

# 2022-世界杯手记

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## 目录

### 1 小组赛回顾

这届世界杯是精彩的，进球很多，剧情也很丰富。

When Pierre Deligne accepted the offer of a permanent position at the Institut des Hautes Etudes Scientifiques, he referred to it, from the vantage point of a visit to Harvard, as a “little paradise”. And so it must have seemed to many if not all of those whose contacts with the IHES were limited to the exercise of scientific research, especially after the installation of the Institute in 1962 in the poetic wooded domain known as the Bois Marie, in the peaceful village of Bures-sur-Yvette some twenty miles south of Paris.

For those involved in the administrative running of the IHES, the story is more complex and less paradisiac, and it was all the more difficult and trying for the three people who assisted at the very birth of the Institute: its conceiver, director, and founder Léon Motchane, and the first two mathematicians that he invited to join his institute as permanent professors, Jean Dieudonné and Alexandre Grothendieck.

Léon Motchane was an experienced businessman of Russian origin, although he had left Russia at the age of 18 to live first in Switzerland, then in France, where he eventually became a citizen. As a banking magnate, he was incredibly successful, but his remarkable spirit also led him to remarkable adventures such as his participation in the clandestine publishing house *Les Editions de Minuit* created during the German occupation and devoted to secretly printing and distributing daring wartime novels (of which the most famous is probably *Le Silence de la Mer* by Vercors). Having joined the company through his friendship with one of its active members, Yvonne Paraf, Motchane not only aided their activities – improving the distribution network, for example, in 1943, by the use of assistants on bicycles – but also published a book, *La pensée patiente*, and married Yvonne Paraf at the end of the war.

At this point in his life, Motchane apparently decided to return to his former love, mathematics (he had studied mathematics and physics in Russia and in Switzerland), and undertook to write a doctoral thesis, which he completed in Paris in 1954. During this time, he became acquainted with the physicist Robert Oppenheimer, head of the Institute of Advanced Studies in Princeton and chairman of the general advisory committee of the Atomic Energy Commission, which had been set up by the government to replace the Manhattan Project, overseeing all atomic research

and development in the country. Strangely, Oppenheimer had been named head of the Manhattan Project during the war and chairman of the AEC in spite of his vocal opposition to the creation of new and more powerful bombs. His stand on the hydrogen bomb caused him to be removed from the AEC in 1953, during the McCarthy era, but his position at the IAS continued uninterrupted until he became ill with cancer in 1966.

From reading the letters between Motchane and Oppenheimer, it emerges clearly that Oppenheimer represented a kind of ideal for Motchane: the extraordinary scientist who at the same time wields the kind of power and public influence for which Motchane very obviously thirsted. Scientific genius held an intense attraction for him, and it is obvious that he had the deepest respect for it and a sincere desire to nurture it in others, well aware that in spite of his deep interest, such genius was entirely lacking in himself. The idea which flashed into his mind one day – the creation of a French answer to the IHES – is entirely understandable: given the impossibility of he himself actually being the European Oppenheimer, he realized that he could accomplish something quite equivalent by associating himself, in the role of powerful and influential director, with a few scientists of the highest level that Europe could offer – preferably of the type who would leave the running of the newly conceived institute to him – and together, collectively, create something equivalent to Oppenheimer’s IAS.

Because Motchane’s thesis work had introduced him into the world of French mathematicians, the name of Grothendieck was suggested to him almost as soon as he had begun to discuss his idea with his colleagues. At that time, Grothendieck was being paid by the CNRS, as he had been on and off since 1950, and had in fact only just been promoted Director of Research. However, CNRS positions were not at that time considered permanent, as they now are; they were stepping stones on the way to becoming a university professor, a position barred to Grothendieck because he was stateless.

If Grothendieck had no intention of asking for French citizenship, it was not merely because he wished to avoid the military draft as a personal bother, but more deeply, because he was a committed pacifist, and also no doubt because the statelessness itself appealed to him in its total independence from governmental constraint; his and his parents’ experiences with the Nazi government would be warning enough about the dangers of citizenship. His later attitude towards John Nash bears witness to this. In any case, when Motchane offered him the possibility of becoming one of the two first “permanent professors” at the fledgling institute, with Jean Dieudonné, who had been a professor at the University of Chicago since 1952 as the other, they both accepted at once, undeterred by the uncertainty of continued funding, and willing to have confidence in Motchane’s ability to carry his project through (it should be said that Dieudonné was already acquainted with Motchane, and advised Grothendieck that he very probably need not worry). In any case, by 1958, Grothendieck’s reputation was solidly established and he was well aware that if the IHES fell through, he would have more than one job offer from prestigious and interesting places, although they might not be in France.

In order to understand the subsequent relations between Motchane and Grothendieck and the curve of events which led to their nearly simultaneous resignations in 1970, it is necessary to understand something of who Léon Motchane was, his personality and his methods. The bare biographic facts already show clearly that he was enterprising, efficient and in a certain manner extremely idealistic, in the sense that he aimed high and worked hard for causes that were worthy

and noble. If in doing this work, he was also seeking personal glory and gratification, and if his methods frequently involved the use of manipulation, flattery, semi-truth or hiding of facts, dividing the better to conquer, hypocrisy and other such familiar techniques for administrative success – in a word, he proceeded on the assumption that the end justifies the means – it can be said to his credit that what he undertook was impressive and admirable, and he did it brilliantly, and that very probably a different type of person would not have been able to carry it through.

Grothendieck profited from Motchane's efforts for eleven years, and during that time, it may seem that conditions improved steadily – by increased salaries, increased reputation, much improved working conditions, the purchase of the lovely Bois-Marie, and then the adjunction of living quarters for the professors and visitors. But the thick file of letters exchanged between Motchane and Grothendieck show clearly that relations were not smooth. Motchane's methods, although he tried to hide his financial maneuvers from his 'permanents', tended to occasionally circle back to the ears of Dieudonné and Grothendieck through interventions of third parties and caused a series of crises and disputes starting as early as 1959; other causes of friction were their violently differing attitudes towards certain aspects of the life that he had chosen which were precious and fundamental to Motchane and a source of contempt for Grothendieck; Motchane's desire for ceremonies and ceremonial relations between people, his interest in awards and recompenses, his belief in and desire to build a public image, and one which would reflect back upon himself and seeming admirable in the eyes of others, obtain grace also in his own.

## 5, Rond-Point Bugeaud

It took Motchane some years to line up a sufficient number of corporate and governmental sponsors to render the possibility of a long-term project realistic. In pursuing these sponsorships, one of his principal weapons (apart from his natural sense of finance and talent for persuasion) was his acquaintance with Oppenheimer, who in spite of his difficulties under McCarthyism was still one of the most prestigious and well-known scientists in the world. Motchane named Oppenheimer to his Administrative Council and repeatedly invited him to France to attend the meetings, invitations which Oppenheimer accepted when he could, but was frequently obliged to refuse or cancel at the last minute. Motchane tried to organize meetings of the Administrative Council around Oppenheimer's visits to Europe in order to increase the likelihood that he would be there, even if just for a brief afternoon; he encouraged his prospective sponsors by honoring them with an introduction to the great man and humbly requested Oppenheimer to please be ready to shake a few hands.

When the financial situation was sufficiently stable, Motchane proceeded to seek for a location for his tiny Institute, and managed to convince the Fondation Thiers to lend a couple of offices, and a seminar room once a week. Modest though these quarters were in terms of size, the Fondation Thiers building was a monument of elegance and luxury, situated at the address then called 5, rond-point Bugeaud in the chic 16th arrondissement of Paris. The luxurious building was sold in 1986, and after a stint as a British-style club, eventually became the Hotel Saint-James Paris and can be admired today at the modified address 43 avenue Bugeaud.

The Fondation Thiers, which occupied the building from 1892, was devoted to supporting research and young researchers, particularly in the domain of the social sciences; fifteen researchers were not merely salaried, but lived in the building in luxurious circumstances, with a concierge

and some twenty or thirty service people working in the building for their comfort; above and beyond these pleasing living circumstances, the Fondation also provided each of its researches with an indispensable visit to Italy. Alas, it eventually encountered a series of serious financial crises, and after the war it would have been compelled to close its doors had it not been rescued by the CNRS, which in a more modest and modern way was providing support (but not lodging) to young researchers in the sciences. Thus, it was with the CNRS that Motchane was able to negotiate the tiny locale attributed to him within the enormous Fondation building. He settled in two offices, together with Mademoiselle Annie Rolland, who as the General Secretary of the fledgling institute was to oil its wheels, smooth its path and iron out its wrinkles for the next eleven years, and entered into the role of Director of the IHES.

It might seem that the work of a director of an institute containing all of two mathematicians, both of them independent-minded, illustrious and productive, and both of whom worked on their research at home, would not necessarily constitute a full-time occupation. However, this would be a misconception: indeed, Motchane's work was cut out for him. For one thing, he and Annie Rolland had to organize all the material supporting circumstances for the public aspects of his Institute that he hoped would build its reputation and eventually create its fame: namely the Séminaire de Géométrie Algébrique, held once a week in a lecture room in the Fondation Thiers building, run by Grothendieck and to which flocked the cream of Paris students, and the Publications Mathématiques, run by Dieudonné and destined to publish manuscripts of importance, those written by Grothendieck and Dieudonné among the earliest. This meant that hours each week were taken up by having posters for the seminar printed and posted at all the universities around Paris, by having the notes for the seminar run off in sufficient numbers, by negotiating contracts with printers and organizing distribution of the issues of the Publications Mathématiques, and by keeping up to date an increasingly long mailing list of international mathematicians who wanted the latest texts. Furthermore, there was the matter of invitations; all three members were agreed that the IHES should become a desirable place for mathematicians to visit, and the selection of whom to invite, for how much time and for how much money, followed by the necessity of organizing lodgings and paperwork for the visitors constituted yet another sizeable task. Then, there was the paperwork inherent, especially in France, in any official enterprise: the newly created institute had to have a legal status, and an administrative council and a scientific council which would meet regularly to discuss important issue. Finally, there was the major matter of fund-raising, which was Motchane's particular domain.

The rules and statutes of the Institute left the domain of activity of the institute and the precise role of its professors relatively vague. Article 2 states that:

*L'action de l'Association s'exerce principalement par la mise à la disposition des savants, nommés professeurs permanents ou temporaires de l'Institut, des ressources matérielles leur permettant de réaliser des recherches désintéressées, et accessoirement par l'institution de prix, bourses et récompenses, ainsi que par la publication de bulletins scientifiques, l'organisation de cours, conférences, séminaires, de tous échanges scientifiques, la fondation d'un centre comprenant des bibliothèques, salles de réunions et bureaux de travail et, d'une façon générale, par la participation à toute expression d'activité scientifique conforme à son but.*

The perfect similarity of the IHES today with the description above, amateurishly typed on

an old and slightly uneven manual machine, shows to what point Motchane was both visionary and pragmatic; one notes with astonishment the care taken to declare the right of the Institute to eventually purchase not only buildings, but also “woods or forests” if these would be useful to pursuing its goals. In fact, in spite of its standard-sounding language, the conception expressed here is quite interesting: Motchane viewed the Institute as being created for the service of its professors, and their research as “disinterested”, rather than viewing the Institute together with its professors and their research as having been created for the service, or for the good, of the wider community, like any other university or research center. The writing of this paragraph reflects Motchane’s admiring attitude towards science and scientists of genius and a real desire to nurture it and to employ his considerable ego and organizational talents for its benefit.

The IHES was founded under the French law of 1901 defining associations with non-lucrative goals (“association à but non lucratif”), namely any legal association with another specific goal than that of financial profit. In December 1960, Motchane succeeded in having his association recognized with the status “association of public benefit (“associations d’utilité publique”), a status which apart from the legal benefits of being allowed, for example, to receive legacies, is mainly a question of prestige. For the rest, the statutes are almost entirely concerned with the Administrative Council. The association grouped members of three different types: titular, donor and honor, according to what kind of services the person rendered; these people were the influential sponsors and donors that Motchane succeeded in attracting to the support of his project. From these members, an Administrative Council of six persons was to be elected: the list of its first members is given in the Statutes as Joseph Pérès, Fernand Picard, Paul Huvelin, Maurice Porte, Léon Kaplan, and Gabrielle Reinach. Ninety percent of the statutes is concerned with details of how to become a member of this council, how to stop being a member, the conditions for membership, the dues to be paid, the conditions for calling a meeting of the Administrative Council and so forth. In addition to this Council, the statutes note the creation of a Scientific Committee whose members are given as: the President of the Administrative Council, the Director of the Institute, all the permanent professors, and some outside members which, at the start, consisted of Paul Montel, Robert Oppenheimer and Joseph Peres. It is made clear in the Articles of the Statutes concerning this Scientific Committee that it has a purely consultatory role – that is, that final decisions are to be made by the Director – and that the role of the Scientific Committee in general is to consider essentially and only the choice of “scientific personnel”, i.e. of permanent or visiting professors.

In principle, REGLEMENT INTERIEUR according to the statutes, Grothendieck’s role apart from research and running his seminar was supposed to be limited to discussing invitations to the institute. He could have requested or even demanded information about the institute’s finances, but in fact he was content to let Motchane handle these issues alone, preferring not to worry about the nature of the sources of financial donations, or about the institute’s unstable financial situation in general. In his own words:

*Sans me laisser impressionner tout au long de ces quatre années par les mises en garde et rumeurs persistantes de faillite imminente d’une “aventure” (à ce que laissaient entendre des amis bien informés...) entièrement irréaliste, pour ne pas dire fumiste sur les bords! Le fait est que l’IHES n’avait alors la moindre assise financière ou foncière, sa vie restait constamment suspendue à des donations à court terme de quelques industriels plus ou moins bien disposés. Je ne m’en pr occupais guère, me bornant à faire confiance au directeur-fondateur Léon Motchane, qui arrivait*

*d'année en année à “sauver la mise” par des prodiges de prestidigitation financière et de “public relations”. Après tout, en ces temps cléments, si ça s'écroulait, j'avais de bonnes chances de retrouver rapidement un point de chute moins problématique! Par contre, si je gagnais le pari que j'avais fait sur l'IHES (avec l'encouragement de Dieudonné, qui connaissait Motchane et en lequel j'avais toute confiance), ma position à l'IHES me convenait mieux que toute autre dont j'avais connaissance.* (RS 442 footnote)

Working at home on his mathematical research day and night, running his famous seminar, discussing with Dieudonné about the writing up of the EGA, discussing invitations to the Institute with Dieudonné and Motchane; these were Grothendieck's professional tasks in those first years of the IHES, and if he terms those years “heroic”, it was because the reputation of the Institute was being built entirely on his work and that of Dieudonné, and it must be admitted that Dieudonné's role in Grothendieck's eyes during those years was reduced to little or nothing in terms of original research, though his written production was enormous and the running of the Publications Mathématiques one of the elements contributing to the success of the IHES: “pendant les années en question (1958-1964), le temps de Dieudonné se partageait pour l'essentiel entre la rédaction des *Eléments de Géométrie Algébrique* [...] et les rédactions Bourbaki – mis à part le piano et la cuisine (Dieudonné était à la fois fin musicien et fin cuisinier)...” (RS 441)

From the beginning, Grothendieck felt that the Institute was being carried forward on the strength of his research and his research alone, and because he accepted that responsibility and with it, the minimal-to-non-existent working conditions (a modest salary, no office, no library) that were all the still largely conceptual Institute could provide him with at that time, he terms this period “the heroic years”: a time of risk and hope and ambition.

## Troubles

There are, however, a number of elements that cast a shadow on this admirable picture.

‘...“l’interdisciplinarité” a été dès les débuts de l’IHES le grand thème de prédilection de son directeur-fondateur.’ (RS 444)

‘...il a alors (selon une tactique éprouvée qu’il maniait à la perfection) joué le jeu du “diviser pour régner”...(RS 541)

p. 856 and preceding of RS, there’s an interesting discussion of rigid analytique geometry, set more or less in the year 1961.

The causes of Grothendieck’s sudden and definitive departure from the IHES in 1970 have often been discussed and analyzed. And this is natural enough from the point of view of professional mathematicians, for most of whom such an act, abandoning a job whose working conditions were more than ideal, first for the uncertainty of a temporary position, then for the mediocrity and the teaching duties of a provincial university, would be unthinkable.

For a long time, it would appear that Grothendieck himself viewed his own act as something sudden and completely unpredictable, which would have amazed him as much as anyone else just a few months earlier. He repeatedly qualifies the sudden rupture and departure from the IHES as “le grand tournant” of his life, a metaphorical image of a path, hitherto straightforward and without surprises, swinging abruptly around a blind corner to reveal an utterly new vista. From this point of view, he attributed the cause of his departure to the discovery that the IHES was accepting a small amount of funding from a military source: “j’ai quitté “le grand monde” mathématique en 1970, à la suite d’une histoire de fonds militaires dans mon institution d’attache...” (RS 74)

In various writings, however, Grothendieck does confront the question of whether the straight road leading up to the rupture was really as uncomplicated and as ideal as he remembered viewing it at the time: twenty years devoted to the steady and brilliant progress of his mathematical program, taking place in comfortable surroundings within a group of colleagues with whom he had affectionate and productive professional relationships. Via some efforts of memory and of consultation of articles and letters, he eventually came to the conclusion that although he noticed nothing consciously at the time, there were already some indications that all was not quite as simple as he had thought. For one thing, he notes, his relationships with his students were not as wholly free from conflict as they had appeared to him: “Ce n’est pas le grand tournant de 1970 qui a créé des antagonismes entre certains ex-élèves et moi, sur l’arrière-fond d’un passé idyllique et sans nuages. Il a seulement rendu visible des antagonismes qui pouvaient difficilement s’exprimer dans le cadre plus conventionnel d’une relation patron-élève typique,” (RS 178) he writes, and even more tellingly:

*Derrière la façade aimable des relations de bonne compagnie au sein d’une même institution feutrée, mon départ finalement arrangeait tout le monde, pour des raisons que je crois discerner avec le recul, et qui n’étaient pas les mêmes chez tous...Si je ne comprenais pas alors le sens de ce qui se passait, c’est que décidément je ne voulais pas comprendre des choses pourtant bien assez claires et même éloquentes!Â Comme si souvent au cours de ma vie, il y avait alors en moi une angoisse (jamais appelée de ce nom!) qui me signalait un “décollage” entre une réalité dont je ne voulais pas me séparer: l’image de ce qu’avait été mon rôle dans l’institution que je quittais, et plus encore, peut-être, l’image de ce qu’avait été la relation à mon ami [Pierre Deligne]. (RS orig 235)*

Although these unrecognized tensions with respect to his colleagues undoubtedly existed, and certainly contributed to the unconscious but gradually increasing rejection of the life he had chosen

and imposed on himself, they do not tell the whole story. There were other causes, some of which were felt by the people around him long before he noticed them himself. Jean-Pierre Serre, for instance, bluntly observed that Grothendieck was quite simply tired of endlessly working on his gigantic task, and that the progress of the task was not so smooth and perfect as might have been believed:

*J'ai l'impression que, malgré ton énergie bien connue, tu étais tout simplement fatigué de l'énorme travail que tu avais entrepris. D'autant plus qu'il y avait aussi les SGA qui prenaient du retard, année après année. Je me souviens de l'état plutôt désastreux de SGA5 où les rédacteurs se perdaient dans des masses de diagrammes dont ils étaient réduits à affirmer sans preuve la commutativité (au signe près, en étant optimiste...); et ces commutativités étaient essentielles pour la suite. C'est à cet état désastreux (et non pas idyllique comme on le croirait à lire Récoltes et Semailles) que se réfère ma phrase du séminaire Bourbaki: "...la version définitive de SGA 5, qui devrait être plus convaincante que les exposés polycopiés existants."* ([CGS], Feb. 8, 1986)

In the same letter, written to Grothendieck as a reaction to Récoltes et Semailles, Serre suggests the possibility that Grothendieck was not only tired, but also frustrated or discouraged by an awareness that his methods, while brilliantly successful in certain domains, would not have much of an effect on the specific problems and situations of number theory.

*On peut se demander s'il n'y pas une explication plus profonde que la simple fatigue d'avoir à porter à bout de bras tant de milliers de pages. Tu décris quelque part ton approche des maths, où l'on n'attaque pas un problème de front, mais où on l'enveloppe et le dissout dans une marée montante de théories générales. Très bien: c'est là ta façon de travailler, et ce que tu as fait montre que cela marche effectivement. Du moins pour les EVT et la géométrie algébrique... C'est beaucoup moins clair pour la théorie des nombres (où les structures en jeu sont loin d'être évidentes – ou plutôt, où toutes les structures possibles sont en jeu); même réserve pour la théorie des formes modulaires, visiblement plus riche que son simple aspect "groupes de Lie" et son simple aspect "géométrie algébrique – schémas de modules". D'où la question: ne serais-tu pas arrivé, vers 1968-1970, à te rendre compte que la méthode "marée montante" était impuissante contre ce genre de problèmes, et qu'il fallait changer de style – ce qui te déplaisait?*

Given that Grothendieck was never much of an arithmetician, and was not especially attracted by the type of number theoretical question that fascinated Serre (and also the fact that he undoubtedly had enough of his own type of mathematics up his sleeve to last several lifetimes without being compelled to change style), this particular motivation seems less likely to have affected Grothendieck's attitude than the weariness mentioned above, which is echoed and confirmed by the passages from Grothendieck's text (given in chapter 1) in which he speaks of his tasks as a burden, and himself as their prisoner. Serre obviously perceived this fatigue in Grothendieck as early as 1968 if not even before, and he was not alone in this sentiment, although Grothendieck himself evokes it only with hindsight, as having been unaware of projecting such an impression at the time.

Apart from this fatigue, there is another source of pressure which may well have led up to the 1970 rupture that he and most people perceive as a breaking point. This point is lost on most mathematicians not acquainted with Grothendieck, because mathematics professors the world over tend to emerge from the highly educated, wealthy and comfortable upper bourgeoisie. All of



Grothendieck's colleagues must have shared similar experiences of childhood and youth – culture, vacations, loving and caring parents, the Ecole Normale – that were like nothing that Grothendieck himself had ever known. The fact is that, whereas his colleagues (and most mathematicians) are very comfortable in their milieu, peopled as it is with others of similar backgrounds, it must have felt very foreign to Grothendieck. This was probably clearer to him as a young man in Nancy, when his friends, such as Paulo Ribenboim or Terry Mirkil, were like himself penniless foreigners subsisting on slim stipends, but later he must have developed a well-functioning carapace to protect himself from the continual culture shock produced by the difference between his own living style (which continued to be that in which he had grown up) and that of his colleagues, and the effect that their surprised regard must have unconsciously produced on him, even without a word being pronounced. Cartier's reaction: "Je n'arrive pas à comprendre pourquoi il a toujours vécu dans des logements horribles; il travaille la nuit, en général dans une pièce immonde, avec le crêpi qui tombe, et en tournant le dos à la fenêtre (à la recherche de quelle humiliation?)" certainly describes the impressions of everyone who visited his home, and the description resembles passages from the autobiographical writings of Grothendieck's mother too much to be ignored:

#### LOTTE KELLER QUOTE

Apart from the building pressure on Grothendieck, he and many of his close friends and colleagues have also considered the role of certain events which may have acted as catalysts, either for the 1970 rupture or for a certain change or bifurcation in his attitude which was dimly felt, as mentioned above, already as early as 1966 or 1968. Pierre Cartier suggests that Grothendieck's attitude to his own work changed already starting in 1966, the year in which he won the Fields Medal. He mentions the "Nobel syndrome", in which the intense visibility and importance acquired by someone who wins a major prize exerts excessive pressure: "je désigne par ce nom un type de dépression qui a saisi certains des récipiendaires du prix Nobel. Incapables de confronter leur personne et ce qui leur reste à vivre – surtout si la distinction est venue assez tôt – à ce personnage statufié par la reconnaissance mondiale, ils craignent d'avoir donné le meilleur d'eux-mêmes et de ne plus pouvoir se hisser à ces hauteurs" [C].

Another catalyst, evoked for example by Valentin Poenaru as well as by Cartier, was provided by the events of May 1968, during which Grothendieck's natural tendency to anarchist political views found itself echoed in the outside world, only for him to discover that as an important university professor, he was considered external and even inimical to the movement. (A COMPLETE) Finally, the effect of Deligne's presence at the IHES was perceived as having an important effect on Grothendieck. Cartier synthesizes all the above perceptions, both of long-term pressure and of catalysts for change, in the succinct commentary: "Les raisons de cet abandon en rase campagne? Crûment dit, il est rattrapé par sa psychose, mais dans le contingent: désespoir d'être dépassé par son disciple préféré Deligne, "syndrome Nobel", mise à jour par la "révolution soixante-huitarde" de la contradiction entre le libertaire qu'il croit être et le mandarin universitaire qu'il est aux yeux des autres, sentiment d'échec devant certaines de ses tentatives mathématiques avortées (conjecture de Hodge, conjectures dites standard), épuisement et lassitude après 20 années d'engagement total, jour et nuit, au service de sa muse mathématique? Un mélange de tout cela." [C]

All of the issues explained above have been discussed at length, both by Grothendieck and by others, as possible or partial causes for his abrupt, unexpected and astonishing decision to leave the IHES in 1970, and all of them have their value. However, the picture they paint, including

Grothendieck's own description, invariably present the situation as one where some outer cause (be it the Fields Medal, the events of May 1968 or the discovery of military funding) causes the final bursting of the lid of a pressure cooker of building tension, caused over the years by unrecognized conflicts and a sense of fatigue. In this chapter, I propose a different psychological view of Grothendieck's development through the years leading up to 1970, essentially expressed by two important ideas.

Firstly, I suggest that *Grothendieck's twenty year stretch of singleminded devotion to mathematics was not so much a choice* – devotion to one all-important activity (“un engagement total au service de la muse”) to the exclusion and consequent stagnation of all else – *but a necessary consequence of the powerful repression of other drives, emotions and interests. This repression* – manifested by many of Grothendieck's characteristic traits during this period observed by others and later by himself (“monomaniac” (Demazure), “driven by duty” (Serre); Grothendieck himself mentions “des forces profondes de mon être, pliées et vissées dans un état de déséquilibre intense, figé” – an accurate portrait of repression if ever there was one) – *appears to me to be intimately linked to Grothendieck's relationships with both his parents.* On the one hand, the unnamed fear of meeting a horrible and tragic destiny such as theirs must have been a powerful psychological deterrent to Grothendieck's natural tendency and profound desire to follow in their footsteps in the direction of unfettered political, emotional and sexual engagement, pursued with a view to ushering in a new and superior epoch of human development. On the other, he was able to employ his mathematical genius (for the existence of which no explanation, psychological or otherwise, need be furnished) to compensate for this sometime betrayal, by transforming it into a form of public service and devoting himself to that service with an intensity equal to his father's, while at the same time reaching the level of effort and genius which had inspired his mother in his father, and alone could be worthy of her. His work, as attested by many, was always done in solitude, at his desk faced with the oil portrait of his father and the death-mask of his mother, the latter covered with a respectful cloth which he removed when he seated himself to work. As investigation of the unknown, his mathematical research may have been the happy work of an exploring child, as he often describes it, but above and beyond this aspect which stemmed from his natural genius, in its aspects of monomaniacal investment and public service, his work was a votive service to the dead.

Secondly, I believe that *the 1970 rupture was not, as it is usually portrayed, a sudden breaking down of long upheld but eroding resistance to inner pressures* – resistance already weakened in some accounts by certain catalysts such as the Fields Medal syndrome or the events of May 1968 – *implying the sudden and drastic abandonment of his gigantic mathematical program, but the natural continuation of an unconscious process begun in 1965, of transferring total responsibility for the accomplishment of his self-imposed mathematical task (duty, burden) to the shoulders of Deligne, elected alter ego, so as to recover his freedom without consciously violating his sense of duty or sacrificing his mathematical program.*

To my mind, the only true and convincing answer to Serre's pointed question: “Pourquoi, toi, tu as abandonné l'œuvre en question?” is this: that he did not, or at least, he did not intend to. And the failure of his unconsciously elaborated plan, implying as it does a failure of duty, appears to me to lie at the root of the resentment expressed over hundreds of pages in *Récoltes et Semailles*, a resentment which under an incredibly coherent appearance (bringing forth many justified accusations of certain acts lying at the limits of intellectual honesty) nevertheless strikes readers as inexplicable and even pathological in its grand lines, since Grothendieck seems to be

accusing other mathematicians (Deligne above all) of *having done mathematics in their own way rather than in his*, something which should patently provoke admiration rather than anger. If Grothendieck was able to turn his attention so entirely to other matters during the 1970's, that he was not even aware of whether his mathematical program was being carried on exactly as he thought it should be or not, it is not because he had become entirely uninterested in it; *Récoltes et Semailles* makes that clear enough. It is because he believed beyond the shadow of a doubt that represented by Deligne (surrounded in principle by a helpful host of collaborators) *he himself*, or as good as, was in fact still continuing the work. If massacre and burial occurred, it was this other Grothendieck who died and was buried, in the mind of one who was for twelve years convinced of his existence, only to learn suddenly and painfully that it was all a giant illusion.

### Le beurre et l'argent du beurre

He did not select Deligne as his student, or as his “heir”, or his “disciple”, although he (hesitantly and doubtfully – one feels he knows they are the wrong words, as are the “mon ami” that he finally elects) does sometimes use these words. But in truth, he elected Deligne to *be himself*, charging him by transference with the full extent of his own duties as he defined them to himself. In this light, the peculiar attitude towards Deligne evinced again and again in *Récoltes et Semailles* and witnessed by all sorts of incomprehensible features, some so absurd that even Grothendieck himself returns to question them later, make much better sense.

Consider, for example, Grothendieck's rather self-conscious minimisation of the amount of mathematics that he communicated to Deligne over the three or four years during which they worked closely together: sentences such as “je lui ai enseigné le peu que je savais en géométrie algébrique”, or “je ne lui ai jamais parlé sans apprendre quelque chose”. Grothendieck later actually berates himself for such obvious absurdities and goes so far as to ask himself in all sincerity why he wrote them, concluding that it was from a desire to appear modest and minimise his own influence – a desire which is entirely absent from every other part of his writings! My opinion is that he minimises the importance of what he brought to Deligne *because in doing so, he also minimises his awareness of the tremendous weight of the burden he was transferring simultaneously*. He cannot admit to having transferred something enormous – because to admit it would be to see immediately and clearly how wrong, and how impossible, it was.

Similarly, consider Grothendieck's seeming resentment at the fact that Deligne proved the Weil conjectures in an unexpected way, without proving the standard conjectures. The entire world lauds Deligne's proof as brilliant; Grothendieck stands alone in opposition and disappointment. This only makes sense if one accepts that what was disappointing was not that Deligne had done poor mathematics, but that he had done *other* mathematics – not Grothendieck's mathematics.

In view of this discussion, my feeling is that the bifurcation occurred in 1965-1966, and took the form of an unconsciously perceived liberation: Grothendieck authorized himself little by little to turn away from his task, in the profound conviction that it was going to be carried forward by his docile other self. From this point of view, everything he chose to do after 1966 – his interest in biology, his insistence on Deligne's being hired at the IHES, his open conflicts with his colleagues and director there on this and on other issues, his involvement in the events of May 1968 – all form a picture of a man who has succeeded in finding the way to satisfy his repressed urges without

sacrificing his self-image, and lead so naturally to his departure from the IHES that rather than a rupture, it appears like a homecoming.

## 1965-1966

As the slowly emerging repressed interests began to take increasing power in his life, I feel that the extreme difficulty of living in a society that had nothing to do with the one in which he had grown up, and the strong temptation to return to the style of living and of social relationships he had known in his youth, exerted an inner pressure on him to leave the IHES altogether. And close examination of the archives shows that in fact, from 1966 or 1967 onwards – from the time, in fact, in which he felt confident enough that he was not abandoning his program to actually abandon it, he began to prepare for his own departure in the most logical manner: by initiating and then exacerbating conflict with the director and each of the other members of the IHES. This idea probably came to him with the first such conflict, which occurred when he fought against the opposition of Thom to have Deligne named a permanent member of the IHES (for obvious reasons). From thence, the conflicts were regular and increasing to the point at which one wonders how it was possible for him to avoid the conscious awareness of his own desire to break away. His will-power was so strong and the habit of repression so inveterate that he managed to prepare his own departure while telling himself that he was going to succeed in modifying the IHES according to his wishes, and convincing the others; he never once felt the conscious intention to break away. Yet the conflicts that he initiated speak loudly for themselves. Following them in detail lead one to the conviction that the sudden rupture was neither sudden nor a rupture, but the natural and ripe conclusion to a carefully prepared recovery of freedom and shaking off of pressures grown intolerable.

In the remainder of this chapter, I will analyse my own analysis in more detail, making extensive use of the archives of the IHES, and reinterpreting well-known passages of Grothendieck's writings.

## Why repression?

The question of *why* he chose to privilege only mathematical activity, covering over everything else with a blanket of surface approval, is answered at some length in the passages concerning the yin aspects of his character, and his mother's insistence on yang values only. But this would perhaps not be. But it seems to me that excessive fatigue, while undoubtedly

This chapter, covering Grothendieck's activities from 1966 to 1970, will provide a lot of evidence to show that as Cartier says, the psychological change in Grothendieck which ended in the final 1970 rupture with the IHES did unconsciously begin at least as early as 1966.

*A vrai dire, faute d'avoir jamais encore consacré une réflexion écrite à cette relation, je ne m'étais pas rendu compte auparavant que les premiers signes (discrets certes, mais qui ne peuvent tromper) de l'ambivalence dans la relation de mon ami à moi, remontent pour le moins à 1968, deux années donc avant "Le grand tournant". C'était un moment où la relation apparaissait comme parfaite, une communion sans nuage au niveau mathématique, dans le contexte d'une amitié simple et affectueuse.*

*c'est le sentiment de disposer d'un tel interlocuteur-relais qui donnait à mes périodes sporadiques d'activité mathématique un sens plus profond que celui de l'assouvissement d'une fringale, en les reliant à une aventure collective dépassant ma propre personne. C'est ce sentiment, sans doute, qui faisait que pendant si longtemps, je n'aie pas senti l'ombre d'un désir de publier ce que je trouvais, et encore moins l'ombre d'un regret de m'être retiré de la scène mathématique (RS orig 265)*

## The Fields Medal

*Talk a bit about the math he won it for, although it will mostly be in a previous chapter, give the reports, also explain and point out that he was already politically involved at this point, not going to Moscow, even if it was in his naive way. Talk about the Russians who were in prison. Describe ceremony (if possible). Recount Serre's anecdote about one of the four winners being in danger of not getting a prize because of lack of money, but in the end someone gave money from his pocket.*

## Grothendieck at the IHES 1966-1970

*Tell mathematically what he was doing in those years, but show how his interest really was declining.*

*Avec le recul, je me rends compte qu'il devait déjà y avoir en moi un besoin de renouvellement, je ne saurais dire depuis quand. Ce n'est sûrement pas une simple coïncidence si l'année qui a précédé mon départ de l'IHES, il y a eu un soudain basculement de mon investissement d'énergie, laissant là les tâches qui la veille encore me brûlaient dans les mains, et les questions qui me fascinaient le plus, pour me lancer (sous l'influence d'un ami biologiste, Mircea Dumitrescu) dans la biologie. Je m'y lançais dans les dispositions d'un investissement de longue haleine au sein de l'IHES (ce qui était en accord avec la vocation pluridisciplinaire de cette institution). Sûrement ce n'était là qu'un exutoire au besoin d'un renouvellement beaucoup plus profond, qui n'aurait pu s'accomplir dans l'ambiance d'"étuve scientifique" de l'IHES, et qui s'est fait au cours de cette "cascade de réveils" à laquelle j'ai fait déjà allusion. Il y en a eu sept, dont le dernier a eu lieu en 1982. L'épisode des "fonds militaires" a été providentiel en déclenchant le premier de ces "réveils". Le ministère des armées, tout comme mes ex-collègues de l'IHES, ont finalement eu droit à toute ma reconnaissance ! (RS 216)*

## May 1968

*Mention how he was funded in Kansas (or at least, about the Kansas funding) Use archives to describe the rupture itself. Mention the anecdote about him being ill-received in Orsay in 1968 (where did I read this? Poenaru?)*

## The final rupture

*Détail typique, ces fonds militaires, au sujet desquels personne ne voulait lever le petit doigt, tant qu'il était question qu'ils seraient cause de mon départ, ont été supprimés l'année même de mon départ dans l'indifférence générale! On ne savait jamais, des fois que ça pourrait indisposer un invité de marque un peu tâtillon sur ce chapitre... Les fonds en question ne représentaient d'ailleurs qu'une faible partie des ressources de l'IHES (5%, si mes souvenirs sont corrects). Sans avoir eu à se concerter, il y a eu entre mes quatre collègues à l'IHES (sans compter le directeur) une belle unanimité, pour saisir une occasion de se débarrasser de moi (presque en même temps, d'ailleurs, que du directeur lui-même). Et moi qui m'étais cru indispensable, et aimé!*

*Les deux physiciens de l'IHES, Michel et Ruelle, étaient mécontents que la section "Physique" à l'IHES fasse un peu figure de parente pauvre, à côté de la section mathématique, représentée par Thom, Deligne et moi (dont deux "médailles Fields"!)). Ce déséquilibre venait de s'accroître par la cooptation de Deligne (laquelle s'était d'ailleurs faite avec l'accord sans réserve de Michel et Ruelle, à l'unanimité en fait du Conseil Scientifique de l'IHES, à l'exception de Thom). Il y avait eu concertation entre physiciens et mathématiciens de l'IHES, pour faire pression sur le directeur, Léon Motchane, afin de rétablir un juste équilibre entre les deux sections, dans la mesure du possible. Je présume que néanmoins mes collègues physiciens ne devaient pas être mécontents de voir ce déséquilibre compensé efficacement, et bien plus tôt qu'ils ne l'auraient espéré, avec la soudaine perspective de mon départ. Quant à Thom, il était ulcéré que la cooptation de Deligne se soit faite à l'encontre de son opposition formelle. Il avait qualifié les contributions de Deligne, toutes non publiées, dont je faisais état dans mon étincelant rapport d'"investissement", et qui visiblement lui passaient par dessus la tête, de simples "exercices"! Ce qui le choquait dans l'accession de Deligne au statut de "permanent" à l'IHES, sur un pied d'égalité avec lui-même, c'était que le jeune Deligne – il avait alors 25 ans – n'était pas déjà couvert d'honneurs. Selon Thom, l'accession à un tel poste devrait venir seulement comme "le couronnement d'une carrière". On était loin, moins de dix ans plus tard seulement, des années héroïques où j'accueillais un Hironaka encore inconnu dans des locaux de fortune... Toujours est-il que l'amertume de Thom était telle, qu'il songeait alors (selon ce qu'il m'en a dit lui-même) à quitter l'IHES, pour réintégrer son poste de professeur à Strasbourg qu'il avait pris soin (plus prudent que moi naguère, en quittant le CNRS pour l'IHES) de conserver. Par mon parrainage chaleureux de Deligne j'avais été la cause première et principale de sa frustration, et je présume que Thom devait trouver, en son for intérieur, que je n'avais que ce que j'avais mérité par mon impertinence, en me voyant contraint de quitter l'IHES quelques mois à peine après y avoir introduit mon brillant "protégé"! Quant au directeur, à un moment où il se voyait acculé par le désir unanime des permanents, le pressant de partir, il a alors (selon une tactique éprouvée qu'il maniait à la perfection) joué le jeu du "diviser pour régner", en utilisant la question des fonds militaires comme un moyen commode pour faire diversion, et de se débarrasser en même temps du plus gênant de ses permanents. (Renversement de situation magistral, alors que le secret qu'il avait maintenu autour de la présence de ces fonds m'apparaissait comme une raison supplémentaire et impérieuse pour l'obliger à partir!) Cela n'a pas empêché qu'après mon départ, ça n'a quand-même plus traîné longtemps, et son départ de l'IHES a suivi de près le mien – de celui donc qui, comme lui, avait fait partie de l'IHES dès ses premières années précaires et héroïques, et qui, avec lui et selon ses propres moyens, en avait assuré la crédibilité et la pérennité. (RS 540)*

## References

[C] P. Cartier: *Grothendieck et les motifs*, online.

[CGS] *Correspondance Grothendieck-Serre*.

*He insisted that the director, Léon Motchane, reject this money, failed to persuade either him or the other members of the IHES, chose to break away definitively in protest, and recalls the event in the briefest and most laconic terms:*

*Mon départ sans retour du milieu scientifique en 1970 en réaction contre certains symptômes de mauvais aloi; il s'agit de la collusion généralisée des milieux scientifiques avec les appareils militaires. J'ai quitté mon institution d'attache en 1970, quand j'ai eu connaissance qu'il recevait des subventions du ministère des armées. (Clef 163)*

*Somehow, Grothendieck managed to raise a family in the style of his origins: even today, members of the extended Grothendieck family tend to live in small villages and work in nature, in the marketplaces or at jobs oriented around helping others. Few of them bother to pass the European school leaving exam; certainly Mireille never did, and neither did his children. The daily contrast between his perversely “miserabilist” habits that he pursued even though there was no lack of money – living and working in depressing rooms with the paint peeling off the walls, bringing his family up in what seemed like unnecessary, exaggerated circumstances of poverty and ignorance, almost positively discouraging them from dressing properly and attending school – and the social habits of his colleagues, the feeling of their uncomprehending regard (whether or not they expressed their sentiments, and some, such as Schwartz, did not hesitate to do so), must have exerted pressure on Grothendieck and prevented him from really convincing himself that he felt right at home. When he did leave the IHES, after some years of wandering around in search of the “right place”, sampling life in an agricultural commune and so forth, he eventually chose to live in a tiny house in a remote village, and acquired the reputation in Paris circles of having “abandoned everything to raise sheep”. It is important to realize that this step away from the comfortable circles of university towns to the countryside would be a step into strange lands for most mathematicians, but represented a natural homecoming to Grothendieck.*

*“vingt ans de créativité mathématique intense et d'investissement mathématique démesuré – et, en même temps aussi, vingt longues années de stagnation spirituelle, en “vase clos”...Sans m'en rendre compte, j'étouffais – c'est de l'air du large que j'avais besoin! Mon “départ” providentiel a marqué la fin soudaine d'une longue stagnation, et un premier pas vers une équilibration des forces profondes en mon être, pliées et vissées dans un état de déséquilibre intense, figé...” (RS 76) And further, “Et l'histoire de ces deux décennies passées dans la quiétude du monde “sans conflit” (?) de ma chère “communauté mathématique”, est aussi l'histoire d'une longue stagnation intérieure en moi, yeux et oreilles bouchées, sans rien apprendre sauf des maths ou peu s'en faut – alors que dans ma vie privée (d'abord dans les relations entre ma mère et moi, puis dans la famille que j'ai fondée sitôt après sa mort) sévissait une destruction silencieuse qu'en aucun moment pendant ces années je n'ai osé regarder...” (RS 158)*

*While these and many similar passages in Grothendieck's writings lead to a somewhat more nuanced view of what was actually happening around him in the years leading up to the 1970 rupture, they shed no light at all on his own role and purpose during that time. One sees portrayed a*

human being, blind and deaf to all but mathematics, persuaded (by a spiritual indifference to asking questions rather than by any real intimate conviction) that all his relationships were smooth and stainless, and plunged into a profound, driven and obsessional program of work with no realization whatsoever that it was becoming too difficult to uphold. In this view, the discovery and conflict over the question of military funding becomes a catalyst for the sudden and blinding realization of many hitherto stubbornly ignored realities – human tensions and mathematical exhaustion – which appear as largely sufficient cause to break away from everything.

Yet this description, although entirely coherent, also seems somehow incomplete. It seems to me impossible, both psychologically and because of numerous indications, that Grothendieck truly spent twenty years in a state of such deadened stagnation that he sensed nothing at all of the many tensions and difficulties threading through an apparently seamless and harmonious personal and professional life.

This simple outlook is borne out by numerous passages of *Récoltes et Semailles*, if they are simply read from a slightly different angle; not purely for their content, but with a mind to asking questions. Like everyone else, Grothendieck is not above the unconscious drive to represent himself to advantage in a given situation, and his exceptional intelligence and sincere desire to comprehend led him to do so in ways that are at the same time convincing and coherent enough to carry the force of conviction. Yet it is not enough; the very sentences he writes, their form and their choice of language, reveal more than the strict content.

My analysis of the process which led Grothendieck to the 1970 rupture is as follows. For twenty years, he did not stagnate (not in the sense of deadened awareness), but repressed the strong currents of interest and emotion that he naturally felt on the score of love, of his children, of social relationships, on friendship, and of larger and broader issues such as ecology and politics. This repression led to his conscious conviction that all was perfectly well in the best possible world, but simultaneously, of course, it led to what he later described as an endless, repetitive series of unrecognized and unadmitted conflicts. Being who he was (“je connais bien la solidité et la rigidité de tes convictions” wrote Serre in 1985 check date), he would possibly have been able to consciously force himself to continue working in this state of increasingly tightly contained repression to the end of his life, driven by his obsessional sense of task and of duty. Having invested everything in his mathematical program, it is impossible to imagine that he could have freely abandoned it on such a small catalyst as a matter of a tiny amount of military funding. The explanation is quite simply insufficient, as no one can fail to notice: this is the question that Serre asks insistently: “Pourquoi, toi, as-tu abandonné ton programme?”

## 1.1 Hello Beijing

北京是 capital of China.

### 1.1.1 Hello Dongcheng District

Tian'anmen Square is in the center of Beijing

Chairman Mao is in the center of 天安门广场。



## 1.2 Hello 辽宁

大连理工 *is one of the best university in* 辽宁。