turns to, in the course of the reflections that continue in the series of notes "La griffe dans le velours" (n° s 137-140), and it is also this violence that remains the focus of our attention until the end of the key. It again forms the climax, in the final note evoking the 'endless chain' of karma, passed down from parents to children and from children to grandchildren, from generation to generation since the dawn of time.

This is the first time in my life that I have come face to face with the mystery of violence "without hatred or mercy" - a violence that is deeply rooted in human life, and which has left an indelible mark on my life since my youth. This is also the first time that I have noticed this imprint on my being. At the same time, it's the simple fact of *the existence* of this violence, of its fearsome omnipresence, in my own life as in that of everyone else (\*\*). This simple fact alone contains the seeds of an *acceptance* of this formidable fact. It is in this observation, perhaps, that the most important thing I have learnt (or at least *begun to learn*) in the course of the whole Harvesting and Sowing process is to be found.

Rather, it's a first step, taking me beyond a threshold into the unknown. For my journey and for my maturation, this humble step seems to me of greater significance than the embryonic 'answers' I glimpsed (in the days that followed) to the question of the '*cause*' of 'causeless violence' (\*). This question itself only takes on its full meaning, which is far more significant than a simple question of 'psychic mechanics', once the very existence and scope of the fact being questioned is fully understood and assumed.

Some will say that I'm getting off the subject, that the observation of a general psychological fact (or one that I claim to be such), concerning each and every one of us, is a matter for the objective knowledge reserved for scientific disciplines (such as psychology, psychiatry, medicine, etc.).

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(\*\*) This observation constitutes the high point of the reflection pursued in the note "Without hatred and without mercy" (n° 157).

(\*) See note of the same name (n° 159).

sociology or whatever), that it is not in the realm (felt to be vague and impalpable, if not entirely far-fetched) of the famous 'self-knowledge'. But I see (not in a vague and impalpable way, but as clearly as a familiar and patent mathematical fact...) that outside of self-discovery, such a statement loses its living meaning

- it loses what makes it more than an exercise in philosophical-psychological style, more than the development of a 'thesis' (admittedly very interesting and all that... ). This observation in itself is a *discovery*, an intimately personal discovery that no one in the world can make in my place, and that I cannot make in place of any other person in the world. This discovery is a stage, the last one or so, in a journey of self-discovery. It situates me in relation to something important, something fearsome, something that has left its mark on me and that until now I have been keen to ignore, as if it were by some kind of special misfortune (perhaps due to some particular feature of my modest person) that I have been exposed to it throughout my life, and that I have seen others exposed to or inflicted by it, if only I took the trouble to open my eyes and look around me.

It's no coincidence, surely, that right from the start of this reflection on violence, I found myself led, by the very inner logic of the reflection, to look back (also for the first time in my life) on the few cases I can remember where it was I myself who subjected others to this violence 'beyond comprehension' (\*), certainly without thinking twice about it. The point of this flashback is not that it gives me the opportunity to beat myself up (and in public, no less) - something I have entirely failed to do. The point is that it has opened a door to a deeper understanding of violence - a door that it is now up to me to cross, at a time of my choosing.

(<sup>186</sup>) This is what seems to me to be the most important part of the journey of self-discovery, this last phase of the reflection on yin and yang, centred on violence, continues throughout the last four parts: "The claw in the velvet", "Violence - or the games and the sting", "The other Self" and "Conflict and discovery - or the enigma of Evil", from 7 December to 14 January (which represent just over a third of the Key).

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(\*) See the note "La violence du juste" (n° 141) which follows the section of the Key quoted above entitled "La griffe dans le velours" (The claw in the velvet).

With hindsight, it seems to me that the main role of the previous eight parts of the Key is to have finally led me to this crucial reflection. Many of the things I develop in this preliminary part are things I've been familiar with for years, and yet which I had to 'remind' to enable a 'new' reader to follow, and to give the reflection an internal coherence that might otherwise have been lacking, or apparent only to me. At times, the style reflects the inner disposition of someone who can't wait to get these reminders out of the way as quickly as possible, so as to finally get to the 'heart of the matter' - whereas often these so-called reminders were far more far-reaching, and worthy of some reflection on their part, than the 'heart' I was in such a hurry to get to (and which, hurry or not, I didn't get to until more than a month later...). I think these dispositions are particularly noticeable in the three consecutive parts "The couple", "Our Mother Death" and "Refusal and acceptance". Even there, it's true, as I got back in touch with things that were supposed to be 'known', I couldn't help but renew my acquaintance, and sometimes in a new light - even for things as impersonal, at first sight, as the inventory of these 'doors to the world' that are each of the groups of yin-yang couples (or 'keyholes') linked by immediate affinities.

But it is with the next three parts (which also precede the last four, centred on the theme of violence) that I once again approach hitherto unexplored shores: 'La mathématique yin et yang', 'Le renversement du yin et du yang', 'Maîtres et Serviteurs'.

It was in the first of these parts that the 'great surprise' occurred, which was to throw new light on the meaning, or at least a certain meaning, of the Burial. It's about the fact that in my approach to mathematics, and more generally, in my spontaneous approach to discovering the world, the basic tonality of my being is *yin*, '*feminine*'. To put it another way, while the conditioned structure of the ego, the 'boss' of my company, is yang (not to say, 'macho' with a touch of zinc), my original nature, the 'child' in me (who is also the worker who shapes what the child discovers at play...) is predominantly '*feminine*'. And it's not this particularity alone that distinguishes my personal 'style' of approach to mathematics from that of anyone else. It seems to me that, even among mathematicians, it's not that unusual for this original background (or 'dominant') note to be *yin*. What is exceptional in my case (it seems to me) is that in my approach to discovery and, in particular, in my mathematical work, I have been fully faithful to this original nature all my life, without any desire to ap-

to make alterations or corrections, either in accordance with the wishes of an inner Censor (who, in any case, has never seen anything but fire, so far from suspecting a 'feminine' sensitivity and creative approach in a 'man's business' like mathematics!), or out of a concern to conform to the canons of good taste in force in the outside world, and more particularly, in the scientific world. There is no doubt in my mind that it is above all thanks to this fidelity to my own nature, in this limited area of my life at least (\*), that my mathematical creativity has been able to unfold fully and without hindrance, like a vigorous tree, firmly planted in the ground, unfurling freely to the rhythm of the nights and days, the winds and the seasons. And so it has been, despite the fact that my 'gifts' are rather modest, and that my beginnings were by no means auspicious (\*).

When I made this unexpected observation about my approach to mathematics, in the note "La mer qui monte..." ("The rising sea...") (n° 122) (\*\*), it came as a kind of unexpected curiosity, a little 'on the margins' of my life, where relationships with others are all about the same thing.

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(\*) As I've had occasion to say over and over again in the course of R and S, one of the two strongest egotic forces that dominated my life from the age of eight (until 1976, when I was forty-eight), was the repression of 'feminine' traits in me, in favour of traits felt to be 'virile'. It was only during the reflection on 'The Key to Yin and Yang' that I realised that this repression was not exercised in my mathematical work (nor, later, in meditation, or the work of self-discovery). The original 'feminine' dominance of my being was able to have a field day, in an activity generally perceived (and rightly so) as 'masculine' par excellence! (On this subject, see the note "The most 'macho' of the arts", n° 119.)

(\*) If I speak of "modest gifts", it's in no way out of false modesty. It's something I've been able to I have seen this again and again, both in contact with brilliant mathematicians who are incomparably quicker than I am to grasp the essentials and to learn about and assimilate new ideas, and in working relationships with anonymous students who have no serious mathematical background, but whose curiosity and mathematical inventiveness were momentarily aroused.

I talk a little about my 'beginnings' (at least, the beginnings of my contacts with the world of mathematicians, in 1948) in the section entitled 'The welcome stranger' (n° 9). It was three years earlier, however, in 1945, that my 'life as a mathematician' began, with most of my energy devoted to mathematical research. Until around 1949 or 1950, the prospects of me, as a foreigner in France, finding a livelihood as a mathematician, nevertheless seemed highly problematic. In case such a possibility did not present itself, I planned to learn carpentry, as a livelihood that might be to my liking.

(\*\*) See also the later note "The arrow and the wave" (n° 130).

the marking of my yang and superyang options. It is only in the rest of this reflection, centred on the dynamics of the conflict, and on the occasion of a return to the Burial, that I realise the extent to which the relationship of my fellow mathematicians to my person and, above all, to my work, has been marked by this unusual particularity, bringing into play in them reflexes of reserve (if not of rejection) in the face of a style of approach obscurely felt to be 'out of place' (not to say unseemly). Such reactions were common when I first entered the world of mathematics, but they were tempered in those clement times by the atmosphere of respect for others that prevailed at the time, at least in the mathematical circles where I had the good fortune to land. Later, they had to be suppressed, but nothing more, in view of 'the power of Grothendieck's results' (to quote a letter from Borel to Mebkhout, in which these 'reservations' are mentioned). On the other hand, they have become the rule, and are sometimes at ease behind a certain discretion of tone (which remains de rigueur) since my departure from the mathematical scene, when the respect of yesteryear has eroded and disappeared a long time ago, and when the person concerned (supposedly dead and buried) is no longer present to give the reply... This unforeseen aspect of L'Enterrement, as the symbolic burial of the 'mathematical feminine' in my modest person, is probed in the two notes 'La circon- stance providentielle - ou l'Apothéose' and 'Le désaveu - ou le rappel' (n° s 151, 152), of 23 and 24 December, right in the middle of the meditation on violence.

There is one last aspect of myself that I would like to mention, which came to light when I was writing The Key to Yin and Yang, in the last of the parts mentioned, 'Masters and Servants' (which immediately precedes the turn of thought begun with 'The Claw in the Velvet'). It's about the 'service impulse', and the leading role it has played in my choice of investments in mathematics and as a driving force at work in vast and interminable foundational tasks, which no one else after me has yet found the courage (or the humility...) to take up and pursue. This aspect, present in me with exceptional strength, is eloquent testimony to the 'feminine' dominance of my original nature, which has been preserved (or even taken refuge...) in mathematical activity (where no one would have the idea of going to look for it. . .).

It occurs to me at the moment that it is even possible that this impulse contributes its part, of a non-egotistical nature this time, to this 'shift' which has taken place in favour of intense mathematical activity, relegating the work of meditation to the background for an indeterminate period. This work, by its very nature, is solitary work, work that (it seems to me),

unless we are deluding ourselves, cannot be seen as an investment in the service of all, or of some 'ideal community of beings eager to know'. It would seem, then, that there is a deep-seated impulse, distinct from the egotistical desire for confirmation or approval, an impulse expressing a person's deep ties with the species of which he or she is a part, which must be frustrated in long-term meditation work, in the sense that I understand it. And this is perhaps an additional cause, on top of those (which are powerful enough on their own) that come from the structure of the ego (the dispositions of the 'boss', in other words), which makes such work seem such a rare thing that I'm not sure I've ever come across any trace of it in another person.

(<sup>187</sup>) (7 April) I think I have come to the end of this retrospective review of what the whole of Harvest and Sowing has taught me. I have only excluded from this retrospective the fifth part of Harvest and Sowing (\*), which has not yet been completed. It began as a 'digression' into the 'Key to Yin and Yang', a digression that eventually extended over a whole month, and materialised in a hundred pages of 'reading notes' on C. G. Jung's autobiography. As the end of this digression was still not clearly in sight, I put it off until later. Above all, I was anxious to bring the Burial to a successful conclusion, to get it written, typed up, printed and sent off to the right and left, at last - and to put an end to it!

I have a feeling that this fifth part is going to shed some unexpected light on this same Burial, but yes - through the examination I plan to make of Jung's relationship with Sigmund Freud, who for years had been a master to the young Jung, still seeking his own path. On first reading the chapter (of the autobiography) devoted to this relationship, I saw nothing but fire - then a number of unusual things caught my attention, I went back over some of them and went through the chapter again. Clearly, this relationship is fraught with ambiguity, which Freud himself seems to have sensed strongly, and which Jung is happy to ignore completely (as the first seminarist would do...), blaming Freud's malaise solely on his 'neurosis' (which he takes pleasure in describing in vivid colours, perhaps even a little too vivid to be entirely true. ...). All the same, various associations have come to mind with the relationship to me of my friend and (also) non-pupil Deligne, associations that I intend to follow up and perhaps delve into a little further.

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(\*) (22 June) And also, the fourth (which I am in the process of writing)! See footnote (\*\*) on page 1240.

tinet. I have a feeling that what happened with the Burial, in terms of the psychic mechanisms involved, is by no means a unique and atypical set of circumstances - quite the contrary! And I have a hunch that Jung's relationship with Freud may well provide further insights in this respect.

But for me, now at least, this fifth part (which may be called 'Jung - or the bogging down of an adventure' (\*)) is no longer the Burial, even if it came out of it - and I would even say : it's no longer Harvest and Sowing 1 It's '*The Aftermath*' - just like the echoes of all sorts, including surely the green and\*unripe ones, that will come back to me when I send you the three parts 'Fatuity and Renewal', 'Burial (I) - or The Dress of the Chinese Emperor', and 'Burial (III) - or the Four Operations' (\*\*). It's already going to be a thousand pages or more, once this part has been typed up - that's quite a lot! All in a day's work...

This eagerness to get it over and done with is probably, above all\*, the eagerness of a battle horse that smells gunpowder, impatient to get into the fray (\*). But perhaps, at a deeper level, there is also the desire to see a certain past detached from me. These 'thousand pages' are a striking embodiment of the *weight* of that past - and to see this work completed, right down to the last of the housekeeping tasks (the very last of which will no doubt be sending Récoltes et Semailles to the one hundred and thirty recipients already on my provisoire mailing list.... . (\*\*)), it also seems to me, almost instinctively, to be the moment when I will have *shed* this weight. Is this an illusion? Only time will tell...

And so I come to the 'final agreements' before this famous 'final point', which for more than a year now I thought I saw before me, and which from day to day, from week to week, from month to month has been pushed back, by the influx of the unforeseen which demanded its 'final point'.

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(\*) I was thinking of writing 'bogging down', but ended up writing 'burial' instead. There's no guarantee that the new name suggested by this slip of the tongue: 'Jung - or the burial of an adventure' won't be just as appropriate, or even more to the point, than the one I'd intended.

(\*\*) Not to be confused with the fourth part of Harvest and Sowing, subtitled "The Four". Operations", with the series of notes grouped under this name, which appears in this part (notes n° s 167<sup>✉</sup> -176<sup>✉</sup> ).

(\*) Such provisions are already discussed in the final section, "The weight of a past" (n° 50) of "Fatuité". and Renouvellement", in a slightly different light (where the "battle horse" is replaced by the bull, setting off in pursuit of a piece of red cloth that is "waved in front of his nose" . . . ).

(\*\*) The famous "weight" will then become even more "striking", with two hundred thousand pages (200 x 1000), instead of a thousand!

place.

What's left to say in these final chords? There is gratitude, expressed as 'thanks', this reflection is the fruit of solitude, and yet I have been helped in many ways.

The most obvious help came from Zoghman Mebkhou, in many ways too : by the patience with which he got me 'into the bath' of philosophy around the theorem of the good God-Mebkhou; by the confidence he showed in me by sharing with me, against all odds, the difficulties and setbacks that were his in his relations with those who were my students; by the help he gave me to find my way in a dense mathematical literature, with which I had lost contact; finally, by the friendly and unreserved interest he showed, from the moment he became aware of it, in this work in which he saw me engaged, in which he above all (I believe) perceived and welcomed the *testimony*.

I am also grateful to Pierre Deligne for coming to see me and read (last October) the then written part of L'Enterrement, and for his comments (\*). This visit also helped me in more ways than one.

Finally, I was helped by the goodwill and sympathetic atmosphere I found among the USTL secretaries who typed the manuscript: Mlle Boulet, Mme Boucher, Mlle Brun, Mme cellier, Mlle Lacan, Mme Mori, two of whom took time out of their personal schedules to do some of the typing on time, without accepting any payment for this work - a gesture that touched me deeply. Miss Lacan, on the other hand, single-handedly typed the whole of the second half of my notes for Récoltes et Semailles, with exemplary care and efficiency. I am happy to express my gratitude to each and every one of them.

I am also thinking of all those who, at many times during my work, have seemed to disturb it and my peace of mind, often in unwelcome ways (\*\*). Surely, these 'disturbances' themselves, which at times have tested me and some of which still leave me with a residue of sadness, also have their role to play.

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(\*) For this visit and the details given to me by Deligne, see the two notes (n° s 163, 164) forming the "Last duties (or the visit)" part of L'Enterrement (III).

(\*\*) These 'disturbances' have been alluded to here and there in the notes of recent months. See on this subject, in particular, the note "The messenger (2)" (n° 181)

to play a part in my work, and to bring me a message that it's up to me to listen to and assimilate. When sadness or resentment are resolved into gratitude, I'll know that this message has been received. ...

(<sup>188</sup>) For almost a year now, these final agreements of the Burial have had a name all their own: De Profundis! In the Introduction (I 7, 'The Ordering of Funerals') I went even further, announcing (imprudently perhaps. . . ) that it is the 'complete satisfaction' of the deceased which forms 'the final note and the ultimate chord of the memorable Funeral'. I was excusable at the time for making this prediction (as if it were a thing of the past) - at the time of writing (in May last year) it did indeed seem to be a very short-term prediction, when I thought I was on the verge of arriving at these final chords of the 'De Profundis'.

It's true that, in a much more acute way than last year (when the 'second wind' of reflection was coming to an end), I realise how far I am from having really 'done the trick' of L'Enterrement, apart from the material facts alone (which I seem to 'hold' to my full sufficiency (\*)). If it's true, as it has seemed to me at times, that understanding L'Enterrement is also 'understanding the conflict', it's likely that the time I have left won't be enough to 'do the trick' - not in depth, at least.

So I can say that I am writing this final note in a very different frame of mind from the one I had when I wrote the Introduction to the Burial. Does this mean that I am ending this reflection without that feeling of 'complete satisfaction'?

I don't think so. As soon as a vision deepens, the work that gave rise to the vision and prepared for its deepening, and which may have seemed to have been 'completed', turns out to be *unfinished*, with the appearance of something 'beyond' what had been done. However, the *meaning* of work, and of the satisfaction or dissatisfaction it gives us, does not lie in its completion, and does not depend on whether or not the work is destined to be completed. The meaning of work is in the work itself, it is in the *present moment* - in the dispositions in which we do it, in the love we put into it (or in the absence of love...).  
- not in some hypothetical future beyond our reach.

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(\*) (10 May) However, after these lines were written, more than a month went by 'fitting' as best we could new facts that had come to light, into a good twenty sub-notes added at the last minute!

In March last year, before I had even discovered Burial, I wrote in the introduction (I 1, "Dream and Fulfilment", p. iv):

"... I leave this work with the complete satisfaction of someone who knows he has completed a job. There is nothing, no matter how 'small', that I have avoided, or that I would have liked to say but did not, and that at this moment would leave me with the residue of dissatisfaction, of regret, no matter how 'small'."

I know now that this work, which I thought was 'finished', is not yet finished, and may never be. But I also know that this is, all in all, a secondary thing. This 'complete satisfaction', which I felt strongly at the very moment when I was writing these lines that attempt to capture it as closely as possible, followed me throughout the writing of *Récoltes et Semailles*. She was an old friend of mine, who had accompanied me throughout my life as a mathematician, letting me know in a low voice that I was on the right track. I found her again later, in my meditation work - it's the same person.

When I stop hearing it, the work loses its meaning. That's why his voice is precious to me, and why I take great care in my work never to stray from it. It's because of this that work has been a source of joy throughout my life, in the 'complete satisfaction' of those who give their all to it.

It has been no different in the work that is coming to an end - this work that is "*Harvest*", and which is at the same time "*Sowing*"...

