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BECOMING VIRTUAL

REALITY IN THE DIGITAL AGE

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Also by Pierre Lévy

Collective Intelligence:
Mankind's Emerging World in Cyberspace

Becoming Virtual Reality in the Digital Age

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Translated from the French by
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PLENUM TRADE • NEW YORK AND LONDON

Introduction

"The virtual possesses complete reality, in its virtuality."

Gilles Deleuze, *Différence et Répétition*

"Virtual reality corrupts, absolute reality corrupts
absolutely."

Roy Ascott, Ars electronica Prize, 1995

A general movement of virtualization has begun to affect not only the fields of information and communication but also our physical presence and economic activities, as well as the collective framework of sensibility and the exercise of intelligence. The process of virtualization has even affected our modalities of being together, the constitution of a collective "we" in the form of virtual communities, virtual corporations, virtual democracy. Although the digitization of messages and the extension of cyberspace play an important role in the ongoing change, the wave of virtualization taking place extends far beyond the field of information technology.

Is there a reason to fear a general process of de-realization, a kind of all-encompassing disappearance, as Jean Baudrillard has suggested? Are we threatened by the looming presence of a cultural apocalypse, by the terrifying implosion of space-time, which Paul Vir-

ilio has been talking about for the past several years? This book assumes a different, noncatastrophic point of view. As we enter the third millennium, societies throughout the world are undergoing various forms of cultural evolution. Despite the undeniably bleak and terrifying aspects of such change, the process of hominization continues.

Never before have the technological, economic, and social changes around us occurred so rapidly or been so destabilizing. Virtualization itself represents the essence, the cutting edge of the mutation taking place. As such, virtualization is neither good nor bad, nor even neutral, but manifests itself as the very process of humanity's "becoming other"—its heterogenesis. In place of fear, condemnation, or unquestioning acceptance, I am asking that we take the trouble to recognize and understand virtualization in all its breadth.

As I will try to show in this book, the virtual, strictly defined, has little relationship to that which is false, illusory, or imaginary. The virtual is by no means the opposite of the real. On the contrary, it is a fecund and powerful mode of being that expands the process of creation, opens up the future, injects a core of meaning beneath the platitude of immediate physical presence.

Many philosophers have dealt with the concept of virtuality, including a number of contemporary French thinkers such as Gilles Deleuze and Michel Serres. What then do I hope to accomplish in the present work? Quite simply, rather than defining the virtual as a specific mode of being, I want to analyze and illustrate *the process of transformation from one mode of being to another*. This book is a study of the virtualization that ascends from the real or the actual toward the virtual. The philosophical tradition, including some of the most recent work in the field, has analyzed the transition

from the possible to the real or from the virtual to the actual. To my knowledge there has been no study about the *opposite transformation*, the movement toward the virtual. Yet it is precisely this movement of return that seems to characterize both the process of self-creation that resulted in the development of the human species and the accelerated cultural transition taking place today. Consequently, this book addresses the virtual from three separate but related points of view: philosophical (the concept of virtualization), anthropological (the relationship between the process of hominization and virtualization), and sociopolitical (understanding contemporary change so that we can play a role in the events taking place in the world). With respect to this latter point, the most useful alternative avoids any simplistic opposition between the real and the virtual, and instead presents us with a choice among various modalities of virtualization. Moreover, we need to distinguish between a virtualization in the process of creation, on the one hand, and its alienating, reifying, and invalidating caricatures on the other. Thus there is, in my opinion, an urgent need that we establish a cartography of the virtual, which this book attempts to satisfy.

In the first chapter, "The Nature of Virtualization," I define the principal concepts of reality, possibility, actuality, and virtuality that will be used throughout the book, as well as the various transformations from one mode of being to another. This chapter also provides an opportunity to analyze virtualization itself and, in particular, deterritorialization and the bizarre spatiotemporal phenomena generally associated with it.

The three following chapters concern the virtualization of the body, the text, and the economy. The concepts introduced in previous chapters are then used

to discuss contemporary phenomena and analyze the dynamic of economic and cultural change taking place.

The fifth chapter analyzes the process of hominization in terms of the theory of virtualization: the virtualization of the immediate present by language, the virtualization of physical action by technology, and the virtualization of violence by the contract. Thus, despite its brutality and strangeness, the crisis of civilization we are experiencing can be understood in terms of the continuity of the human adventure.

Chapter Six, "The Operations of Virtualization or the Anthropological Trivium," uses the empirical data presented in the preceding chapters to address the invariant core of basic operations at work in all processes of virtualization: a grammar, dialectic, and rhetoric that have been expanded to accommodate technological and social phenomena.

The seventh and eighth chapters examine the "virtualization of intelligence." They introduce the technosocial operation of cognition by following a dialectic of the objectivation of interiority and the subjectivation of exteriority, which are typical of virtualization. These chapters end with the presentation of two major ideas: first, a renewed vision of the *collective intelligence* that is emerging within digital communications networks, and second, the construction of a concept of the *object* (as social mediator, technological substrate, and nucleus of intellectual operations), which the theory of virtualization provides.

The ninth chapter summarizes and systematizes the information provided earlier, and outlines a philosophical project capable of incorporating the duality of event and substance, intimated throughout the course of the book.

The epilogue looks to an art of virtualization and a new aesthetic sensibility, which, during this period of profound deterritorialization, makes an expanded sense of hospitality its principal focus.

The Nature of Virtualization

The Actual and the Virtual

Consider the simple and misleading opposition between the real and the virtual. As it is currently used, the word "virtual" is often meant to signify the absence of existence, whereas "reality" implies a material embodiment, a tangible presence. Reality is implied when someone says "I've got it," virtuality when they say "You'll get it." The illusion involved generally allows us to introduce a sense of trivial irony to evoke the various forms of virtualization. As I'll try to show later on, this approach involves an interesting element of truth, but it is obviously too simplistic to form the basis of a general theory.

The word "virtual" is derived from the Medieval Latin *virtualis*, itself derived from *virtus*, meaning strength or power. In scholastic philosophy the virtual is that which has potential rather than actual existence. The virtual *tends* toward actualization, without undergoing any form of effective or formal concretization. The tree is virtually present in the seed. Strictly speaking, the virtual should not be compared with the real but the actual, for virtuality and actuality are merely two different ways of being.

Here, I would like to introduce the distinction between the possible and the virtual, which Gilles Deleuze discussed in *Différence et Répétition*.¹ The possible is already fully constituted, but exists in a state of limbo. It can be realized without any change occurring either in its determination or nature. It is a phantom reality, something latent. The possible is exactly like the real, the only thing missing being existence. The realization of a possible is not an act of creation in the fullest sense of the word, for creation implies the innovative production of an idea or form. The difference between the possible and the real is thus purely logical.

The virtual should, properly speaking, be compared not to the real but the actual. Unlike the possible, which is static and already constituted, the virtual is a kind of problematic complex, the knot of tendencies or forces that accompanies a situation, event, object, or entity, and which invokes a process of resolution: actualization. This problematic complex belongs to the entity in question and even constitutes one of its primary dimensions. The seed's problem, for example, is the growth of the tree. The seed is this problem, even if it is also something more than that. This does not signify that the seed *knows* exactly what the shape of the tree will be, which will one day burst into bloom and spread its leaves above it. Based on its internal limitations, the seed will have to invent the tree, coproduce it together with the circumstances it encounters.

In one sense the entity conveys and produces its virtualities. An event, for example, reorganizes a previous problematic and is susceptible of being interpreted in various ways. In another sense the virtual constitutes

¹ Complete references will be found in the annotated bibliography located at the end of the book.

the entity. The virtualities inherent in a being, its problematic, the knot of tensions, constraints, and projects that animate it, the questions that move it forward, are an essential element of its determination.

Actualization

Actualization thus appears as the solution to a problem, a solution not previously contained in its formulation. It is the creation, the invention of a form on the basis of a dynamic configuration of forces and finalities. Actualization involves more than simply assigning reality to a possible or selecting from among a predetermined range of choices. It implies the production of new qualities, a transformation of ideas, a true becoming that feeds the virtual in turn.

For example, if running a computer program, a purely logical entity, implies a relationship between the possible and the real, then the interaction between humans and computer systems implies a dialectic between the virtual and the actual. Writing a software program, for example, is a way of addressing a problem in an original manner. Each team of programmers redefines and resolves, although differently, the problem it is faced with. The actualization of the program during use in a work environment, however, ignores certain skills, reveals new kinds of functionality, gives rise to conflicts, resolves problems, and initiates a new dynamic of collaboration. The software carries with it a virtuality of change that the group—also set in motion by a dynamic arrangement of tropisms and constraints—actualizes in a more or less inventive way. The real resembles the possible. The actual, however, in no way resembles the virtual. It responds to it.

Virtualization

We now have a better idea of the difference between realization (the occurrence of a predetermined possible) and actualization (the invention of a solution required by a problematic complex). But what is virtualization? No longer the virtual as a way of being but virtualization as a dynamic. Virtualization can be defined as the movement of actualization in reverse. It consists in the transition from the actual to the virtual, an *exponentiation* of the entity under consideration. Virtualization is not a derealization (the transformation of a reality into a collection of possibles) but a change of identity, a displacement of the center of ontological gravity of the object considered. Rather than being defined principally through its actuality (a solution), the entity now finds its essential consistency within a problematic field. The virtualization of a given entity consists in determining the general question to which it responds, in mutating the entity in the direction of this question and redefining the initial actuality as the response to a specific question.

Let's look at the very contemporary example of the virtualization of a company. The conventional organization gathers its employees in one building or a group of buildings. Each employee occupies a precisely defined physical position, and his schedule indicates the hours he will work. A virtual corporation, on the other hand, makes extensive use of telecommuting. In place of the physical presence of its employees in a single location, it substitutes their participation in an electronic communications network and the use of software resources that promote cooperation. The virtualization of the corporation consists primarily in transforming the spatiotemporal coordinates of work into a continuously renewed problem rather than a stable solution. The organization's center of gravity is no longer a group of

buildings, workstations, and schedules, but a process of coordination, which redistributes the spatiotemporal coordinates of the labor community and each of its members as a function of various constraints.

Actualization proceeds from problem to solution, virtualization from a given solution to a (different) problem. It transforms an initial actuality into a particular instance of a more general problematic, one on which the ontological accent is now placed. Having done so, virtualization fluidizes existing distinctions, augments the degrees of freedom involved, and hollows out a compelling vacuum. If virtualization were nothing more than the transition from a reality to a collection of possibles, it would be derealizing. But it implies as great a sense of irreversibility in its effects, indeterminacy in its processes, and creativity in its striving, as actualization. Virtualization is one of the principal vectors in the creation of reality.

Getting Away: Virtualization as Exodus

Having defined virtualization in its most general sense, I would now like to examine one of its principal modalities: its detachment from the here and now. As I indicated earlier, common sense interprets the virtual as something intangible, the complement of the real, or tangible. This approach contains a significant germ of truth, however, for the virtual is quite often literally "not there." The virtual corporation can no longer be precisely located. Its elements are nomadic, dispersed, and the pertinence of their geographic position significantly diminished.

Does the text exist here on paper, occupying its assigned position in physical space, or rather in terms

of some abstract organization that is actualized in a variety of languages, versions, editions, and typefaces? Today a given text can appear as the actualization of a digital hypertext. Does such a text "virtually" occupy every point in the network connected to the digital memory in which it is encoded? Does it extend to each terminal from which it can be copied in a matter of seconds? While it is possible to assign an address to a digital file, given the present state of on-line technology, this address is transitory and relatively insignificant. Deterritorialized, fully present in all its existing versions, copies and projections, deprived of inertia, ubiquitous inhabitant of cyberspace, hypertext helps produce events of textual actualization, navigation, and reading. Only such events can be said to be truly situated. And although it requires a real physical substrate for its subsistence and actualization, the imponderable hypertext has no place.

Michel Serres's book *Atlas* illustrates the theme of the virtual as something "not-there." Imagination, memory, knowledge, and religion are the vectors of virtualization that have enabled us to leave this "there" long before the appearance of computerization and digital networks. While developing this theme, Serres indirectly pursues a polemic against the Heideggerian philosophy of "being-there." This is the literal translation of the German *dasein*, which primarily signifies existence in classical philosophical German and specifically human existence—being a human being—for Heidegger. However, the fact of not being associated with any "there," of clinging to an unassignable space (the one in which telephone conversations take place?), of occurring only *between* things that are clearly situated, or of not being only "there" (like any thinking being)—none of this prevents us from existing. Although etymology doesn't really prove anything, it is worth pointing out that the word "exist" is derived

from the Latin *sistere*, to cause to stand or place, and *ex*, outside of. Does existence therefore mean being in a place or leaving it? *Dasein* or existence? It is as if the German emphasized actualization and the Latin virtualization.

A virtual community can, for example, be organized on the basis of its affinities through the intermediary of telematic communications systems. Its members are reunited by the same centers of interest and the same problems: geography, being contingent, is no longer a starting point or constraint. Although it is strictly speaking "not-there," this community is guided by passions and projects, conflicts and friendships. It exists without a stable point of reference: wherever its mobile members happen to be...or nowhere at all. Virtualization reinvents a nomadic culture, not through a return to the Paleolithic or to the early pastoral civilizations, but by creating a medium of social interaction in which relations reconfigure themselves with a minimum of inertia.

When a person, community, act, or piece of information are virtualized, they are "not-there," they deterritorialize themselves. A kind of clutch mechanism detaches them from conventional physical or geographical space and the temporality of the clock or calendar. They are not totally independent of a referential space-time since they must still bond to some physical substrate and become actualized somewhere sooner or later. Yet the process of virtualization has caused them to follow a tangent. They intersect classical space-time intermittently, escaping its "realist" clichés: ubiquity, simultaneity, massively parallel or distributed systems. Virtualization comes as a shock to the traditional narrative, incorporating temporal unity without spatial unity (by means of real-time interactions over electronic networks, live rebroadcasts, telepresence systems),

continuity of action coupled with discontinuous time (answering machines and electronic mail, for example). Synchronization replaces spatial unity, interconnection is substituted for temporal unity. Yet the virtual is not imaginary. It produces effects. Though we don't know where, telephone conversations do take "place," as I'll show in the following chapter. Though we don't know when, we communicate effectively by means of answering machines. The most deterritorialized agents, those that have been decoupled from a specific spatio-temporal presence, the most fully virtualized and virtualizing communities of the contemporary world, are those associated with technoscience, finance, and the media. And they structure our social reality with the greatest force, perhaps even the greatest violence.

Taking a profoundly actual constraint (time and place) and making it a contingent variable clearly involves the creation of an effective solution to a problematic and thus of virtualization in the sense in which we defined it earlier. It was therefore to be expected that deterritorialization, the escape from the "here" and "now" and "that," would be encountered as one of the royal roads to virtualization.

New Spaces, New velocities

But the same movement that makes ordinary space-time contingent also opens up new environments for interaction and synchronizes unforeseen chronologies. Before analyzing this important property of virtualization, I would first like to introduce the notion of the plurality of times and spaces. As soon as subjectivity, signification, and pertinence come into play, we are no longer dealing with a single expanse or uniform chronology, but a multitude of types of space

and duration. Every life form invents its world (from the microbe to the tree, the bee to the elephant, the oyster to the migratory bird) and with this world, a specific space and time. The cultural universe, characteristic of humanity, further extends this spatial and temporal variability. For example, each new system of communication and transportation modifies the system of practical proximities, that is, the pertinent space for human communities. When we build a railway network, it is as if we had physically joined the cities or regions connected by rail and dissociated those that are not part of the network. For those who don't travel by train, however, the former distances are still valid. The same is true of the automobile, air travel, the telephone, etc. Several systems of proximity coexist, several practical spaces.

In analogous fashion, different systems of recording and transmission (oral traditions, writing, audiovisual recording, digital networks) construct different rhythms, velocities, and historical qualities. Each new mechanism, each technosocial "machine" adds a space-time, a special cartography, a singular music, to a kind of elastic and complicated system in which expanses are covered over, deformed, and interconnected, in which temporalities interact, respond, or are contrasted to one another. The contemporary multiplication of spaces has made us nomads once again. But rather than following tracks and migrations within a fixed domain, we leap from network to network, from one system of proximity to the next. The spaces metamorphose and bifurcate beneath our feet, forcing us to undergo a process of heterogenesis.

The process of virtualization that disengages us from a specific environment did not begin with the human species. It is inscribed in history, in life. According to Josef Reichholf, from the most primitive single-cell creatures up through birds and mammals, improve-

ments in locomotion have introduced "increasingly larger spaces and more abundant possibilities of existence for living beings" (Reichholf 1994, 222). The invention of new velocities is the first degree of virtualization.

Reichholf notes that "the number of persons who now travel cross-country for vacation is greater than the total number of persons who were in transit during the period of the great invasions" (Reichholf 1994, 226). The acceleration of communication is contemporaneous with an enormous growth in physical mobility. Both are part of the same wave of virtualization. Tourism is currently the number one global industry in terms of annual turnover. The economic significance of the activities involved in supporting and maintaining the processes of physical locomotion (vehicles, infrastructures, fuel) is infinitely greater than it was in previous centuries. Will the multiplication of the media and increasing speed of communication become a substitute for physical mobility? Probably not. For until now, the two types of growth have always paralleled one another. Those who make the most phone calls are also those who interact with the largest number of people face to face. The growth of communication and the generalization of high-speed transport are part of the same process of virtualization affecting society, the same tension that drives us to get away from "there."

The transportation revolution has complicated, shortened, and metamorphosed space, but this has obviously resulted in the significant degradation of the traditional environment. By analogy with the problems of locomotion, we should also question the price we will have to pay for computer-mediated virtualization. What fuel will we burn when we are still unable to monitor its usage? Will wear and decay have any meaning in this environment? Will we leave in our wake a

series of devastated landscapes of data? Here, the ultimate substrate is subjective. Just as ecology balanced recycling with the technologies of waste and pollution, human ecology will have to balance continuous learning and skills improvement with disqualification and the accumulation of human waste (the so-called "marginal" individual). With respect to this meditation on the escape from "there," we should bear in mind that virtualization does not simply accelerate already known processes or suspend, or even annihilate, time and space, as Paul Virilio has claimed. Based on expenditure and risk, it creates qualitatively new velocities, mutant space-time systems.

The Moebius Effect

Aside from deterritorialization there is another characteristic often associated with virtualization: the transition from interior to exterior and from exterior to interior. This "Moebius effect" takes place in several different registers: between public and private, personal and shared, subjective and objective, map and territory, author and reader, etc. I will give several examples throughout the course of the book but the idea can be illustrated using the previously mentioned notion of the virtual corporation.

The traditional worker had *his* office. The participant in the virtual corporation, however, *shares* a number of physical (buildings and furnishings) and software resources with other employees. The member of the conventional corporation travels from the private space of his home to the public space of the workplace. In contrast, the telecommuter transforms his private space into a public space and vice versa. Although the opposite is more often the case, he is frequently able to man-

age a public temporality on the basis of purely personal criteria. The limits of interaction are no longer self-evident. Place and time blend together. Clear borders give way to fractalized divisions. The very concepts of public and private are called into question. Earlier, I referred to the worker as a "member" of the corporation. This assumes a clear sense of belonging. However, this is precisely the source of the problem, since there now exists a continuum among the traditional long-term employee, the contract employee, the term employee, the beneficiary of social programs, the member of an affiliate, the client, supplier, intermittent consultant, and loyal independent contractor. And at each point in the continuum the question is repeated: Who am I working for? Intercorporate systems for electronic document management, like the group projects shared among several organizations, frequently weave stronger bonds among mixed communities than those that passively unite individuals who officially belong to the same legal entity. The sharing of resources, information, and skills does indeed result in such indecision and active blurring of boundaries, oscillating between outside and inside.

Only in reality do things have clearly defined limits. Virtualization, the transition to a problematic, the shift from being to question, necessarily calls into question the classical notion of identity, conceived in terms of definition, determination, exclusion, inclusion, and excluded middles. For this reason virtualization is always heterogenesis, a becoming other, an embrace of alterity. We should not confuse heterogenesis with alienation, its intimate and menacing opposite, its enemy sister, which I would characterize as reification, a reduction to the thing, to the "real." These ideas will be more fully developed and illustrated in the following chapters, where I will look at three specific instances of virtualization: the virtualization of the body, the text, and the economy.

The Virtualization of the Text

Reading: the Actualization of the Text

Since its Mesopotamian origin the text has been a virtual object, abstract, independent of any particular substrate. This virtual entity is actualized in multiple versions, translations, editions, instances, and copies. Through the process of interpretation, by giving meaning to the text here and now, the reader continues this torrent of actualization. I am specifically referring to the actualization of reading and not the realization that would occur by selecting from among preexisting possibles. Faced with the configuration of stimuli, constraints, and tensions offered by the text, the reader resolves the problem of meaning in an inventive and always singular manner. The reader's intelligence erects a mobile and irregular semantic landscape above the smooth pages of the text. Just how does this process of actualization occur?

We read. We listen to a text. What takes place when we do so? First, the text is shot through, peppered with holes. These are words, parts of sentences that we don't hear or understand (in a perceptual but also intellectual sense). They are text fragments that we are unable to comprehend, do not view as part of a whole, fail to attach to other fragments, or simply overlook. So that, paradoxically, reading, or listening, be-

gins by ignoring, by failing-to-read, by undoing the text.

While we are tearing the text apart by reading or listening to it, we are also mishandling it. We rumple it. We shift corresponding passages. We weave together its scattered members, spread out, dispersed across the surface of the pages or within the linearity of discourse. We stitch them together. Reading a text means rediscovering the textile gestures that have given it its name.

The passages of text virtually embody a correspondence, a kind of epistolary activity, which we actualize, more or less, by following—or failing to follow—the author's instructions. As makers of text, we travel from one side to the other of the space of meaning, guided by the system of addresses and pointers that the author, editor, and typographer have prepared for us. But we are just as capable of disobeying those instructions, following different paths, rearranging the text incorrectly, establishing secret, clandestine networks, allowing other semantic geographies to emerge.

Based on a linearity or initial uniformity, the reader's work involves tearing, rubbing, twisting, and repiecing the text to create a living environment in which meaning can be established. The space of meaning does not exist before the text is read. It is while moving through the text, mapping it, that we fabricate and actualize meaning.

But while we fold the text in upon itself, thereby producing its self-referentiality, its autonomous existence, its semantic aura, we are also relating the text to other texts, other discourses, images, and affects, to the immense fluctuating storehouse of desires and signs that constitutes our being. It is no longer the

meaning of the text that concerns us, but the direction and elaboration of our thought, the accuracy of our image of the world, the fulfillment of our plans, the awakening of our pleasure, the thread of our dreams. This time the text is no longer crushed and crumpled into a ball, but cut up, pulverized, distributed, evaluated in terms of an autoparturient subjectivity.

Of the text itself, nothing more remains. At best, through the text, we have been able to adjust our models of the world. The text enables us to establish a resonance among the images and words already in our possession. At times we are able to carry some of its fragments, invested with special intensity, to a specific region of our mnemonic architecture, others to a section of our intellectual networks. The text will have served as an interface to ourselves. Only rarely will our reading or listening result in the dramatic reorganization, as if by some sudden threshold effect, of the tangle of representations and emotions that shape us.

Listening, looking, and reading ultimately amount to a kind of self-invention. By initiating the attempt at signification that comes from the other, by laboring, digging up, crumpling, and cutting the text, incorporating it within ourselves, destroying it, we help erect the landscape of meaning that inhabits us. The text serves as a vector, a substrate, or pretext, for the actualization of our own mental space.

From time to time we confide fragments of the text to the signs that roam within us. These ensigns, relics, fetishes, and oracles have nothing in common with the author's intentions or the living semantic unity of the text, but help create, recreate, and reactualize the world of signification that we are.

Writing: the virtualization of Memory

This analysis can also be applied to the interpretation of other types of complex messages besides alphabetic text: ideograms, diagrams, maps, flowcharts, simulations, iconic or filmic messages. The word text should be understood in its most general sense: an elaborated discourse or deliberated utterance.

You may have noticed that I have not yet mentioned *hypertext*. And yet, it lies at the heart of our discussion. By hierarchizing or selecting regions of meaning, by making connections between those regions, joining a text to other documents, embedding it in a memory that serves as the background from which it detaches itself and to which it returns, we are, in fact, describing computer-mediated hypertext.

An intellectual technology nearly always exteriorizes, objectivizes, virtualizes a cognitive function, a mental activity. In doing so, it reorganizes the intellectual economy or ecology as a whole and modifies in turn the cognitive function it was intended merely to support or strengthen. The relationship between writing (intellectual technology) and memory (cognitive function) bear witness to this process.

The arrival of writing has accelerated the artificialization, exteriorization, and *virtualization of memory* that most likely began with hominization. Virtualization, not merely a form of prolongation: the partial detachment of a living body, sharing, heterogenesis. We cannot reduce writing to the recording of speech. Yet, having enabled us to conceive of memory as a kind of record, it has transformed the face of Mnemosyne. The semi-objectivation of memory in the text has helped promote the development of a critical tra-

dition. In effect, writing creates distance between knowledge and its subject. It is most likely because I am no longer that which I know that I am able to question my knowledge.

Because it is virtualizing, writing desynchronizes and delocalizes. It has led to methods of communication in which messages are often separated in time and space from their source, and thus received out of context. From the reader's point of view, it has been necessary to refine the practice of interpretation. From the writer's point of view, it has been necessary to imagine self-sufficient systems of utterance, independent of context, which have promoted messages that respond to criteria of scientific or religious universality. By means of writing and, to an even greater extent, the alphabet and printing, theoretical and hermeneutic modes of knowledge have surpassed the narrative and ritual knowledge of oral societies. The demand for a universal truth, objective and critical, has only been able to assume precedence in a cognitive ecology largely structured by writing or, more specifically, by writing on a static substrate.

The contemporary text feeds electronic messages and newsgroups and flows through networks, fluid, deterritorialized, immersed in the oceanic medium of cyberspace. It is this dynamic text that reconstitutes, but differently and at an infinitely greater scale, the copresence of the message and its living context, which characterizes oral communication. Once again the criteria have changed and are now similar to those of a dialogue or conversation: pertinence with respect to the moment, readers, and virtual settings; brevity, the ability to point directly to our references; and efficiency, for helping the reader (navigate the text), are the surest ways to signal our presence within the informational deluge.

Digitization: the Potentialization of the Text

The new text has a number of technical features that need to be determined and whose analysis embodies a dialectic between the possible and the real. The reader of a book or article on paper is confronted with a physical object in which a specific version of the text is incorporated. This reader can write annotations in the margins of the text, make photocopies, cut and paste it, create a montage, but the initial text is always present, black on white, already fully realized. When reading on screen, this extensive presence that precedes the act of reading has disappeared. Digital media (diskette, hard drive, optical disc) does not contain a text that can be read by a human being but a series of digital codes that will be translated by a computer into alphabetic signs intended for a display. The screen is like a small window through which the reader can explore a potential storehouse of text.

Potential, not virtual, for the digital engram and the software used to read the text predetermine a set of possibles, which, though immense, are numerically finite and logically bound. However, it is not quantity that distinguishes the possible from the virtual. The essential distinction is to be found elsewhere. If we consider the mechanical substrate alone (hardware and software), computer technology provides only a combination of possibles, albeit infinite, and never a problematic domain. Digital storage is a potentialization, display a realization.

A hypertext is a matrix of potential texts, only some of which will be realized through interaction with a user. There is no difference between a possible text and a text we read on screen. The majority of software

programs are designed to display (realize) messages (text, image, etc.) on the basis of a computational mechanism that determines a universe of possibles. This universe can be immense or introduce random processes. Nevertheless, it is fully precontained and calculable. Thus, strictly speaking, we shouldn't describe digital images as virtual images but as possible images displayed on screen.

The virtual begins to flourish with the appearance of human subjectivity in the loop, once the indeterminateness of meaning and the propensity of the text to signify come into play, a tension that actualization, or interpretation, will resolve during the act of reading. Once these two planes, that of the potential-real and that of the virtual-actual, have been clearly identified, it is critical that we immediately promote their reciprocal enfolding: digitization and new forms of displaying text on screen are only interesting because they imply other ways of reading and understanding.

The reader of on-screen text is more "active" than the conventional reader of paper-based text. Reading text on screen implies that, even prior to the act of interpretation, we are able to control a computer so it displays a partial realization of the text on a small, bright surface. If we think of the computer as a tool for producing conventional text, then it is no more than an instrument, although more practical than the combination of a mechanical typewriter, photocopier, pair of scissors, and a tube of adhesive. Although produced by a computer, the ontological status or aesthetic properties of a printed text are no different than those of a text prepared with the tools that were available in the nineteenth century. The same is true of an image or film made on a computer and viewed with conventional media. But if we consider the set of all the texts (all the images) that the reader can display *automatically*

by interacting with the computer through a digital matrix, we enter a new universe for the creation and reading of signs. By considering the computer merely as an additional instrument for producing texts, sounds, or images on permanent media (paper, film, magnetic tape), we deny its cultural fecundity, that is, the appearance of new genres associated with interactivity.

The computer is thus primarily a means of *potentializing information*. Based on an initial store of data, a model or metatext, a program can calculate an indefinite number of *different* visible, audible, or tangible manifestations, on the basis of the current situation or the demands of the user. It is really only on screen or by means of other interactive devices that the reader encounters this new plasticity of text and image, since paper-based text (or images on film) is by necessity already fully realized. The computer screen is a new "typereader," the place where a reserve of possible information is selectively realized, here and now, for a particular reader. Every act of reading on a computer is a form of publishing, a unique montage.

Hypertext: Virtualization of the Text and Virtualization of Reading

An act of reading is an actualization of the significations of a text, actualization rather than realization, since the interpretation involves an ineradicable creative element. Hypertextualization is the opposite of reading in the sense that it produces, from an initial text, a textual reserve and instruments of composition with which a navigator can project a multitude of other texts. The text is transformed into a textual problematic. But, once again, this problematic exists only if we

take into consideration the human-machine interaction and not only computer-based processes. We can then speak of virtualization rather than potentialization. In effect, hypertext can't be logically deduced from the source text. It is the result of a series of decisions: adjustment of the size of the nodes and basic modules, arrangement of connections, structure of the navigational interface, etc. In the case of automatic hypertextualization, these choices (creation of a specific hypertext) will occur at the time the software is designed and selected.

Once these quasi-technical factors have been established, it would appear to be very difficult to speak of the potentialization and virtualization of the text as *homogenous* phenomena. On the contrary, we are confronted with an extreme diversity, closely bound to three interrelated factors: the nature of the initial digital store, the software, and the communications mechanism.

A conventional linear text, even digitized, can't be read as a true hypertext, or database, or a system that will automatically create texts as a function of interactions fed by the reader. The relationship between the reader and the software for reading and navigation is much closer than that between reader and screen. Does the program only enable the reader to follow the text sequentially (like the first word processors, which regressed the reading process to a point where it resembled the fussy manipulation of antique paper rolls, a point that even fell short of the pages of a codex)? Does the software provide features for searching and moving through the text? Can automatic links be constructed among different parts of the text, different types of annotation? Can the reader personalize the software? These are all significant variables that will strongly influence the reader's intellectual activities. Finally, does

the digital media provide the means for new forms of collective reading (and writing)? A varied continuum extends between the individual reading of a specific text and navigation within vast digital networks in which a multitude of persons annotate, augment, and connect texts by means of hypertext links.

Thought is actualized in a text and a text in the act of reading (interpretation). Ascending the slope of actualization, the transition to hypertext is a form of virtualization. This ascent doesn't return us to the thought of an author, but turns the actual text into one of many possible figures in an available, mobile, freely reconfigurable, textual field, and thus connects it with other texts, incorporates it in the structure of other hypertexts and the various instruments of interpretation. By doing so, hypertextualization multiplies our opportunities for producing meaning and makes the act of reading considerably richer.

We have come back to the problem of reading. We know that in the first alphabetic texts individual words were not separated from one another. It was only gradually that spaces between words, punctuation, paragraphs, the division of books into chapters, tables of contents, indexes, page layout, the cross-referencing found in encyclopedias and dictionaries, footnotes, etc. were developed—all elements that facilitate the reading and use of written documents. Helping to control texts, structure them, articulate them beyond their linearity, such auxiliary technologies construct what we might refer to as an apparatus for artificial reading.

Hypertext, hypermedia, or interactive multimedia thus continue an ancient process of artificializing reading. If reading consists in selecting, diagramming, and constructing a network of cross-references within the text, associating it with other data, integrating words

and images within a personal memory that is continuously being updated, then hypertext mechanisms represent an objectivation, exteriorization, and virtualization of the reading process. I am not referring only to the technical processes for digitizing and displaying text, but the human act of reading and interpreting, which integrates the new tools. Artificial reading has existed for quite some time, however. Is there a difference, then, between the system that has stabilized on the pages of books and newspapers and that which is currently being created on digital media?

The simplest way of approaching hypertext, which excludes neither sounds nor images, is to describe it, in contrast with linear text, as network-based text. Hypertext would then consist of nodes (elements of information, paragraphs, pages, images, musical sequences, etc.) and links among those nodes (references, notes, pointers, "buttons" pointing the way from one node to another). Reading a conventional encyclopedia is already a kind of hypertext event, since it incorporates the navigational tools embodied in dictionaries, glossaries, indexes, thesauruses, atlases, tables, tables of contents, and endnotes. However, digital media are considerably different than precomputerized hypertexts: Searching and navigating, moving from one node to another takes place very rapidly, within seconds. Digitization also enables a single media to incorporate sound, animation, and text. Based on this approach, digital hypertext could be defined as a collection of network-based multimodal information that can be quickly and "intuitively" navigated.

Compared to earlier network-based technologies, digitization represents a minor Copernican revolution: We no longer have a navigator who follows instructions and moves physically through a hypertext, turning pages, carrying heavy volumes from place to place,

roaming through a library. Now there is a mobile and kaleidoscopic text, which presents its various facets, turns, folds and unfolds itself before the reader. A new art of publishing and documentation is being invented that attempts to take advantage of our capability of rapidly navigating large masses of information, which are being condensed into increasingly smaller volumes.

From a different point of view, we could consider the contemporary trend toward the hypertextualization of documents as a movement toward indistinctness, the blending of the functions of reading and writing. This is the process of virtualization, which so often results in linking together exteriority and interiority, and in this case the intimacy of the author and the estrangement of the reader with respect to the text. Like a Moebius strip, this continuous transition from inside to outside already characterizes conventional reading. For, in order to understand a text, the reader must "rewrite" it mentally and thus go inside it. Similarly, the difficulty of writing consists in rereading what we have written in order to correct it, and in the effort to alienate ourselves from the text. Hypertextualization objectivizes, functionalizes, and brings to power within the community this identification of reader and author.

Let's examine the situation from the reader's point of view. If we define a hypertext as a space of possible readings, a text would then represent a particular reading of a hypertext. The navigator thus participates in the writing or at least the publishing of the text he "reads," since he determines its final organization (the *dispositio* of classical rhetoric). The navigator can become author in a more profound sense than by transiting a preestablished network, however. He can participate in structuring the hypertext and creating new links. Some systems record the reader's movements and strengthen (make more visible, for ex-

ample) or weaken the links on the basis of how they are used by the community of navigators. Finally, readers can not only modify the links but also add or modify the nodes (text, images, etc.), connect one hyperdocument to another, making a single document out of two separate hypertexts, or create hypertext links among a number of documents. These methods are now being developed on the Internet, primarily on the World Wide Web. Any public text accessible through the Internet is now a virtual component in an immense and ever-expanding hypertext. Hyperdocuments that are accessible through a computer network are powerful instruments of a *collective reading-writing process*.

In this way reading and writing exchange their traditional roles. The person who participates in structuring a hypertext, who outlines possible folds of meaning, is already a reader. In turn, the person who actualizes a process or manifests a specific aspect of the document store helps write and momentarily realize an interminable act of writing. The seams and cross-references, the paths of original meaning that the reader creates, can be incorporated in the structure of the corpus. In the hypertext every act of reading is an act of writing.

Cyberspace: the Virtualization of the Computer

By focusing strictly on the transition from paper to the computer screen, we obtain only a partial view of the contemporary virtualization of the text and reading. As a medium for the presentation of potential messages, the computer is already integrated, one could

say, dissolved, in the fabric of cyberspace, that turbulent zone transited by vectorized signs. Before discussing the deterritorialization of the text, however, I would like to say a few words about the virtualization of the computer.

For a long time polarized as a "machine," balkanized by the available software, contemporary information technology, both hardware and software, deconstructs the computer to create a navigable and transparent communications space centered on the flow of information. Computers sold by various manufacturers can now be assembled from nearly identical components, and computers by the same manufacturer contain parts from various sources. Today's hardware components (transducers, memory, processors, etc.) not only are used in computers, but can be found in smart cards, automatic distributors, robots, motors, household appliances, communications networks, photocopiers, facsimile machines, video cameras, telephones, radios, televisions, etc., anywhere that digital information is automatically processed. Moreover, a computer connected to cyberspace can make use of the storage and processing power of other computers on the network (which are also engaged in a similar process), as well as various remote devices for capturing and displaying information. The majority of data processing functions (input, digitization, storage, processing, display) are distributable and, to a greater and greater extent, distributed. The computer is no longer the center but an element, a fragment of the whole, an incomplete component in a universal computational network. Its dispersed functions impregnate every element of the technocosmos. Ultimately, there will be no more than a single computer, a single text substrate, but it will be impossible to determine its limits or establish its contour. Its center will be everywhere and its circumference nowhere. A hypertextual computer, dis-

persed, living, pullulating, incomplete, virtual. A Babel computer. Cyberspace.

The Deterritorialization of the Text

Millions of individuals throughout the world are at work building and improving the immense hypertext known as the World Wide Web. On the Web, as with any hyperdocument, we need to conceptually distinguish two distinct types of memory. First there is the multimodal text or document store, the data, quasi-amorphous, yet sufficiently well organized so that individual elements can be provided with an address. Second, there is the set of structures, paths, directional signs or networks of pointers, which represent specific arrangements, selective and subjective, of the store. Each individual, each organization is encouraged, not only to add to the store but to provide other cybernauts with a view of the whole, a subjective structure. These subjective points of view appear in the links found on the various home pages displayed by an individual or group. In cyberspace, since any point is directly accessible from any other point, there is an increasing tendency to replace copies of documents with hypertext links. Ultimately, there will only need to be a single physical exemplar of the text, stored in a computer connected to the network, for it to be integrated by means of an interplay of pointers into the millions of different search paths or semantic structures that are continually being constructed. Based on the available home pages and on-line hyperdocuments, we can follow the threads of a multitude of subjective universes.

In the digital world, the distinction between original and copy has ceased to have any real significance.

Now, cyberspace has blurred the notions of unity, identity, and location. Hypertext links can connect us with an address that supplies us not with a specific text but with data that is updated in real-time: statistical results, political information, images of the world sent by satellite, etc. Thus, like the river in Heraclitus, hypertext is never the same. Fed by sensors, it opens a window on cosmic flux and social instability.

The hypertext found in digital networks has *detrterritorialized* the text. It has created a text that lacks sharp outlines or a definable interior. Now, there is only *text*, as we might say of water or sand. The text has been set in motion, swept up in the flow, vectorized, metamorphosed. In this sense it is much closer to the movement of thought or its representation. Having lost its affinity with immutable ideas intended to transcend the sensible world, the text has become the analog of the universe of processes with which it is intertwined.

The text will always exist, but the page has been stripped of its significance. The page, the Latin *pagus*, blank field, territory enclosed by white margins, intersected by lines and sown with characters, is still weighed down by the Mesopotamian clay and clings to the Neolithic soil. This ancient page is slowly disappearing beneath the informational flood, its untethered signs carried away by the digital ocean. It is as if digitization were establishing a kind of immense semantic plane, accessible from anywhere, which each of us can help produce, manipulate, or modify. And yet—as if the point needed to be emphasized—the economic and legal forms inherited from previous centuries prevent the movement of deterritorialization from reaching its fulfillment.

The same analysis could be applied to images, which virtually constitute a single hypericon, bound-

less, kaleidoscopic, growing, subject to a multitude of chimeras. The music of cyberspace rises up from banks of sound effects, repertoires of sampled timbres, synthesized scores, automatic sequences and arrangements. It composes an inaudible polyphony, or collapses into cacophony.

Interpretation, the production of meaning, no longer refers exclusively to the interiority of an intention, to hierarchies of esoteric signification, but to the individual appropriations of a navigator or surfer. Meaning is based on local effects, it is formed at the intersection of a deterritorialized semiotic plane, and its goals are efficiency and pleasure. I am no longer interested in what an unknown author thought, but ask that the text make *me* think, here and now. The virtuality of the text nourishes my actual intelligence.

Toward a Resurgence of the Culture of Text

If reading involves arranging, selecting, diagramming, constructing a semantic network, and integrating acquired ideas with a memory, then digital technologies of hypertext and navigation constitute a form of technological virtualization and exteriorization of the reading process. Through digitization there has been a resurgence of text and reading, along with their profound alteration. We can imagine a time in the near future when books, newspapers, printed technical and administrative documents will be no more than temporary and partial projections of much richer and still vital on-line hypertexts. Since the alphabetic writing in use today has been stabilized on and for a static substrate, it is reasonable to ask if the appearance of a dynamic

substrate might lead to the creation of new writing systems that are better able to exploit this new potential. The computer icons, video games, and interactive graphic simulations used by science represent the first steps in the direction of a dynamic ideography of the future.

Does the increased number of computers signal the end of writing, as our contemporary prophets of doom have led us to understand? The idea is very likely based on a misconception. Certainly, the digitized, fluid, and reconfigurable text, nonlinear, circulating throughout local or global networks in which each participant is an author and potential editor, is vastly different than the conventional printed text. It is important, however, that we not confuse the text with the unilateral method of distribution found in printing, or the static substrate of paper, or the linear and closed structure of messages. The culture of text, along with everything it involves—the deferral of expression, the sense of critical distance implied by interpretation, the closely related cross-references within a semantic universe of intertextuality—is, on the contrary, undergoing a tremendous development in the new communications space found in digital networks. Far from destroying the text, virtualization seems to have helped it conform to its newly revealed essence. It is as if the contemporary process of virtualization had brought about the text's becoming. As if we were leaving a period of prehistory and the adventure of the text was just now beginning. As if we had, at last, just invented writing.

The Virtualization of Intelligence and
the Constitution of the subject

In the previous chapter I examined the *operations* of virtualization. I would now like to turn my attention to its *object*, or rather to the creation of the object as the fulfillment of virtualization. In order to approach the object through a process of logical progression, however, I would first like to draw the reader into an examination of the virtualization of intelligence. In this and the following chapter, I examine three interrelated themes: the collective dimension of personal cognition and affect, the question of the "thinking community" as such, and collective intelligence as a technopolitical utopia. The following discussion will help clarify the interrelationship between the object and collective intelligence.

As humans we never think alone or without tools. Institutions, languages, sign systems, technologies of communication, representation, and recording all inform our cognitive activities in a profound manner. The whole of a cosmopolitan society thinks in us. Thus, despite the permanence of elemental neuronal structures, thought is profoundly historical, dated and situated not only by its forms of expression but also in its procedures and methods of operation. If the community thinks in us, is it reasonable to assume that group thought can be real and effective? Can we speak of an intelligence without a unified consciousness or thought

without subjectivity? How far should we go in redefining the notions of thought and psychic life so that they become congruent with society? It is said that we are becoming the neurons of a planetary hypercortex. It is important, therefore, that we be able to explain these problems and underline the differences between various types of collective intelligence, especially those that distinguish human societies from ant colonies and bee hives.

The development of computer-mediated communication and global digital networks appears to be the realization of a more or less well-formulated project to deliberately create new forms of collective intelligence, which are more flexible and democratic and based on reciprocity and respect for singularities. In this sense we could define collective intelligence as a fully distributed intelligence that is continuously enhanced and synergized in real-time. This new ideal could replace artificial intelligence as the myth that drives the development of digital technologies and reorients the cognitive sciences, the philosophy of mind, and anthropology toward such questions as the ecology or the economy of intelligence.

In exploring these problems I'll make use of the concepts of the virtual and the actual and the theory of anthropogenesis through virtualization introduced in previous chapters. The operations of elevation to a problematic, deterritorialization, sharing, and the reciprocal constitution of interior and exterior, which have been associated with virtualization throughout this book, will also be examined. After reviewing the importance of our language, technology, and institutions in shaping the individual psyche, I will briefly discuss the central themes of cognitive ecology and economy. I'll also try to formulate a definition of the psyche that is compatible with the idea of collective

thought. In doing so I will examine the Darwinian notions of intelligence and outline an affective approach to these questions that takes into account the mind's dimension of interiority. Following this I will describe the new forms of collective intelligence made possible by the development of interactive digital networks and the perspectives they create for positive forms of social evolution. An analysis of cyberspace will introduce the next chapter, devoted to analyzing the role of the "object" operator in the formation of intelligent communities, from market capitalism to the enigma of hominization. Finally, I will show how the object, key to collective intelligence and primary substrate of virtuality, confronts the "real," its tenacious and perverse double.

Collective Intelligence in Personal Intelligence

By "intelligence" I mean the canonical set of cognitive aptitudes, namely the ability to perceive, remember, learn, imagine, and reason. To the extent that we possess such aptitudes, all individual humans are intelligent. The exercise of such cognitive abilities, however, implies a collective or social element that has generally been underestimated. We never think alone but always as an element of a dialogue or multilog, either real or imagined. We exercise our higher mental faculties only as members of living communities, with their heritages, conflicts, and projects. Whether they occupy the background or foreground of mental activity, these communities are always already present in every aspect of our thought, acting as interlocutors, intellectual instruments, or objects of reflection. The knowledge, values, and tools transmitted by culture constitute the nour-

ishing context, the intellectual and moral bath out of which individual thoughts develop, weave minor variations, and occasionally produce major innovations.

For the moment I would like to concentrate on the instruments of thought. It is impossible for us to exercise our intelligence independently of the languages and sign systems (scientific notation, visual codes, musical notation, symbols) we inherit from a culture and share with thousands or millions of others. These languages carry with them methods of segmenting, categorizing, and perceiving the world. They contain metaphors that serve as filters of the given and small interpreting machines. They embody an entire heritage of implicit judgments and preestablished ways of thinking. Languages and sign systems make our intellectual operations possible; the communities that forged them and enabled them to slowly evolve think in us. Our intelligence possesses a significant communal dimension because we are creatures of language.

The tools and artifacts that surround us incorporate humanity's age-old memory. In using them, we make use of collective intelligence. Houses, automobiles, televisions, and computers summarize secular lines of research, inventions, and discoveries. They crystallize the wealth of organization and cooperation that has been used to produce them. But tools are not only memories, they are also perceptual machines that can operate on three different levels: direct, indirect, and metaphoric. Directly, eyeglasses, microscopes, telescopes, X rays, telephones, cameras, and televisions extend our reach and transform the nature of our perceptions. Indirectly, automobiles, aircraft, and computer networks profoundly alter our relationship to the world and in particular our relationship to space and time, in such a way that it becomes impossible to determine whether they transform the human world or

our manner of perceiving it. Finally, material instruments and artifacts provide us with a large number of concrete and socially shared models, with which we can metaphorically apprehend more abstract phenomena or problems. Thus Aristotle considered causality using the example of a potter. The seventeenth century represented the body as a kind of mechanism, and today we construct computational models of cognition. Through the use of artifacts, the immense labor of humanity and its age-old intelligence share in our perception of the world, here and now.

The universe of things and tools that surrounds us and in which we share thinks in us in a hundred different ways. By this means we participate in the collective intelligence that produced them. The social institutions, laws, rules, and customs that govern our relations have a determining influence on the course of our thoughts. Whether we are a high-energy physicist, priest, head of a public organization, or financial investor, we will tend to favor a given intellectual quality over another. The scientific community, church, government bureaucracy, or stock market each embodies different forms of collective intelligence, along with their distinct modes of perception, coordination, learning, and memory. The social "rules" governing the interactions among individuals also model the collective intelligence of human communities as well as the cognitive aptitudes of the individuals that share in them.

Every individual human has a brain, which, roughly speaking, is modeled like the brains of other members of the species. Because of biology our intelligences are individual and similar (although not identical). Because of culture our intelligence is highly variable and collective. In effect, the social dimension of intelligence is closely tied to our languages, technologies, and in-

stitutions, which differ greatly according to time and place.

Cognitive Economies

With the growth of institutions and "rules," there is a transition from the collective dimensions of individual intelligence to the intelligence of the community. We can consider human groups as ecological or economic environments in which various species of representation and ideas come into being and perish, expand or contract, compete or live together symbiotically, remain unchanged or mutate. Not only individual ideas, representations, messages, and statements, but their species: literary or artistic genres, methods of organizing knowledge, current forms of argument or "logic," message types and their media. A human community is the theater of a cognitive ecology or economy within which various species of representation evolve (Sperber).

Social forms, institutions, and technologies model the cognitive environment in such a way that certain kinds of ideas or messages have a greater chance of reproducing than others. Among the factors affecting collective intelligence, intellectual technologies, including systems for communicating, writing, recording, and processing information, play a major role. Indeed, some types of representation have difficulty surviving, or even coming into being, in environments lacking certain intellectual technologies, while they may prosper in other cognitive ecologies. For example, lists of numbers, tables, and other forms of systematically arranged knowledge cannot easily be transmitted in preliterate cultures. Oral societies favor the encoding of representation in narrative forms, which can be preserved and transmitted more easily in the absence of a medium for

writing. To take a more recent example, an increasing percentage of knowledge is currently expressed by means of interactive digital models and simulations—something that was obviously unthinkable before the existence of computers with easy-to-use graphical interfaces. The types of representation that are prevalent within a given cognitive economy favor distinct modes of knowledge (myth, theory, simulation) together with their corresponding styles, criteria of evaluation, and "values." As a result intellectual technologies or media can, even indirectly, have profound repercussions on collective intelligence.

Communications infrastructures and intellectual technologies have always had close ties to economic and political forms of organization. There are several well-known examples of this. The birth of writing is associated with the first hierarchically arranged bureaucratic governments and centralized forms of economic administration (taxes, the management of large agricultural domains). The appearance of the alphabet in ancient Greece is contemporary with the emergence of money, the polis, and especially the creation of democracy. Since the practice of reading had become widespread, everyone was able to learn about laws and discuss them. Printing made possible the widespread distribution of books and the existence of newspapers, which served as the basis for public opinion. Without the printing press, modern democracies would not have been born. Printing also represents the first mass-production industry, and the technoscientific development it promoted was one of the engines of the industrial revolution. The audiovisual media of the twentieth century (radio, television, records, films) have played a role in the emergence of the society of the spectacle, which overturned conventional rules both in politics and the market (publicity, the economy of information and communication).

It is important to emphasize that the appearance or extension of intellectual technologies do not automatically determine a given mode of knowledge or social organization. We must be careful, therefore, to distinguish causal or determining actions from those that prepare the way for or make something possible. Technologies don't determine, they lay the groundwork. They expose us to a broad array of new possibilities, only a small number of which will be selected or employed by social actors. If such technologies weren't themselves condensed forms of collective intelligence, we might say that technology proposes and man disposes.

Darwinian Machines

The notion of collective intelligence is not simply a metaphor, some helpful analogy, but a coherent concept. To describe such a concept, we need to define a "mind" that is fully compatible with a collective subject, that is, an intelligence whose subject is multiple, heterogeneous, distributed, cooperative-competitive, and constantly engaged in a self-organizing or autopoietic process. This set of conditions automatically eliminates computational or informatic models such as Turing machines, which do not possess the capacity for self-creation.

Models based on biology seem to be better candidates, particularly those that employ a Darwinian approach. Darwinian principles are, by definition, applicable to populations, and involve the presence of some means for generating novelty or variability: genetic mutation, use of new neuronal connections, invention, the creation of organizations or products. Coupled to its environment, the Darwinian machine se-

lects from among the novel items introduced by the generator. Its choice is notably constrained by the viability and capacity for reproduction of the individuals or subpopulations provided with the new characteristic. Darwinian systems demonstrate a capacity for non-directed learning or an ability for continuous self-creation (which amounts to the same thing for a theory of mind). Through the dialectical interplay of mutation, selection, and transmission of the selected elements, Darwinian machines drag their environments with them along an irreversible historical path. In their own way Darwinian machines embody the memory of that history.

The principles of Darwinian systems can be applied to the ecology of living species, human groups considered as development environments for representation, market economies (populations of producers, consumers, goods), and the individual psyche understood as a society of thoughts and cognitive modules. And finally they can be applied to the operations of the brain seen in terms of the principles of neuronal Darwinism. Systems capable of nondirected learning, together with their environments, can be simulated by computer. Given the development of genetic algorithms and various artificial life systems, it's possible that software, symbiotically connected to the technological and human environment of cyberspace, may soon represent the latest Darwinian systems capable of learning and self-creation.

The intelligence of the Darwinian machine is enhanced when it behaves fractally, at several tightly nested levels of integration. For example, the market can be considered as a Darwinian machine but its intelligence is increased when the businesses and consumers that keep it going are also Darwinian machines (intelligent organizations, consumer groups). A brain is

at the same time the result of Darwinian processes that occur at the level of biological evolution and the level of individual apprenticeship. Moreover, it integrates several types of "learning populations" at different scales: neuronal groups, extended sensory maps, global regulatory systems, etc. (Edelman, 1992).

The Four Dimensions Of Affectivity

Although the presence of a Darwinian system may be a necessary condition for the existence of mind, it is not a sufficient one. The question of intentionality or the ability to refer to entities outside the mind is not really the problem, however, as it is often made out to be in discussions concerning the intelligence of computers. For Darwinian machines do not operate in a closed circuit, they are by definition coupled to an environment. Their nature is to translate the other into self or to incorporate the history of their relations with their environment in their own organization. Yet there is nothing in the general definition of Darwinian machines that necessarily implies subjective experience or the dimension of interiority characteristic of sensation, in other words, *affectivity*. It is important to clearly distinguish between affectivity and consciousness. A mind can be unconscious, like the "minds" of certain animals, like a large percentage of the human mind, or like the minds that emerge from intelligent communities. As for affectivity, which can be confused, unconscious, multiple, heterogeneous, it constitutes—unlike consciousness—a necessary dimension of the psyche and perhaps its very essence. Without it the system would return to a state of insensibility, to exteriority, to the ontological dispersion of a simple mechanism. A mind must be affective, but not necessarily conscious. Consciousness is the product of selection, of the linear-

ization and partial display of an affectivity to which it is fully indebted.

For our purposes it is less important to decide what is and what isn't an element of the psyche than to provide a definition of the psyche that can be applied to an individual human mind as well as to a collective intelligence, a concept of mind that is fully compatible with a collective subject. An integral psyche, one that is capable of affect, can be analyzed along four complementary dimensions: topological, semiotic, axiological, and energetic. I referred to these four dimensions in the chapter on the virtualization of the economy and would now like to develop them in greater detail.

Topology. The psyche is structured at each moment by its connections, systems of proximity, or a specific space: associations, connections, paths, gateways, switches, filters, attractors. The topology of the psyche is in continuous transformation, some regions being mobile and others stationary, some quite dense, others only sparsely populated.

Semiotics. Mutant hordes of representations, images, signs, and messages of all shapes and kinds (aural, visual, tactile, proprioceptive, diagrammatic) people the space of connections. By circulating throughout the pathways and regions of topological space, the hordes of signs modify the landscape of psychic attractors. Because of this, signs or groups of signs can also be referred to as agents. The transformations of connectivity in turn influence the populations of signs and images. Topology is itself the set of qualitatively differentiated connections or relations among signs, messages, and agents.

Axiology. The representations and regions of psychic space are associated with values, either positive or

negative, depending on the different measurement systems. These values determine the tropisms, attractions and repulsions between images, the polarities among regions or groups of signs. These values are by nature mobile and changing, although some of them may also display a certain stability.

Energics. The tropisms or values attached to images can be strong or weak. The movement of a group of representations can cross certain topological barriers (distend certain connections, create others, modify the landscape of attractors) or, lacking sufficient force, remain within them. All psychic activity is thus irrigated and animated by an energetic economy involving the movement or immobilization of forces, the assignment or mobilization of values, the circulation or crystallization of energy, the investment or divestment of representations, connections, etc.

According to this broadly described model, the operations of the psyche are parallel and distributed rather than sequential and linear. An affect, or an emotion, can be defined as a psychic process or event that involves at least one of the four dimensions introduced here: topology, semiotics, axiology, energics. But since these four dimensions are mutually immanent, an affect is generally a modification of the mind, a differential of psychic life. Psychic life in turn appears as a stream of affects.

This model has the virtue of being compatible with the most recent data of cognitive psychology (primarily with respect to the semantic organization of long-term memory) and the major tenets of psychoanalysis, including schizoanalysis. Moreover it does not contradict introspective experience or phenomenology. It is also compatible with the Darwinian approach since the configurations of four-dimensional abstract psychic space

are continuously modified by external elements and redistributed by the dynamics of the psychic environment. We can draw a comparison between these continuous transformations and the effects of the "variety generator" of the Darwinian machine. Coupled to its environment, the psychic system selects viable affective dynamics during the unfolding of a history or by following an irreversible evolutionary path: construction of the individual or collective personality, apprenticeship, invention, language obsolescence, affective investment or divestment.

The psyche constitutes an interiority. Its topology is not a neutral container, a pure system of coordinates, but a qualitative and differentiated space whose component parts are all related to one another and form figures, or figure-ground arrangements. Signs and messages, by circulating through and populating the space, by constantly referring to one another, and by actualizing connectivity, also help create the interiority of the mind. Values mutually determine one another and form a system. Finally, the energy that irrigates the mind leaves one place only to occupy another, helping to create a certain form of coordination, codependence, and unity within the psyche.

Psychic unity however is like a bustling city and its affective interiority open to external influence. Gilles Deleuze wrote that the interior is a fold of the external world. Psyches are also Darwinian machines, however, for they can be identified with a process of transformation-translation between the other and the self, a self that is never definitively closed but always in a state of disequilibrium, openness, receptivity, and change, a self whose essence is perhaps the singular quality of the process of assimilation of the other and heterogenesis. This openness begins with a simple sensation, undergoes a process of apprenticeship and dialogue, and

culminates in *becoming*—the chimerization or transition toward another subjectivity.

This model of the psyche can be applied to a text, film, message, or any work of art. In the case of a complex message, for example, we have

- a collection of signs or message components
- connections, cross-references, and echoes among the parts of the message
- a distribution of positive or negative values among the elements, zones, and connections associated with the message, as well as a value emerging from the message as a whole
- energy that is differentially distributed among certain connections and values, lines of force, structure

The message as a whole, if we concentrate on its signification, functions as a dynamic configuration, a kind of unstable force field (which can be variously interpreted) that must obviously refer to an exterior in order to function: other messages, real referents, interpreters.

The message is itself an affective agent for the mind of the person who interprets it. If the text, message, or work of art functions like a mind, it is because they have already been read, translated, understood, imported, and assimilated with mental and affective matter. A subject transmutes a series of physical events into a meaningful message. Just as King Midas could touch nothing without turning it into gold, the mind is unable to apprehend anything that is not, by that very fact, changed into the movements and folds of the rich fabric of affect. What is true of messages is equally true

of all the elements of our experience, of the world itself. For us, the world, our human world, is a problematic field, a dynamic configuration, an immense, constantly metamorphosing hypertext, crisscrossed by tensions, faded and barely present in certain regions, intensely present and luxuriously detailed in others. Geographic proximities and traditional causal connections are no more than a small subset of the bonds of signification, analogy, and affective circulation that structure our subjective universe. The physical universe is a particular instance of the subjective world that surrounds, impregnates, and sustains it. The subject is its world, the world here being understood as everything that affect envelops. Thus to say that the psyche is open to the outside world is something of an understatement. It is *nothing but* exteriority, but an exteriority that is infiltrated, energized, complicated, transubstantiated, and animated by affectivity. The subject is a world bathed in meaning and emotion.

This image of a living intelligence or psyche is also an image of the virtual. By its nature, and although it is always connected to its physical body, the affective subject extends beyond physical space. Deterritorialized and deterritorializing, it exists, which is to say, it continues to grow far from any "there." Because of its construction, the psyche transforms the exterior into interior (the inside is a fold of the outside) and vice versa, since the perceived world is always already immersed in the element of affect. The psychic landscape, as I have described it, is a kind of dynamic configuration. It exists as a knot of forces, constraints, and finalities, the intimacy of an aggregate of tensions, the image of an unstable field of heterogeneous attractors that defines every unbounded problematic situation.

The psyche provides a canonical example of the virtual, a virtual that is actualized through its affects.

How is this virtual actualized? Through affects. Here too, affects refer to psychic acts, regardless of their nature. The quality of an affect depends on the mental environment that gives it meaning and which it helps to determine. Because of the reciprocal implication between a subjectivity and its world, affective qualities are also dependent on environmental qualities, an outside environment that continues to provide new objects, new practical or aesthetic configurations for it to inhabit. Thus there are no longer any a priori limits to the growth of new types of affects just as there are no limits to the production of new objects or landscapes. We could say there exists a kind of affective inventiveness. The ordinary classification of emotion (fear, love, etc.) would thus represent a limited and highly simplified subset of the various types of affects.

Thinking Societies

We can now better understand why intelligence incorporates a collective dimension: It is not only languages, artifacts, and institutions that think in us but the whole of the human world, with its lines of desire, affective polarities, hybrid mental machines, and landscapes of meaning paved with images. To act on one's environment, no matter how slightly, even on a purely technological, material, or physical level, means that we erect a shared world that thinks differently in each of us, indirectly secrete some subjective quality, work in and with affect. What about the production of messages and relations? The heart of the matter is that by living, acting, and thinking, we weave the very fabric of life of others.

For this reason human communities as such can be said to be intelligent. The psyche is by definition

something collective. It involves a multitude of interacting sign-agents, charged with value and investing their energy in mobile networks and changing landscapes. Human communities are a kind of megapsyche, not only because they are perceived and affectively inhabited by persons, but because they can adequately model themselves in terms of mutually immanent topological, semiotic, axiological, and energetic dimensions. Social megasubjects, although they do not possess a linearizing consciousness, are crisscrossed by affect. Social life itself is the result of an immense interplay of affects. The role of selection and sequential display performed by the individual consciousness is carried out within communities by political, religious, or media structures, which in turn inhabit individual subjects. But the comparison between the services rendered to the individual by his conscious mind and those provided by centralized media or spokespersons to the community is not always favorable to the latter.

Intelligence is fractal. It reproduces itself in proportion to the relevant scale of magnitude: macrosocieties, transindividual psyches of small groups, individuals, infraindividual modules (unconscious but complex regions of the brain), transverse interactions among infraindividual modules involving different persons (sexual relationships, complementary neuroses, etc.). Each node or region of the collective hypercortex contains a living psyche, a kind of dynamic hypertext crisscrossed by tensions and energies colored by affective qualities, animated by tropisms, and agitated by conflicts. And yet, through its connection to a mortal body and its consciousness, the *person* manifests a psychic tone and affective intensity that are absolutely singular.

There is one quality, however, that is distributed to varying degrees in all types of minds, but which hu-

man societies (rather than individuals) exemplify better than the others: the ability to reflect the whole of the collective mind somewhat differently in each of its parts. Intelligent systems are holographic and human groups are the most holographic of all intelligent systems. Like Leibniz's monads or Whitehead's actual occasions, each individual embodies a selection, a version, a particular vision of the shared world or global psyche.

Human Communities and Insect Societies

The notion of collective intelligence inevitably evokes the operation of insect societies: bees, ants, termites. Human communities and ant colonies are, however, profoundly different. In the first place, and all other distinctions follow from this, collective intelligence thinks in us, whereas the ant is a semi-opaque and not very holographic member, an unconscious cog in the intelligent ant colony. We can take individual pleasure in the collective intelligence, which enhances or modifies our own intelligence. We contain or partially reflect, each in our own way, the intelligence of the group. The ant, however, takes little pleasure in the social intelligence of the colony, of which it has a limited vision. It receives no mental enhancement. An obedient beneficiary, it participates blindly in the life of the colony.

In a more trivial sense this means that man is (rather) intelligent while the ant is, relative to the human, dumb. Not only does the ant receive less social intelligence than a human but it also contributes very little in turn. A woman or man in a human culture is capable of learning, imagining, creating, and modifying, although perhaps only slightly, the language, technolo-

gy, and social relations that exist in their environment, something an ant—highly dependent on genetic programming—is incapable of doing. Among insects, only society can resolve new problems, whereas among humans, individuals are often far more inventive alone than in groups, such as crowds or bureaucracies. The intelligence of human societies is variable and, in the best of cases, evolutive, due to the nature of the individuals who compose it and—what amounts to the other side of the same reality—the bonds, often free or contractual, that hold it together. Within the framework of a given species of ant, however, the operation of the colony is fixed.

The status of the individual in each type of society crystallizes and summarizes the set of differences between them. The position and role of each ant is firmly established. Within a particular species, the types of behavior or morphological differences (queens, workers, soldiers) are invariable. Ants (like bees and termites) are organized into castes and ants of the same caste are endlessly interchangeable. Human societies, however, are continuously inventing new categories. Individuals move from one class to another, and it is impossible to reduce an individual to membership in a class (or a group of classes), for each individual is unique. Humans, because they pursue individual paths of learning and embody different affective worlds and virtualities of social mutation (even minimal), are not interchangeable. Individuals contribute differently and creatively to the life of the collective intelligence that illuminates them in turn, whereas an ant blindly plays a role that dictates its social position within a vast unconscious mechanism of which it is completely unaware.

Certain civilizations, certain political regimes have attempted to compare human collective intelligence with that of ant colonies. They have treated the indi-

vidual as a member of a category and suggested that such a reduction of the human to the insect is both possible and desirable. My own philosophical, moral, and political position on this is quite clear: Human progress in constructing new forms of collective intelligence is radically different from the behavior of an ant colony. On the contrary, this progress should make individual consciousness more receptive to the operations of the social intelligence, furthering the enhancement and integration of creative singularities shaped by individuals and small human groups in the cognitive and affective processes of collective intelligence. There are no guarantees that we will succeed in such an endeavor. Regression is possible. Rather than embodying some historical law, our progress is more like a project that is transmitted, enriched, and newly reinterpreted by each generation, and unfortunately susceptible to stagnation or forgetfulness.

The Objectivation of Shared Context

The contemporary reactualization of this project will most likely involve the judicious use of digital communications technologies. Intellectual and communications technologies are currently undergoing widespread and radical change. As a result cognitive ecologies are being rapidly and irreversibly reorganized. The brutality of cultural destabilization shouldn't prevent us from recognizing the most socially positive forms now emerging and promoting their development, however. One of the principal effects of the current transformation is the appearance of a new method of communication within very large deterritorialized communities, which I refer to as *many-to-many communication*. A similar technology is being used for the Internet, computer bulletin boards, electronic confer-

ences and forums, groupware, virtual worlds, and knowledge trees. The cyberspace now being formed fosters the development of large-scale, nonmedia-driven communication, which constitutes a decisive advance toward new and more evolved forms of collective intelligence.

With conventional media (one-to-many) there is a clear separation between transmitters and passive receivers, which are isolated from one another. Messages broadcast from a transmitter realize a crude form of cognitive or collective unification by supplying a shared context. Nevertheless, this context is imposed, transcendent, does not result from the activity of the participants with the mechanism, and can't be laterally negotiated among the receivers. The telephone (one-to-one communication) does involve a form of reciprocal communication, but it does not provide the participants with a global vision of what is occurring throughout the entire network or enable them to construct a shared context. In cyberspace, however, each of us is a potential transmitter and receiver in a space that is qualitatively differentiated, nonstatic, constructed by its participants, and explorable. Here we no longer encounter people exclusively by their name, geographical location, or social rank, but in the context of centers of interest, within a shared landscape of meaning and knowledge.

Based on modalities that are still primitive but being refined yearly, cyberspace provides large and geographically dispersed groups with the instruments for cooperatively constructing a shared context. Communication is here deployed throughout the full range of its pragmatic dimension. No longer restricted to the distribution or transport of messages, communication now involves participants in a form of interaction that they can modify or stabilize, a negotiation of meanings, a

process of mutual recognition that takes place through the very activity of communication. The important element here is the partial objectivation of the virtual world of significations, which is shared by the participants and reinterpreted by them using the mechanisms of many-to-many communication. This dynamic objectivation of a collective context serves as an agent of collective intelligence, a kind of living bond that takes the place of a memory or shared consciousness. A living subjectivation references a dynamic objectivation. The shared object dialectically engenders a collective subject.

For example, the World Wide Web, as described in Chapter Three, is a carpet of meaning woven by millions of people and continuously being reworked. From the constant addition of millions of subjective universes emerges a memory that is dynamic, shared, "objectivized," navigable. Landscapes of meaning have emerged from collective activity in the form of Multi-User Dungeons (MUDs). A MUD is a role-playing game, a kind of linguistic virtual world, that takes place in real time and involves hundreds or even thousands of people around the world. Electronic bulletin-board conferences and Internet newsgroups represent a less elaborate form of collectively secreted shared memory, where the changing list of groups creates a dynamic map of the interests of shifting communities. In the best of cases these forms of interaction constitute living encyclopedias. The posting of "frequently asked questions" (collectively known as a FAQ) in certain newsgroups avoids repetition and enables everyone to participate in the dialogue with a minimum of basic knowledge about the topic under consideration. This encourages individuals to participate as effectively as possible in collective intelligence.

Shared landscapes of meaning are also to be found in knowledge trees, free markets for a new econ-

omy of knowledge, which provide members of a community with a synthesized view of the range of skills possessed by the group and enable them to locate their identity as an image in the knowledge space. On the knowledge tree information is always presented in context, in terms of a figure-ground relation, the figure being the information and the ground the context. Thus the same information provides a different aspect, image, or mask depending on its context. This context (the tree, its shape, color, etc.) emerges dynamically from the acts of apprenticeship and the knowledge transactions experienced by the participants and, more generally, from the corpus of information under consideration and its use by a community.

The Cortex of Anthropia

The transmission and sharing of social memory are as old as humanity. Stories, physical skills, and wisdom are passed down from generation to generation. The progress made by communications and recording technologies has considerably extended the reach of this shared inheritance (book, audio, and film libraries). Today, the information available on-line or in cyberspace generally includes not only the deterritorialized "stock" of conventional texts, images, and sounds, but hypertextual points of view about this stock, knowledge bases with the capacity for autonomous inference, and digital models for simulations. In addition to these masses of static or dynamic documents, shared landscapes of signification coordinate the varied subjective structure of the informational ocean. The collective memory at work in cyberspace (dynamic, emerging, cooperative, reworked in real time as it is interpreted) must be clearly distinguished from the traditional

transmission of narratives and skills, or the static recordings found in libraries.

Somewhere beyond memory, software functions as an automatic cognitive micromodule that integrates itself with human intelligences to transform or enhance their capacity for calculation, reasoning, imagination, creation, communication, learning, or navigating information. Every time someone produces a new piece of software, they accentuate the collective character of intelligence. While the supply of information increases only the common *stock* (or enriches its structure), software adds to the number of shared *operating modules*. Programming software cooperatively in cyberspace illustrates in striking fashion the autopoiesis (or self-production) of collective intelligence, especially when the software is itself designed to improve the infrastructure of digital communication.

Cyberspace promotes connections, coordination, and synergy among individual intelligences. And its effects are even more pronounced when a living context is shared, when individuals or groups are able to identify one another in a virtual landscape of interests and skills, and when there is greater diversity of shared or mutually compatible cognitive modules. We know that during every historical epoch, humanity has felt as if it were experiencing an important transformation. This may help us put into proper perspective any similar impressions concerning contemporary events. I cannot, however, abandon the idea that we are currently experiencing a significant change in the forms of collective intelligence. The dynamic objectivation of the emerging context, the massive sharing and growth of different cognitive operators, and the existence of real-time interconnections that are independent of geographical distance seem to mutually reinforce one another. One of the most striking features of the new

collective intelligence is the acuity of its reflection in individual intelligences. It is almost as if the psychic acts of a growing fraction of humanity were directly felt by others. Certain forms of the virtual world enable us to express, to map in real time, the topological, semiotic, axiologic, and energetic components of collective psyches.

Satellite images of our planet, information from multitudes of global sensors, computerized models that integrate this data, simulations that allow us to interpolate the movements of the Earth, its history, the unimaginable intimacy of its infinitely unhurried existence, opaque, enormous, dispersed—all of this conspires to gradually bring into focus within the human mind the archaic figure of Gaia. In the presence of the ancient goddess, still mingled with the substance of her origin, we can now almost hear and see, rising before our eyes, swift and crackling, the great hypercortex of her daughter, Anthropia, thinking.

No less than the utilitarian search for information, it is the vertiginous sensation of plunging into the communal brain that explains the current enthusiasm for the Internet. Navigating through cyberspace allows us to parade our conscious glance through the chaotic interiority, the tireless drone, the banal futilities and planetary fulgurations of the collective intelligence. Access to the intellectual process of the whole informs that of each part, individual or group, and nourishes in turn that of the whole. In so doing we make the transition from collective intelligence to intelligent community.

Despite its many negative aspects and especially the risk of leaving a segment of humanity on the shoulder of the information highway, cyberspace displays a number of new and exciting properties. These provide

us with an important instrument for the nonhierarchical coordination and rapid integration of intelligences, the exchange and navigation of knowledge, and the deliberate self-creation of intelligent communities.

At a time when a new culture is being formed, it is important that we take advantage of this rare opportunity to deliberately orient the ongoing evolution. By arguing in terms of its impact, we condemn ourselves to passivity. We must stop demonizing virtuality (as if it were the opposite of the real). The choice is not one between a nostalgia for an antiquated reality and a threatening but exciting virtuality, but between *different concepts of the virtual*. The alternatives are straightforward. Either cyberspace will reproduce the media, the spectacle, the consumption of commodity information, and social exclusion we are presently experiencing on a scale far greater than any we have known (to a large extent this is the natural trend seen in the current development of the "information highway" and interactive television), or we will accept the most positive aspects of the ongoing evolution and work toward a civilizing project centered on intelligent communities. This will involve a re-creation of the social bond through the exchange of knowledge, mutual recognition, the awareness and enhancement of singularity, more direct, more participatory forms of democracy, the enrichment of individual lives, the creation of new forms of open cooperation to resolve the terrible problems that humanity must confront, and the improvement of the software and cultural infrastructures associated with collective intelligence.

The Virtualization of Intelligence and the Constitution of the Object

The Problem of collective Intelligence

The problem of collective intelligence is simple to identify but difficult to resolve. Can a group of human beings be more intelligent, wiser, smarter, or more imaginative than the individuals who compose it? And does this hold true not only for the long term, throughout the duration of our technological history, our institutions and culture, but here and now, as events unfold and during our daily activities? Is there a way for us to coordinate intelligences so that they amplify rather than cancel one another? Is there a way to instigate some form of reciprocal improvement, a mutual exaltation of the mental capacities of individuals, rather than subjecting them to a norm or adjusting them downward to some lowest common denominator? In one sense we could interpret the history of institutions, languages, and cognitive technologies as more or less successful attempts at resolving such problems.

While individuals are all intelligent in their own way, groups are often disappointing. In a crowd, for example, individual intelligences, rather than being additive, tend to divide. Bureaucracies and authoritarian forms of organization provide a certain level of coordination, but stifle and flatten singularity. In small groups rules of organization and mutual awareness en-

sure the reciprocal improvement of intelligence. But when tens of thousands of people are involved, hierarchical planning and group management based on broad categorizations have long since become the rule. In keeping with a growing number of politicians, economists, and artists, I feel that contemporary communications technologies may help to alter a long-standing anthropological situation that condemns large communities to forms of political organization that bear little relation to intelligent collectives.

Why has "the world of culture," in the bourgeois sense, that is, the production and consumption of science, philosophy, literature, and the fine arts, had such an appeal for so long a period of time? Most likely because, in its elitist and imperfect way, it approaches an ideal of collective intelligence. What are the social norms, values, and rules of behavior designed to govern (ideally) this world of culture? They include the ongoing evaluation of works of art by the artist's peers and the public, the constant reinterpretation of our heritage, the refusal to accept authoritarian arguments, our encouragement to enrich a shared patrimony, competitive cooperation, continuous education of our notions of taste and our critical faculties, refinement of personal judgment, concern for variety, encouragement in the use of imagination, innovation, unfettered research. Society will have succeeded in resolving a number of crucial problems of the contemporary world once it has begun to implement a method of operation that is "cultivated" outside the restricted environments and specialized fields to which it is generally limited. One of the surest signs of the closeness between the world of culture and intelligent communities is its (theoretical) willingness to limit or sidestep power. The ideal of collective intelligence is obviously not to *distribute* science and the arts throughout society as a whole, thus disqualifying other types of knowl-

edge or sensibility. Rather, it is to recognize that the diversity of human activities, without being exclusive, can and must be conceived, treated, and lived as "culture" in the sense mentioned previously. As a result each human being could and should be respected as an artist or researcher in a republic of minds.

Such a program sounds utopian. However, the key to economic, political, or even military power now resides in our capacity to produce intelligent communities. While I don't deny that relations of power and domination certainly exist, they are ultimately nothing more than a way of sapping our strength. For a universally intelligent society will always be more efficient than an intelligently governed society. The problem is not determining whether we are for or against collective intelligence, but rather choosing among its various forms. Are they self-generating or imposed from above? Do they respect singularity or tend toward homogenization? Do they enhance the diversity of resources and skills available or disqualify them in the name of rationality or some dominant model?

The stadium

How then can we make the transition from collective intelligence, which is an inherent feature of humanity, to intelligent communities, which deliberately optimize their intellectual resources here and now? How can we create a society that is flexible, intense, and inventive without founding the community on hatred of the foreigner, a sense of knee-jerk victimization, or a relation to transcendent revelation or some providential leader? Is there a way for personal acts and resources to operate in concert without subjecting them

to an alienating exteriority? A program such as this can't simply be initiated by decree and requires more than our good will to carry out successfully.

Michel Serres has used the image of the stadium to illustrate certain fundamental anthropological theorems. Take a soccer or rugby game for example. Listen to the sounds that rise from the stands. The supporters of the team all shout the same things at the same time. Individual acts are difficult to distinguish, do not intertwine to create a shared history or memory, fail to trigger any irreversible bifurcation. The individual is buried in the mass of supporters, the background noise of the crowd. Yet the intelligence of this mass (its capacity for learning, imagination, and reasoning) is notoriously low, whether it is manifested in the stadium or at the exits.

Now let's look at what happens on the field. Each player carries out actions that are clearly distinct from those of the other players. Nonetheless, each action is coordinated, attempts to respond to and make sense of all other actions. The acts of the players, unlike those of their supporters, are part of a collective history and orient, although somewhat differently, the course of an as-yet undetermined outcome. The teams implement strategies, improvise, take risks. Each of the players must be aware not only of what the opposing team is doing but also what his own side is planning, so that the actions of his teammates are not in vain. The game is "constructed."

The spectators can take no direct action in the game that unites them; they all have the same function with respect to the field before them, which remains out of reach. The bond (the spectacle of the game) transcends the individuals who compose the collective. In the bleachers, being a society means being for or

against, taking sides, rooting for the home team and booing the visitors.

On the playing field, however, it isn't enough merely to dislike the opposing side. We have to study them, guess their actions, anticipate and understand them. And most importantly, we must coordinate with one another in real time, react quickly and discretely as a single individual. Yet this spontaneous synergy of skill and action is only possible because of the presence of the ball. On the field the process of social mediation abandons its transcendence. The bond among individuals is no longer out of reach but now lies, on the contrary, in everyone's hands (or rather at their feet). The living unity of the players is organized around an immanent object-bond. Making a detour around a circulating being, a mobile center that designates each one in turn as the transitory pivot, the intelligent group of players is its own reference. The spectators need the players; the teams don't need the spectators. A Chinese proverb states that the finger points to the moon and the idiot looks at the finger. The resourceful players make the ball both a revolving index among individual subjects, a vector that enables each one to designate the other, and the principal object, the dynamic link of the collective subject. We can consider the ball a prototype of the object-bond, the catalyzing object of collective intelligence. Such an object, which I will simply refer to as the *object*, is unknown to animal species.

Prey, Territory, Leaders, and Subjects

The higher mammals and especially the social primates from which we evolved do not make use of objects. Like all animals they understand their prey, and in a sense this prey is a proto-object. The hunt can lead

to cooperation. The captured prey leads to rivalry or combat. It serves as a primitive agent of socialization. But the prey will be devoured, incorporated, and finally absorbed in a subject. How would we react if the players on the field were to puncture the ball they've captured, before dividing it among themselves and eating it?

Animals also have strong relationships to the territories they inhabit, each society defending itself against attacks from other animals. Animal society defines its identity primarily by its relationship to a specific territory. Dogs, cats, and other animals mark their territory with their bodily scent. Birds occupy it with their song. Why then is the territory not an object? Primarily because it stands in a relation of appropriation or exclusive identification. You'll never see a soccer player plant his team flag on a ball and claim its exclusive possession. The true founder of civil society was the person who abandoned the idea of enclosing a portion of the physical universe and stated, "This is an object." In order to play its anthropological role, the object must pass from hand to hand, subject to subject, and be free of the cycle of territorial appropriation, identification with a name, exclusivity or exclusion.

The social primates also understand relations of dominance, and these play an essential role in regulating their interactions. Stable relations of domination, however, with gradations of rank and subtle hierarchies, only exist among the vertebrates. The social insects practice polyethism (highly standardized behavior among castes) and polymorphism (whereby anatomical differences reflect the social division of labor). Hierarchical social relations, which are not subject to genetic programming, are frequently determined by open combat. Obviously this must be seen in terms of the aptitude for greater individual autonomy among

mammals compared to insects. Ethologists also consider these relations as a way of regulating aggressiveness among members of the same social group, this type of aggressiveness being very rare among insects. The dominant individual serves to unify and coordinate the society by inhibiting the aggressiveness of other individuals, by focusing the attention of other members of the society, and by making important decisions (hunting, migration). Once again, neither the dominant nor the submissive subject are objects. The ball in play, however, has some affinity to the relation of dominance since it is both submissive and the center of attention. In a sense it serves as a *substitute* for the leader, subordinate, or victim by virtualizing them. Far from determining any stable relationship of dominance, the ball maintains a cooperative (on the same team) and competitive (between teams) relation that is egalitarian and always open-ended. Obviously the game results in winners and losers but their status is maintained only between games. No formal hierarchy exists during the game itself; it is suspended while the ball is in play.

The relationship to the object results from a virtualization of the relations of predation, dominance, or exclusion. The finger designates the victim, points to the dominant subject, indicates the prey or circumscribes the territory. The idiot looks at the finger and invents the object.

Tools, Tales, and Cadavers

The ball serves as a perfect illustration for the object. It is typical of the object's function of hominization since a marked tendency for game playing is one of the major characteristics of our species. No animal

species plays ball or engages in any analogous activity. The majority of the time animal games are simulations of combat, predation, domination, or sexual activity, which directly involve the bodies of the participants without the use of an objective intermediary. Obviously other types of object exist, corresponding, more or less, to the ideal type so well represented by the ball. These would include tools, materials, or artifacts that pass from hand to hand during the activities of collective labor, the traditional stories transmitted orally in slightly different form from generation to generation, each individual serving as listener and teller in turn, the cadaver before and after the funeral rite.

We recognize the object by its power to serve as a catalyst in forming social relations and inducing collective intelligence: technological intelligence and cooperation where tools are concerned, the collective inventiveness of myth, legend, and folklore for the circulation of tales. These two obvious cases do not require any specific comments. The example of the cadaver is less immediate, however. Mortal remains are associated with ritual and what we now call religion, archaic but powerful forms of collective intelligence. During funeral ceremonies, the group circles around its corpse, surrounds it, washes it, dresses it, cries over it, reconstructs it in its eulogies, touches it with flowers or handfuls of dirt, buries or burns it. Even though impure or untouchable, death ritualizes, objectivizes, remains an agent of socialization. However, failure of the cadaver to play a role in the funeral rites that serve as the collective object, its treatment as a simple thing, the inability to virtualize the decomposing flesh of the body of the dead, is a sure sign of the disintegration of a group, its dehumanization. It is tempting to view the relationship to the cadaver as the original form of virtualization, the transition from the subject of dominance to the object: the mummified body of the chief

or the skull of the victim brought back as a trophy. Are the shrunken heads of the Jivaros, which play a complex role in reestablishing the collective, a kind of monstrous precursor of the soccer ball?

Money, Capital

In a capitalist society money serves as one of the most efficient of all objects. If everyone kept their money in a safe, the contemporary economic market would crumble suddenly and completely. On the other hand, if every landowner held on to his lands, there would be no catastrophic consequences for agriculture. Fluid, shared, anonymous, money is the antithesis of territory. This is what is meant by the famous maxim that money has no odor. No individual, no matter how putrid, can imprint money with his identity or his acts. Money as such doesn't exist and has no positive economic function except when it is in circulation. It is the tracer, the vector, and regulator of economic relations.

Money isn't wealth but its virtuality. Although this may appear paradoxical, money can't be appropriated or, rather, through its incessant circulation it returns to the public in private and to the private in public, thus enabling everyone to participate, although somewhat differently, in the collective intelligence of the capitalist market. Money can obviously serve as a form of leverage for power and domination, but it also catalyzes deterritorializing social forces that do not respect existing hierarchies. Indifferent to borders and conflicts, money helps, for better or worse, coordinate and regulate innumerable activities without the need for a central authority. Driving our systems of transport and communication, it is the money of the capitalist market, held by billions of human beings, that weaves glo-

bal society today. And while certain animal societies possess the vague outlines of tools, languages, and funeral rites, they have nothing that resembles money, much less capital.

The Scientific Community and Its Objects

The scientific community is another example of the intelligent community united around the circulation of objects. These objects are in principle "studied for their own sake," in disinterested fashion, which is to say that they are neither territories, nor prey, nor revered or submissive subjects. Such objects emerge from a dynamic of collective intelligence that virtualizes certain specific occurrences (results of observation, experiment, or simulation) to generate consistent problems: electrons, black holes, viruses...

Circulation determines both the object and the community: a phenomenon that occurs in a laboratory doesn't become "scientific" until it can be reproduced (or is at least reproducible) in other laboratories. A laboratory that fails to make use of—and fails to transmit to other laboratories—the instruments, experimental protocols and, finally, the "objects" of the community (stars, elementary particles, molecules, physical or biological phenomena, simulations) is no longer an active member. Scientific inventiveness consists in bringing genuine objects into view, the vectors of intelligent communities, capable of interesting other groups who will in turn circulate, enrich, transform, indeed multiply, the initial object and thus transform their identity within the community. As with soccer, everyone's role is unique and is required to be so (a scientific article must be original). The game is at the same time cooperative and competitive. Actions are "built" on top of

one another, thus leading to the development of a sense of historicity, a complex irreversibility. Professional disciplines construct rigid territorial boundaries around the open dialectic of scientific objects and communities.

Of course, the scientific game is subject to economic, social, and political constraints, including the technological "means" and any anticipated or actual spill-over benefits. The same could be said of professional soccer. But while technoscience can be reduced to a set of constraints, to relations of force and alliances, even within the hybrid environment of human-thing communities, its unique creativity, like its grasp of the world, does not last long. It would be as if we decided to account for love using only the ideas of the Marquise de Merteuil. In saying this I am not so much criticizing the theories of the new anthropology of science and technology (Latour, 1989, 1993) as the caricatures that some of its formulations have led to.

Characterized neither by the simple relations that exist among human beings nor the predation or appropriation of things, the scientific enterprise integrates the reciprocal formation of intelligent communities and objects of understanding. The objects of science, far from preexisting their "discoveries" or constituting transcendent referents for absolute truths, are immanent in the technical procedures that construct them and the communities that enable them to circulate. This does not mean they are arbitrary or purely relative, for they are themselves at risk as elements in the selection processes that qualify them and that they judge in turn. Of all the object candidates that appear, very few of them are finally capable of asserting the relevance of the proofs that will enable them to "become object" (Stengers, 1993).

CyberSpace as Object

The extension of cyberspace represents the most recent ascent of the inductive objects of collective intelligence. What is it that makes the Internet so interesting? To claim that it is "anarchic" would not only be simplistic but inaccurate. The Internet is a shared object, dynamic, constructed, or at least fed by everyone who uses it. It acquired this character of nonseparation, of being fabricated, extended, and improved, from the computer scientists who were initially its principal users. It provides a bond, serving as the common object of its producers and its users (Huitéma, 1995).

Cyberspace provides objects that move from group to group, shared memories, and hypertexts for constructing intelligent communities. Unlike television it does not designate winners and losers out of a mass of separate and powerless individuals. It is equally important, however, that the Internet be distinguished from the "electronic highway," its perverse twin, which presents us with a territory (physical networks, pay-per-use services) rather than shared objects. The electronic highway degrades a circulating object into a thing that can be appropriated. If cyberspace results from the virtualization of computers, the electronic highway reifies this virtual world. The acrimony of the debates concerning the commercial nature of the Internet has profound anthropological implications. One of the legitimate sources of pride of the community that developed the Internet was the discovery of a novel way of constructing an intelligent society along with a new object. The question is not whether to banish commerce from the Internet (why should we?) but to preserve an original method of forming intelligent communities, which is unlike the methods used by the capitalist market. In cyberspace we have no need of

money because the community already possesses a constitutive, virtual, deterritorialized object, which by its very nature is cognitive and capable of producing a bond. Cyberspace itself is perfectly compatible with money or other immanent mediators. It can even increase the virtualizing power and rate of circulation of monetary and scientific objects. Since it is receptive to the circulating bonds of intelligent communities, the Internet serves to accelerate the flow of objects, virtualizes the virtual. And yet, we are witnessing only the early stages of its development.

By means of the products of economic and scientific activity, by using cyberspatial mechanisms, the relationships of predation, appropriation, and power are reinstated on a much larger scale than ever before. Throughout the animal kingdom, it is mankind who has been the greatest proponent of territorial imperialism, the relentless chase, implacable domination. Yet, such relations are momentarily suspended through humanity's relationship to the object. It is true that technoscience, money, and cyberspace turn mankind into the most terrifying hunter, owner, and ruler the world has ever seen. But our most important contemporary objects provide him with access to these powers only after forcing him to undergo the specifically human experience of renouncing his prey, giving up power and abandoning property. The experience of virtualization.

What is an Object?

What are the general characteristics of the anthropological object, the object-bond or mediator of collective intelligence? While such an object must be the same for everyone, it is at the same time different, in the sense that each of us is, from our individual perspective,

in a slightly different position. The object marks or traces the relationships maintained by and among individuals. It circulates, physically or metaphorically, among members of the group. It is simultaneously or alternately at everyone's disposal. This means that each of us can mark the object with our actions, contributions, impulses, or energy. Not only does the object help incorporate the whole in the individual but it implicates the individual in the whole. Contained and controlled by the groups it constitutes, the object nevertheless remains outside them, "objective," since it is not a member of the group as another subject would be. It requires the assistance of a kind of revolving transcendence, alternately and momentarily placing every locale it comes in contact with in the position of central agent. This distributed transcendence, this center that flits from place to place, no doubt constitutes one of the major figures of immanence. In the end the object can only be maintained by everyone and the group is formed only to enable the object to circulate.

The object sustains the virtual: deterritorialized, agent of the reciprocal transition from private to public or local to global, not subject to wear, nonexclusive, it traces a situation, bears with it the field of a problematic, the knot of tensions or psychic landscape of the group. This objectively based virtuality is normally actualized as a social event or process, act or affect of the collective intelligence (by passing a ball, telling a story, buying and selling, through new experiences, new hypertext links to the World Wide Web). Instead of directing our actions, the object can also collapse into a thing, subject, or substance, become reified as prey or territory. Depending on the function it is made to carry out, the same entity can be a thing or an object.

The functioning of an object as a mediator of collective intelligence always implies a contract, a set of

regulations, an agreement. It is important to realize, however, that the majority of contracts do not involve the circulation of objects and a contract (respectively a rule, an agreement, a law, etc.) alone is never sufficient to lead to the emergence of collective intelligence. It is not the signing of a contract or the establishing of a regulation but the flowering of the object that is so unusual. For example, there are very few scientific objects that are not associated with agreements or rules of procedure of some sort, but it is much easier to promulgate epistemological recipes than to make a discovery.

We could describe the history of humanity, starting with its first appearance, as a succession of appearances of objects, each of them inseparable from a specific form of social dynamic. We would find that each new type of object resulted in a particular style of collective intelligence and that every important social change implied the creation of an object. Throughout the course of anthropological duration, communities and their objects are created as part of the same movement. In keeping with the size and circulation of its objects (whether associated with cyberspace, the economy, or technoscience), humanity is alone among the animal kingdom in that it tends to create only a single society. Since communities possess no more intelligence than is contained in their objects, humanity will have to perfect its objects and indeed invent new ones if it is to confront problems on a scale unlike that it has had to face in the past. These future object-worlds, vectors of collective intelligence, will have to ensure that the collective effects of their actions are felt by each individual. And since they are capable of bringing to life within each individual a new sense of immensity, they will have to implicate everyone, take into account each unique locale, in the untotizable dynamic of the whole. Objectivity on a global scale will only come into being if maintained by everyone, if it

can circulate among nations and lead to the growth of human culture.

The meteorological earth, the earth of earthquakes, elephants, and whales, the earth of the Amazon and the Arctic, the earth circled by satellites, the enormous and pacific earth, is blue like a ball.

Object—Human

Earlier, I said that humanity constituted itself by virtualizing violence through the contract, the here and now through language, and its organic functions through technology. Yet, the object is able to complete and unify the three forms of virtualization related to beings, signs, and things. Moreover, the virtualization of violence does not occur uniquely through the contract but also, and especially, through the object, which forms nonviolent social bonds because it is not subject to predation, appropriation, or domination.

As already shown virtualization of the here and now through language extends time and space beyond sensory immediacy. But the process of virtualization is only completed with the construction of the object, an object that is independent of the perceptions and acts of the individual subject, an object whose sensible image, its manipulation, causal effect or concept, can be shared by other subjects. The objective world that emerges through language overflows any material world populated only by things. Such is the challenge of language: to bring into existence an objective world that simultaneously connects beings with one another and constitutes subjects.

Technology virtualizes action and organic functions. Yet the tool, the artifact, are not merely efficient things. Technological objects are passed from hand to hand, body to body, like a baton in a relay. They create shared uses, become vectors of knowledge, messengers of collective memory, catalysts of cooperation. From the first biface to modern airports and digital networks, from the original hut to our metropolises crisscrossed by highways and skyscrapers, technological objects and artifacts are the glue that holds mankind together and insinuates the physical world into the most intimate corners of our subjective life. Thus the object intersects the three fundamental virtualizations of anthropogenesis. It constitutes the human as social, cognitive, and practical subject. It interconnects and unifies technological, linguistic, and relational subjectivities.

If you are not an animal, if your soul is more virtual, more detached from inertia than that of a monkey or a bison, it is most likely because it is able to assume a state of objectivity. Our subjectivity is exposed to the play of the shared objects that weave, in a single symmetric and complicated gesture, individual intelligence and collective intelligence, like two sides of the same cloth, embroidering on each surface the indelible and flagrant figure of the other.