

The Jubilatory Virtual: Assumption or Dissolution of Complexity?

René Berger

A riddle or a joke? I regret having made light of both myself and the reader. However, the concept of complexity has been explored with such intensity and pedantry, has been analyzed from so many points of view – the mathematical, linguistic, physical, chemical, political, psychological, sociological, physiological, algorithmic, logical, religious, and metaphysical – that nothing, not even the title of this piece, can escape it.¹ Indeed the situation has reached the point where we grow misty-eyed over the very thought of the discrete charms of yesterday's simplicity. Sometimes we dream that complexity itself, after having given us so much, muses – now that its task is fulfilled – of flying up miraculously into the sky, like the Virgin Mother (the Assumption); or ourselves wish to experience – for those spirits who prefer to keep their feet on the ground(!) – the “dissolution” with which entropy begins. Isn't it true that certain words, marked by the spirit of their age, are themselves in fact carried away by the spirit of the age?

The current situation demands that we take a fresh look at the question of complexity. For the first time, problems can no longer be solved within the conceptual framework passed down by tradition. For the first time, technology, beyond the objects that it produces and the services it provides (not to speak of the more and more amazing feats it carries out), now determines our behavior and even the way we think.² In our time it has become possible for anyone to discover America without a ship or machinations, without Columbus or the King of Spain; all that's needed is handful of dollars (or, better still, a credit card). Moreover, we have recently learned, to our surprise, that technology can have ambition (can computers think?) and even feelings (as some assert, there exist

programs capable of controlling our emotions): technology is also capable of (mostly black) humor as, for example, when a computer breaks down; and of something like philosophical optimism, as when machines dream of freedom (which Marcel Duchamp brilliantly anticipated at the beginning of this century). Can there be a greater show of impertinence than when a ready-made gives itself the right to aspire to the status of an independent object, refusing to serve the functions for which its maker had designed it? Such was the case with Duchamp's celebrated urinal, which he called *Fontaine* (and signed with the name Mutt), while Andy Warhol made this approach to art his life's work with mixed, although always highly profitable, results.

We have been witnesses to a profound metamorphosis. For the first time, concepts are no longer subject to the rules of language. Rather, with the help of a computer, they can be converted into an endless series of numbers from 0 to 1, like calculus, like all symbols. Thus, in turn, the most complex philosophical categories have themselves been transformed. Thought, consciousness, the virtual and the actual, the real; for the first time these are expressed – or can be expressed – in technological forms.

On the Subject of Virtual Reality

One certainly has the right to be surprised about the fate of a term like *virtual reality* which, until recently, was reserved for use among specialists but now has gained wider acceptance, as its development in the United States (where it was born) bears witness.³ What, in short, is virtual reality? It is the creation of a space into which one is invited in order to "live through" an experience, not only in imagination, but concretely, on the level of perception, although without the objects themselves being actually present. Among the applications under study at NASA the most important is the use of so-called telepresence, which allows for interactive simulation of telerobotic activities. By this means astronauts can simulate – without danger – the carrying out of complex and perilous repair work in space. More broadly, the combined use of computer, earphones, visualization helmet, gloves, and a *data suit*, is in the process of creating an environment of a new type, itself capable of making us part of a reality of a new type. Thus the Matsushita company has already commercialized a system of "virtual kitchens" that allows potential clients (with the appropriate

equipment) to choose the kitchen equipment and accessories of their choice, to modify and move them around, to change their forms and colors, as if they were working in a real kitchen. Another example is the paradoxical way in which military uses can be linked to the development of life-enhancing, civilian technology: for example, in the same way that pilots, equipped with the latest computer generated systems, are capable of choosing their weapons, arming and firing them by ocular movements – commands – connected to a camera that controls an ad hoc computer program, so can a completely paralyzed child, thanks to a system developed by Eyegaze (one that detects the child's ocular movements), make contact with his playmates, telephone them, study, and experience, at least in part, the simple joy of being a child. It is also thanks to Eyegaze (and systems of this type) that marketing and advertising agencies are able to measure precisely the amount of interest generated by particular advertisements. In another area, surgical simulators allow the surgeon, in the same way as flight simulators allow aviators, to simulate the carrying out of complex surgical procedures. These "virtual cadavers" present a double advantage; not only do they possess all the anatomical features of a real cadaver but – no matter what procedures they must undergo – they do not bleed.

The entertainment and leisure industries are not lagging behind. Who has not dreamed of a Caribbean vacation, charmed by its sun and sights? With the use of ad hoc equipment (the price of which continues to drop), every desire can now be realized. By using the *Home Reality Engine* (such was the name given it by its inventor, Jaron Lanier,⁴ who is one of the most creative of the pioneers of virtual reality), it is now possible for anyone to live as he or she wishes; on another planet, in a palace or a slum, in the body of a cat or a leopard, or even inside a piano; and it can be done either alone or with others!

All worlds become possible worlds. However, as opposed to literary fiction, which relies on language, or as opposed to movies and television, which rely on spectacle, cyberspaces – these new, computer-generated worlds – can offer us new worlds that are made more concrete by the fact that they combine visual with acoustic and tactile perceptions. Moreover, the kinesthetic perception itself is enriched thanks to the way movement is coordinated by the data suit and data glove that the program controls. The glove is equipped with sensors that allow its user not only to point

to an object but to grasp and move it, all the while feeling its form, its weight, and its materiality "as if it were real." As Patrice von Erstel wrote in amazement: "One can decide to inhale the odors of Beethoven's nights or to fly through one of Mandelbrot's fractal forms." And he reports that Jaron Lanier said: "What we call *information* is but alienated experience. . . . Virtual reality gives the opposite of information: it is lived and shared experience."⁵

On the Virtues Of Words

In Lalande's *Vocabulaire Philosophique*, "virtual" is defined in the following way: "in a general sense, that which is simply *possible* in a particular object (like the block of marble that is virtually "God, table, or toilet bowl"); in a more limited sense the virtual is that which is predetermined in an object, containing within itself all the essential conditions for its realization, although not visible from the outside." Modern dictionaries generally agree with this distinction, emphasizing the opposition between the concepts of possibility – or potentiality – and actuality. Particular uses of the concept are also enumerated, such as in physics (virtual images) or, more recently, in computers (virtual memory); but the idea of virtual reality has not yet shown up in dictionaries.

The virtual, in both its accepted meanings (one which accents the possible, the other the predetermined), is conceived within a single temporal and structural framework, that is, the idea of a passage from state A, "possible and/or predetermined," to state B, "actual." Although it may not appear so at first glance, this state B, within this framework, is actually more "real" than state A, since B *proceeds* from A. B confirms the temporal structure, since B *terminates* the sequence $A \longrightarrow B$. Of course we are not speaking here of a known fact nor even of a proven probability. Rather we are speaking of a more or less conscious feeling that has grown so habitual with us that we have the impression, even the certainty, that it reproduces the actual order of things. That which is potential (i.e., possible or predetermined) is, in this framework, held to be something that has not yet come to pass; and that which has come to pass is held to be the result of that which was held in abeyance in the virtual. This "natural" disposition of our mind is further strengthened by the confirmation it receives from the most routine way in which we think about relations, that is, in terms of causality. The virtual is thus mistaken for the *cause*, and the actual for the

effect, which underscores the deterministic character in which both relations are conceived.

Approached from another direction, we can see that the etymology of the word "virtual" contains a reference to the virile, to virility. *Virum* is a human being in all his or her vigor. *Vertu, virtutem*, is physical force, but also moral force; and both are signs of achievement and excellence. At first glance this acceptance may seem surprising, since it contradicts the current philosophical as well as general use of the word virtual. Yet, if we look at it more closely, our investigation may lead us in a productive direction. The etymology of the word virtual – that is, as moral or physical force – emphasizes the actual not as the result of the act but, on the contrary, as the vigor or energy – which is in fact what virility is – through which we manifest our aptitude for generation. It is no longer a matter of guaranteeing the *succession* of two states A and B, nor of the mechanism that regulates it; rather it is a matter of uncovering our power to generate, thus to *create*; that is, to make something come into existence that did not exist previously. Here we leave behind the mechanistic conception – "possible, predetermined, actual" – and enter into a dynamic – "genetic and/or generic" – one. Instead of legitimating linear causality, the "etymological" acceptance of the virtual has sent us upward, to the source of transformations, to the riches of the possible.

Fire: The First Virtual Reality

Over hundreds of millions of years (that is, since the dawn of life on our planet), an innumerable variety of species and organisms have evolved by means of a process of growing complexity. This process constitutes the wildest movie ever made: on the one hand, living creatures, from bacteria to mankind, continue to be born and reproduce; on the other hand, they die and disappear by the billions, *anonymously*. The only exception to this rule is mankind. Gradually detaching itself from the other animal species, man has learned, with the appearance of *Homo Sapiens* (barely a hundred thousand years ago), what it means to live and to die, what it means to be a person, to distinguish among family, neighbors, strangers.⁶

Let us try to imagine how it began. After thousands and thousands of years of a nomadic existence, of never-ending daily vicissitudes, a handful of our distant ancestors – a timorous and

extremely precarious horde – emerged from the forest and set off into the savanna. Haunted by the very real fear of death – a fear that was redoubled at night – they wandered until the moment when they discovered fire, the first virtual reality. With this discovery human society, the first complex reality, was born. It was thanks to fire that people were first able to create a habitable refuge for themselves; thanks to fire they learned to cook their prey; and when these culinary practices gained wider acceptance they were transformed into an important element of social integration.

Fire was also a source of light. It simultaneously kept animals at bay and allowed for mutual recognition of the human members of the group even at night, thereby reinforcing the ties within the group. Besides satisfying material needs, light also played a decisive psychological and symbolic role from the very beginning of humanity. “Fire is more of a *social* than a *natural* being,” Gaston Bachelard has written.⁷ Elaborating on the point, he quotes Rodin, “Each thing is no more than the border separating it from the flame to which it owes its existence,” and then concludes: “Meditating on this intuition, we can see that Rodin can in some sense be called the sculptor of depth, that he has in some way, against the ineluctable necessity of his art, forced into the outside the qualities of the inner.”

For me, Bachelard’s statement serves to clarify the very foundation of virtual reality. It is not, however, the result of a simple opposition to actual reality. The opposition of terms – in this case the epithets “virtual” and “actual” – is rather the result of a linguistic constraint that does not by itself prejudge the respective statuses of the entities that its designates. Virtual reality is not limited to its role as a stage in the process of actualization (as though the actual were the aim of the virtual). The “objects” that are distinguished owe as much to the “flame” that outlines them as to the gaze that defines them. Flame and gaze stand in a relation of reciprocity. A sign of this is that when the flame goes out, or the gaze loses some of its vivacity, knowledge is hardened and then blurred with the objects outlined in fields (plural) of knowledge. It is in the ardor of the flame and the gaze that things and ideas are cross-fertilized. Complexity is born of interactions that the fire nourishes, feeding reverie as much as imagination.

It is striking to hear one of the most famous pioneers of Artificial Intelligence, Marvin Minsky, insisting upon this fundamental trait and in fact resorting to a sculptural metaphor to explain it: “*Mind*

Sculpture: 'Then, what we now call programming will be entirely changed; it will be, as I see it, more akin to the art of sculpture. . . .'⁸ After the material fire of prehistory, will not artificial intelligence be the "immaterial fire" of our new civilization now in the making?

The Brain: A Complex of Virtuality, or Virtuality of a Complex?

Just as humans invented the idea of sitting together around a fire (the first "social sphere") in order to "sculpt" the first communities whose initial boundary was the area that the flame could illuminate and the distance that a human voice could travel, so encephalization "sculpts" several hundred billion neurons, the sole shelter of which is the cranium, itself barely fifteen hundred square centimeters in volume and weighing a kilogram but whose "fire" nourishes trillions of interactions and interrelations.⁹ Also, just as the first human communities, which expanded in step with the spread of lighting, turned this physical light into a symbol – i.e., made the combustion of wood a symbol through the mediation of language and its concepts – so individual humans, while remaining bound to their physical bodies, contrived to enrich the physical environment with a cultural one, which became the initial basis of human society.

What is most important about this too brief mention of the enormous volume of neurons in the brain is not the number itself; it is the fact that current research has had to replace the traditional image of the brain – the anatomy of which had been believed to be established and functions supposedly identified – with an ensemble of elements and relations of apparently infinite complexity, the analysis of which goes beyond the competence of classical methods. Thus there has been a twofold change; *both in the object and in the perspective employed to study it*. For instance, in contrast to the concept of the brain as developing in terms of a strictly defined "program," it has been discovered that at the very beginning of the brain's development there is a migration of neurons by means of what are called growth cones. This discovery has been disconcerting not only for the "profane" but for many in the scientific community itself: "To the Cartesian spirit, it might seem that the construction of neuronal circuits calls only for the establishment of an orderly relation between the axons and their target neurons. But in fact nature does not proceed along these lines, as neurobiologists discovered to their surprise quite a long time ago. Instead it

appears that the developmental program begins by introducing a superabundance of interneuronal connections. This is followed by a process of choosing and selecting, after which the supernumerary neurons and axons are eliminated . . . cells begin to die at the moment that this population begins to establish connections with its target structure. . . . This kind of result suggests that neuronal death is a means of harmonizing the size of the neuronal population with that of its target territory."¹⁰

Let us pause for a moment. From the point of view of neurobiology, neuronal death shows – and this is a surprising, or at least unexpected, discovery – that the embryonic brain develops as though it were learning “self-sculpture,” that is, eliminating superfluous neurons in order to clarify its own form . . . which leaves us wondering about the twists and turns of nature. Let us then pause once more. Do not these “twists and turns” imply, in some sense, that we have the right – or at least believe we have the right – to expect that the phenomena of nature should develop according to a plan that conforms to *our* logic?

Not only the understanding of facts, but also their choice and interpretation, depends on our image of the world and of the means we possess to conceive of it. This point needs to be underlined, given the ever new techniques of observation and more sophisticated means of experimentation that we have at our disposal. Thus, for the first time in history, the positional camera allows us to observe on a screen, in real time, the route of a “thought” through our brain. This clearly suggests – and this is a point that I myself have been insisting on for many years – that technology is not merely – in spite of the generally excepted idea – instrumental: it has epistemological power. Quite literally, technology causes us to see things differently. Thus the twofold process that gives birth to complexity is especially difficult to grasp because, at the very moment that the image begins its transformation, both its own content and the way this content is produced are called into question; that is, the change simultaneously affects the content and the way it is produced, both of which are transformed as the process proceeds.

Unfortunately, things do not proceed even this smoothly. In fact, there are numerous other obstacles, only some of which – and only to a certain extent – are comprehensible. Knowledge is acquired with difficulty, in the course of studies and experiments that begin in the early years of childhood and extend into adulthood, where

the ability to learn tends to petrify. Gradually, our frames of reference and our value systems become mechanisms of identity and permanent security. A proof of this is our mistrust of anything that is "foreign."¹¹ This shows to what extent we are "structured" (simplified!), even without our knowledge. How can we accept the "other" when our beliefs, our convictions, and our feelings, become second nature by force of habit?

This is a general intellectual tendency. Its source is the simplistic notion that a plan of action, effectuated with the help of a blueprint, ends with the desired result. The words *result*, *ends*, *blueprint*, are key here, and none of them are value-free. They all imply the desirability of production. According to this outlook, everything is essentially linked to action, and action is understood first and foremost as a process of actualization. Its operations and steps can and should be foreseen, foreseeable, and, with the help of cutting-edge technologies, actually predictable. This mentality is permeated by a "philosophy" whose goal is to legitimate the objectives of this enterprise. Through a subtle (?) twist, philosophy is no longer conceived of as an activity of investigating the world and oneself in order to know (which was the foundation of the ancient search for wisdom); philosophy is a matter of marking one's differences in order better to force competition. The "philosophy" of Apple pretends to be radically distinct from the "philosophy" of IBM (although in fact today's commercial realities incline the two "philosophies" to co-exist, even to become "compatible," not to say "clones" of each other). Even though it may appear nonsensical, such a conception of philosophy is far from ineffectual. Disseminated by all forms of our media, in particular by advertising, it permeates our mental outlook.

Two fundamental notions underpin this outlook. One is the Cartesian idea of mechanism,¹² which states that the laws of nature, as understood by calculus, make the universe transparent and therefore intelligible, calculable, and manipulable. The second is the faith – inspired by positivism – in the progress of history. According to this view, each new stage of history should bring about an increase in the exactness and range of historical experience.

At this point I wonder whether it might not be appropriate to take up the situation anew, from the beginning, but by reversing our approach. Instead of proceeding along the organizational lines laid down long ago by Descartes, might it not be more appropriate to start at the "original" starting point, that is, where ideas, feel-

ings, sensations, memories, desires, dislikes, images and sounds, swarm pell-mell, in order to link up with the complexity *above*, that is, in the “virtual,” rather than in the until now preferred study of what is *below* (in the actual)?

Toward a Change of Perspective

We will therefore proceed by attempting to change our perspective. In short, I would be tempted to say that the virtual is *not* the “initial state” that the mechanical model postulates in the sequence $A \longrightarrow B$: *nor is it* the sum of potential states awaiting actualization, as some philosophies conceive it; *it is the dynamic of all possibles and, without merely playing with words, the possible of all dynamics.* In other words, the virtual is not reached by following an effect back to its cause, nor by tracing an act back to its potential. Rather, we must sever the link that ties the terms into antinomical pairs: *actual versus virtual, actual versus potential, act versus potential.* Their connection is merely a linguistic one, and we must guard against letting it influence our “ontological” outlook. Obviously a considerable effort of the imagination is required in order to accept the fact that knowledge, which has for so long been “domesticated” into distinct disciplines, is only one possible form of organization among others. We must now direct our effort toward a form of “cultural decolonization.” However, we must understand that it is an awesome task since it implies a simultaneous renunciation of the “colonies” and of the mental instruments of culture (lexical, syntactic, semantic, methodological) that have been the foundation of our use and legitimation of knowledge. Furthermore, this act of fundamental reevaluation has an effect on both the levels of thought and language.

It is not my intention to reject outright our habit of connecting facts with reasons (in so doing I would remain imprisoned within the traditional framework in which linguistic and mental worlds are opposed); rather it is my intention to trace a path back to the founding principle, that is, to the *source of energy in its actual movement.* Let us keep in mind the gushing forth of neurons in the neural tube, their migrations in successive waves, and their ultimate death; all of these are episodes in the amazing adventure called life, an adventure that always holds more and descends more deeply than can be understood within the classical framework of cause and effect. Let me therefore be so bold as to offer the hypoth-

esis of a “jubilatory virtual.” This expression may cause some to blush: so be it. Indeed I myself must even confess to a lack of arguments in favor of my hypothesis. It is based instead on an intuition that, lacking facts, is fed on clues and analogies. It will be said that this isn’t enough; and yet is not our life made more of approximations than certitudes, of impressions more than clear concepts, of half truths more than complete ones, and always mixed with pleasures, joys, emotions? To be moved: does it not mean to be forced outside of our natural inclination to persist in our habitual ways? This is the source of the terror we feel when our identity is threatened. As Alice says: “Dear, dear! How queer everything is today! And yesterday things went on just as usual. I wonder if I’ve changed in the night? Let me think: was I the same when I got up this morning? I almost think I can remember feeling a little different. But if I’m not the same, the next question is, ‘Who in the world am I?’ Ah, *that’s* the great puzzle.”¹³ The puzzle for all of us! On one side stands the reflecting mirror that confirms us in our habits; on the other side of the mirror, Wonderland. But it is not everyone’s good fortune to find him or herself walking in the footsteps of Lewis Carroll! Lacking such luck, let us instead take a brief stroll through the world of quantum mechanics, which itself is a kind of Wonderland. Let us investigate some of its wonders, which are as worthy as Alice’s.¹⁴

While in our ordinary daily experience phenomena occur in *continuous* space, it is different at the sub-atomic level, where the *discontinuous* reigns; here things happen as though a bird, sighted on a branch, were suddenly to disappear, only to reappear on another branch without it having been possible to follow its flight, for the very good reason that there was no flight! Of course this is but a metaphor, since a bird is a macroscopic object; but the example does give us a feeling for the phenomenon of discontinuity, which causes a surprise that may lead us to further reflections. Along these lines, it is no less surprising to learn about the existence of two entities, several meters apart (or even inhabiting regions vastly distant from one another), that act according to a correlation that cannot be accounted for by the transmission of any kind of information, since such transmissions are limited by the speed of light. What scientists have agreed to call the principle of non-separability (the term is Espagnat’s) upsets the concept of *local causality*, one of the foundations of classical physics, which is based on the idea of reciprocal relations among materials organized according to a sys-

tem that can be decomposed into mathematical elements. Here then is another attack on our everyday perception of reality.¹⁵ The paradox of the photon, which is simultaneously a wave and a particle (or rather, in fact, is neither), is another example. If we measure it as particle matter, the photon acts like a particle; if we measure its undulatory properties, it behaves like a wave. This certainly is perplexing.

It is a perplexity that is not about to disappear: indeed it can only increase. If, for example, thanks to the wave function, quantum physics is able to predict, at any instant, the evolution of a system, and if, "between two observations, the wave function rigorously obeys Schrödinger's equation . . . then at the time of the observation, this equation brutally ceases to be valid, and the wave function becomes but one of several possible realities that it describes, since the wave action immediately repeats the observation just made."¹⁶

We can see just how contradictory the interpretations of these phenomena can be if we keep in mind that some scientists have gone so far as to postulate the existence of parallel universes, while others – such as the Nobel Prize winner in physics Eugène Wigner – assert that the cognitive act itself is the determining factor. The observer, even while using a measuring instrument, remains an observer endowed with consciousness, and it is this consciousness that manifests itself in and throughout an experiment. It then becomes difficult to rely completely on the pure "objectivity" of any observation, since this observation can not – at least not completely – be dissociated from the "subjectivity" of the observer using the measuring tool. Indeed it must be observed that the very idea of "measure," in quantum as well as classical physics, is a *construction* derived from the analysis of the conditions in which the measure is established and the conditions under which it functions.

For the time being, we can draw the following conclusions:

Whether or not we are scientists, we can no longer be content with the two competing visions of nature that the two different branches of physics, classical and quantum, present us with. And to reduce ourselves to one or the other would be an even greater distortion. Our traditional concepts of causality, of objectivity and subjectivity, of time, space, and force, must be revised. Moreover, as opposed to the reductionist spirit to which these concepts have for too long been bound, we must take them up within a more complex perspective. Thankfully, it is already happening. Aristotelian logic has been called into question and, simultaneous-

ly, numerous non-classical logical systems have arisen. As Roger Penrose has written: "The world of algorithms is essentially one of the calculable while the world of thought can call for the intervention of quantum mechanisms that give rise to an infinite number of structural levels."¹⁷ How can one remain indifferent to the extension of the field of complexity, which encompasses the immensity of both the universe and of thought? Pascal's dread is replaced by the jubilation of a discovery that never ends, that constantly begins anew, that becomes, so to speak, an endless Assumption! This is what, lacking a better expression, I've called, perhaps maladroitly, the jubilatory virtual; and now I've repeated it.

Getting to the Heart of Complexity: Myth and Its Avatars

Without exaggeration we can say that modern physics has managed to express the totality of the human adventure and the twofold question that has preoccupied humanity since its beginnings; namely, the existence of the world and humanity's existence in the world. It is a question that helps to clarify the paradoxical singularity of human thought: on the one hand, when thought considers an object (etymologically, an ob/ject is something thrown toward or against, placed in front of), it stands apart from it; on the other, by joining the object to its point of origin, thought stands in relation to it. This capacity to rely simultaneously on distance and proximity is the source of human consciousness: but it is also the source of the human feeling of rift or fissure. Unlike animals, humans, as both social *and* individual beings, are obliged to *organize this fissure*, since it accompanies the human being from birth until death. Indeed, even if this fissure disappears materially with the physical death of each one of us, it is never abolished in a social sense: from the dawn of time the defining moment of each human society has been how this fissure, which we call death, has been organized. It is to this end that the first Nature-Artifice, which we call Myth, was "invented"; for the purpose of myths, as is well known, is to express our relation to the mysteries of life and the universe. What, though, is happening today? And what will happen tomorrow? Should we believe, as some assert, that myths are in the process of dissolution, or even disappearance? Or rather, as others say, are new myths being created? Or still again, is it, as some suggest (and I am one of them), that a *techno-myth* is in the process of development?

As the first ethnologists showed, myths can never be reduced to their narrative content; nor, at the other extreme, can they be reduced to their rational substrate (this has been tried by structuralism which, with the help of a smug linguistics, finds rational content even in the most arcane corners of the primitive mind). In every case, myths transcend the cognitive dimension. This can be demonstrated with an approach to myth that is broader, less ethnocentric, more sensitive to complexity and more generous (is generosity not, on the level of the heart, a form of complexity?). Within this broader perspective, rational structures are but one aspect of myth. Corporeal, kinesthetic, and artistic structures (music, dance, and song) are equally important. Their structures can be seen among all peoples, in all civilizations, in all ceremonies and festivals, institutions and beliefs: in every structure that *sets a myth in motion*.

It is therefore at the heart of Myth that the mystery lies; a mystery that gives life to, articulates, and – with the help of connected practices – causes the myth to function. In this way the character and life of the fissure varies with the infinite wealth of civilizations. In Egypt, “The creation begins in thought and is translated by the creative Word. The God Ptah, in his heart, thinks things and beings, then he names them and they exist.”¹⁸ This is done by means of *the correct intonation*. The Gods possess both the power of conception and of giving life. At the beginning of our era Hermes Trismegistus, assimilated to Thoth and Mercurius, managed to join science to religion by means of “sympathy”; and this gave rise to astrology, philosophy, alchemy, and, more broadly, to the entire hermetic tradition from Antiquity to the present.

For its part, Indian civilization has preserved to our day the tradition of millenary rites. These rites, unlike the isolating hermetic practices of the cultured classes, are part of daily life and affect both the powerful and the weak, aristocrats and commoners. In this regard we should mention the sacrament of baptism, through which peoples of different languages and customs are brought together. And what can we say about the meaning of the Eucharist, which transforms bread and wine into the flesh and blood of Christ? Through transubstantiation man is able to commune with God, and God with man. In short, myths and religions form systems whose elements, while remaining inseparable, act on different levels; physical, psychological, intellectual, spiritual, corporeal, gestural, symbolic. And complexity is consubstantial with them: it excludes any attempt at reduction.

It is the process of universal *incarnation* that gives myth its life and its effectiveness. In other words, the “formalities” of ritual become the “naturalities” of myth, and vice versa. Equally, the “virtuality” of myth becomes the “actuality” of ritual, and vice versa. Still more, the celebrant becomes the actor of myth, and vice versa. Here is how Colette Goddard, in words more suggestive than those found in most specialized studies on the subject, described a performance of the *Teatro Negro* at the Avignon Festival of 1992: “For us this is just another spectacle. Observing it, we maintain our customs of remaining seated, of moving about as little as possible, of politely applauding at the end as the lights come back on (so that no one will be inconvenienced). In Venezuela (where *Teatro Negro* comes from), the people who watch, even if they remain motionless – which happens rarely – participate in the performance of the ceremony. They know the form and meaning of the ritual, just as European Christians know what must be done in a church, and why. At Avignon, the spectators are only able to appreciate the music and the dance.”¹⁹

It only becomes necessary to define and distinguish among ideas at the moment when myths and rituals are reduced to mere objects of study; or, as in this case, when the performance, within a European framework – and, more importantly, as part of a festival – replaces the ceremony carried out by natives. In both cases, *the lived experience is separated from the myth as myth*. This is not a superficial observation. Myth is transformed depending on the different levels at which we place it and ourselves. This is why ethnologists for so long preferred to study distant and exotic populations (“primitive,” as they were once called): by choosing an object distant in space and time, the analytic study of the object was fostered. As an object of study, the myth could be reduced by the researcher to an object of anthropological knowledge subject to the scientific method, which is the prevailing Western approach. As an object of performance, the myth is produced in relation to the imperatives of the Western stage in order to arouse the type of attention and signification that the Western spectator expects of a theatrical performance. This shows just how difficult it is to feature foreign repertoires: in adjusting them we betray them. Nevertheless, it is important to note that there has been a marked increase in just this kind of theatrical performance, especially at festivals. Equally important is our own recent – and growing – interest in viewing ourselves ethnographically, which is accom-

plished by looking at our contemporaries in the same way we once looked at “natives.” Along with scholarly studies that often shock us by shedding new light on some of our “modern” behaviors, there is the ever-growing fascination of Europeans with the United States, a country that is itself a combination (or cocktail) of rock, the free market, jeans, Coca-Cola, and performances of all kinds! Yet we shouldn’t laugh at this. What we are witnessing is an awesome process of transculturation by means of a no less awesome process of mediization. It is at work in every one of our homes, a mixture of *virtual pop* and *actual pop*. But underneath it an even more profound transformation is taking place!

From Monument to Onto-Urgy?

As dynamic configurations, civilizations have expressed their respective visions of reality by combining – each civilization in its own way – beliefs, rituals, institutions, customs and ceremonies. History has traced the development of the various civilizations over the course of the centuries, while the “monuments” produced by these civilizations have preserved their specific characters and purposes. However, even if, as the poet Paul Valery wrote, civilizations are mortal (a statement that has often been misused), then it must also be pointed out that, even when dead, civilizations have been able to escape the “fissure of death.” It is the secret of art, and its strength, to be able to maintain, if not the actual life, then at the least the presence of something that has perished, beyond the limits of mere chronology. It is as if the virtual were the key to an order of “transhistorical” reality; an order that brings to life – and this is the not least of its surprises – the most astonishing adventures and avatars.

Dug out of their formidable entrenchments inside pyramids and hypogea (where they were to lie for eternity), the pharaohs are now displayed, with appropriate labels, in the world’s largest museums. As for the Mona Lisa: Malraux, minister and visionary, long ago sent her off to Tokyo as a pioneer in what was then a most unusual kind of cultural tourism (but that for us has become old hat) in order to receive the tribute of millions of Japanese at a rate of one admirer every two seconds.

Neither the Pharaohs nor Leonardo da Vinci could for a moment have imagined such events, since nothing in either Egyptian civilization nor the Renaissance allowed for – nor could have allowed

for – such an eventuality. *And yet these things happened.* Therefore we cannot escape this conclusion: technological developments made these incarnations possible (and the word incarnation is not too strong). If we can legitimately define technique as the totality of means used toward an end, and if we can say that a technique is invented and perfected in order to satisfy our needs – and this according to the following pattern: from a project to a plan, from potential to an act, from the predetermined to materialization – then it would seem no less legitimate to say that from the start such techniques are pregnant with unforeseeable metamorphoses. Along with the objectives that we assign them, along with the uses with which we burden them, it is as though these techniques possess *their own power to create*, or at the very least the capacity to bring out unexpected characteristics, an extension of their inherent “virtuality” (in the etymological sense that the words *virtue* and *virility* carry). It is this quality that *proves* – the choice of this word does not seem excessive to me here – the validity of the two above-mentioned examples and permits us to expect other incarnations, other completely unexpected and equally astonishing metamorphoses in other places (and, why not, in non-places?) in the future. Barely a century ago who would have thought – after so many laborious and dangerous experiments with objects “heavier than air” – that the airplane would become the extremely commonplace form of transport that it has become in our time? What are we to say about the human voice that is now capable of reaching around the globe in a matter of a fraction of a second, after first traveling the forty-odd thousand miles it takes to be bounced off a satellite circling the earth? And what about television, with its now hundreds of channels that reach every corner of the globe, broadcasting twenty-four hours a day, on twenty-four bands, by cable and satellite? Yesterday’s “miracles” are today’s commonplaces. All spheres of human activity have been affected: biology, genetics, medicine, industry, commerce, communication, travel, leisure, private and personal life, not to speak of public life (where the image of a presidential candidate is at least as important, if not more so, than his actual person!). There is a generalized mutation taking place, a transformation of social structures and the most firmly entrenched customs.

Archival work, which was once done manually, has now been taken over by computers. We also have the *electronic archive*, which replaces the writing stone, papyrus and clay tablet of old, and also

paper, which has been in use for five centuries. The electronic archive will be like a universal memory, capable of organizing data bases and data banks that can then be produced on ever less expensive compact disks. We can say with confidence that anything capable of leaving a trace – whether letters, sounds, numbers, drawings, graphics, data, etc., either in isolation or combination, in whatever form or place – will have the potential for being digitally recorded and thus available to all. In business, computers and computer programs have already taken over all operations that involve calculations. They also play a large role in management decisions, in areas as diverse as command and marketing. Governments rely on computers for all kinds of tasks, including the establishment of budgets, the governing of localities, and the development and implementation of projects. Computers manage hospitals, courts, revenue collection agencies, not to mention police departments and entire justice systems. With the development of artificial intelligence, all planning, evaluation, and decision-making must now be reviewed by the “expertise” of the computer, which is provided to it by the proliferation of expert systems of all kinds.

Let us now briefly turn to another phenomenon, one that is commonplace and yet somehow vague: this is the subject of the word “information,” whose ambiguity is only equaled by the frequency of its use. The first meaning of information – from the verb inform – is the act of giving knowledge of a fact, one that in principle is useful to the person who receives it (i.e., scientific, artistic, economic information). However, its meaning quickly evolves. In French, we talk about listening to a *bulletin d’informations*²⁰ (note the plural). In the case of radio we listen, in the case of television we listen and watch, to the dissemination of a kind of news whose chief characteristic is less its utility for the person who receives it than the fact that it is communicated by the media, in conformity with the rules that govern the media; that it is a media product. Television, in order to exercise the prodigious powers inherent in continuous transmission, must be in a position to *invent* the products most technically capable of manifesting the ever-expanding range of its means. At the same time television must stimulate and satisfy the growing appetite of the public for these very products. This twofold, looping mechanism has a tendency to monopolize the time of both the transmitter and receiver of the information, which results in the use of recurring themes, themselves treated by repetitive procedures. Thus the television “series” is the most valued and

profitable form of information. However, in order to avoid a too great dependence on fiction (which could end by wearying both the producer and the public), the media have taken to "manufacturing" genres that exploit the past in the form of media celebrations. Thus it is that certain great men (Christopher Columbus, Mozart, Picasso, etc.), certain stars (Marilyn Monroe, Elvis Presley, Marlena Dietrich, and the like, who, it should be noted, are more volatile than the "great men"), and certain noteworthy events (centennials, bicentennials, tricentennials, recently the five hundredth anniversary of the discovery of America, etc.), suddenly become all-important subjects, endowed simultaneously with prestige and splendor. As for the daily press, if at first glance it appears to be a primary material of second choice, it does have the advantage of directly addressing "current affairs" (in the plural again!), a new figure of Modernity. This press deals with subjects ranging from local news to electoral campaigns, fires to floods, the latest assassination to the latest health tips, with its *zoom lens* ever on the lookout for the latest in scandals, "affairs," scoops.

The impact of television is strengthened by the fact that, because the broadcast is live, *there is perfect congruity between the event and its transmission*. For the first time, television viewers can enjoy a privilege once reserved for the Gods: viewers can simultaneously be in the sky and on earth or, more modestly, in their living rooms and in a stadium. Thanks to this tele-participation the viewer is both spectator and half-actor, and his or her techno-social status is strengthened by the fact that each viewer seated in front of the set knows that this "media transubstantiation" is simultaneously affecting millions, sometimes even billions of fellow "communicants." Ontological memory is reduced or even disappears; it is the *Screen* that is "ontologized," just as myth, religion and ritual are "screened." Movie screen, television screen, computer screen, the Eucharist of the media is everywhere. No longer is it a matter of seeking the reality behind appearances, nor even behind the screen; no longer is it even a matter of producing a spectacle (a claim that has been repeated all too often). What matters is the continuous Broadcast, in which the virtual, ever in the process of actualization, is perpetually "re-virtualized," in which complexity is constructed and deconstructed in the ebb and flow of metamorphoses. Just as the information generated by the media has become – but who saw it coming? – a "fractalizing" enterprise, so has broadcasting itself, in the widest sense (newspapers, theatricals,

sports, fiction) become an enterprise of infinite “fractalization.”²¹

And what lies ahead? According to the sport’s columnist of the New York Times, it was thanks to *high-tech* that the 1992 Olympiad in Barcelona (with its ten thousand participants, tens of thousands of spectators, its three and a half billion television viewers) was able to bring to life myth and joy; i.e., La Sagrada Familia, the fountains of Montjuic, the towers of Tibidado; and also, he emphasized, the works of Gaudi, Miro, Dali, Picasso; in short, the two thousand years that comprise the history of Barcelona and Catalonia. Then he wondered: “And how will Atlanta, the site of the 1996 Olympics, be able to compete with Barcelona? What myths, what gods, what legends, what history can it evoke? Will a stock-car race be used as a demonstration sport? Will the opening ceremony be comprised of dancing soda bottles?”²²

This exemplary question lies at the heart of our present situation and haunts our future as well. We, who have for the most part lost the sense of Being (with the exception of certain vehement dogmas and multiform superstitions that can be found here and there) find ourselves facing the question of whether an ever-more complex technology will ever – beyond the products and services that it provides – be able to satisfy our metaphysical needs, which have not completely disappeared. Even if we continue to seek the support of the past (a phenomenon to which the Barcelona Olympics bore witness), might we not anyway, due to the acceleration of technological developments, be forced to a new “Atlantisization,” that is, to the need to rebuild everything from scratch? The fissure is simultaneously a wound, that is, the consciousness of death, and an opening, that is, the invention of meaning that transcends death. After the invention of fire, which illuminated the dawn of humanity, after the thousand coils of myth and the rise of modern science, does not technology offer us the means not merely to seal up the fissure, not merely to disguise it under the guise of culture, but to “enchant” it in the widest possible sense, *to charm it with the magical effects that technology provides*? Would this not be what we could name *onto-urgy*, the work (*ergon*) by which it would now *be possible to create Being (onto)*? This is not a matter of choice: this a wager whose stake is our survival. It has no winners’ podium, no doping, no gold medals. The words of Jaron Lanier that I quoted earlier can serve as epigraph: “What is called *information* is but alienated experience. . . .” It is not the least of paradoxes that these extremely lucid words of warning come from someone who, perhaps more

than anyone else, has met the challenge of *onto-urgency*, since virtual reality could be – surely this is its aim – an enterprise that creates a *non-alienated experience of information*. This awakening of technology can only occur if technology is joined, at the heart of the virtual, to generosity, which can be called “creativity.”

Translated from the French by Thomas Epstein.

Notes

1. Among the copious material on this subject, see the works of Edgar Morin, in particular: *La Methode 3 – La Connaissance de la Connaissance 1*, Paris, Éd. du Seuil, 1986; *Introduction à la pensée complexe*, Paris, ESF Éditeur, 1990; and *Les Théories de la complexité, autour de l'œuvre d'Henri Atlan*, colloque du Cerisy, under the direction of Françoise Fogleman Soulié, Paris, Éd. du Seuil, 1991; from Jean-Paul Delahaye, *Complexités*; and “La Profondeur Logique selon C. Benoit,” *Pour la Science*, no. 166, August 1991; from the Nobel Prize winner in physics, Murray Gell-Mann, “Simplicity and Complexity in the Description of Nature,” *Engineering and Science*, California Institute of Technology, Spring 1988, vol. LI, no. 3, pp. 3–9.

2. It is in the afterword to my book *L'effet des changements technologiques – En mutation, l'art, la ville, l'image, la culture, NOUS!* (Lausanne, Éd. Pierre-Marcel Favre, 1983) where, in speaking of what I called the rise of “techno-imagination,” I wrote: “Technologism . . . is the first philosophy to integrate objects and machines into its system. In so doing, its aim is less to understand than to transform the world. Technomorphism thus designates the power and results of technological activity.” (pp. 226–227). The totality of this activity is part of what I called “technoculture,” a neologism that is gaining currency today.

3. To date, the most complete inquiry on the subject was carried out by Howard Rheingold, in *Virtual Reality, The Revolutionary Technology of Computer-Generated Artificial Worlds – and How it Promises and Threatens to Transform Business and Society*, New York, Summit Books, Simon and Schuster, 1991. See also: Catherine Richards, Neel Tenhaf, Seminar Leaders, *Visual Seminar on the Bioapparatus*, The Banff Center, 1001, published in Canada; Michael Benedikt (ed.), *Cyberspace: First Steps*, Cambridge, Mass./London, The MIT Press, 1991; Stan Davis and Bill Davidson, *2020 Vision*, New York, Simon and Schuster, 1991; Derek Leebaert (ed.), *Technology 2001, The Future of Computing and Communications*, Cambridge Mass./London, The MIT Press, 1991; Myron W. Krueger, *Artificial Reality II*, Reading, Mass., Addison-Wesley, 1991; Brenda Laurel, *Computers as Theater*, Reading, Mass., Addison-Wesley, 1991; Richard Kadrey, *Cyberthon 1.0 Whole Earth Review*, Spring 1991, Sausalito, Ca., pp. 54–60; Jean Segura, “‘Réalité virtuelle,’ un plongeon dans l'image?” in *La Recherche*, 229, February, 1991, Paris, pp. 232–235. Especially relevant to the current essay is *Actes d'Imagina 92*, in which the principal examples that I cite (and which I personally witnessed) can be found (see the *Guide*, which gives a good summary of what took place).

4. “Virtual Reality, An Interview with Jaron Lanier by Kevin Kelly,” Adam Heilbrun and Barbara Stacks, *Whole Earth Review*, 1989, Sausalito, pp. 108–119.

5. Patrice von Erstel, *Actuel*, no. 137, Paris, November 1990, p. 70.

6. On this subject see issue number 155 of *Diogenes*, “From the Cosmos to the

Mind," with its articles on the origin of the universe (Herbert Reeves), the emergence of thought (Edgar Morin), the origin and evolution of mankind (Yves Coppens), and other subjects.

7. Gaston Bachelard, *La psychanalyse du feu*, Paris, Gallimard, Idées, 1949, pp. 23, 32, 94 (the quote attributed to Rodin was reported by Max Scheler).

8. Marvin Minsky, "Logical versus analogical or symbolical versus connectionist or neat versus scruffy. AI systems should assimilate both symbolic and connectionist views," *AI Magazine*, 12.2, 1991, pp. 34–51.

9. The process of encephalization is at the heart of the work of the great anthropologist André Leroi-Gourhan. As for its relation to artificial intelligence, see *Daedalus, Journal of the American Academy of Arts and Sciences*, Winter 1988, vol. 117, no. 1, Cambridge, Mass., in particular the article of Jacob T. Schwartz, pp. 85–121.

10. Henry Kennedy and Colette Debray, "Le développement du cerveau," *La Recherche*, no. 184, Paris, January 1987, p. 28.

11. For how this tendency affects science itself, see Thomas Kuhn's classic, *The Structure of Scientific Revolutions*, The University of Chicago Press, 1962, 1970.

12. It is useful here to recall Descartes' own starting point: "My philosophy," he wrote, "takes into account only magnitudes, figures and their movements, as does mechanics." It is a mechanism, he continues, that affects even our bodies: "And in truth the nerves of the machine I am about to describe can be compared to the pipes of this fountain; its muscles and tendons can be compared to the other motors and springs that serve to move the pipes; its animal spirit to the water that stirs them; whose heart is the source, and the concavities of the brain are its eyes." (*L'Homme*) It is more than a little disconcerting to observe that nearly three centuries after Descartes the very same mechanistic spirit inspired the inventors of computer science and continues to dominate the approach of the majority of engineers. This shows to what extent this mechanistic spirit, as much an attitude as a philosophy, remains profoundly anchored in both our mentality and our behavior.

13. Lewis Carroll, *Alice's Adventures in Wonderland* (W.W. Norton and Company, 1971) p. 15.

14. My purpose here is not to pretend to be a physicist (which I am not). However, just because my scientific qualifications are limited, this should not preclude my taking into account the contributions of modern science. It is a matter of reading and research: thus the books I cite below. I should also mention, in this connection, that I am especially indebted to my friend Basarab Nicolescu, whose book, *Nous, la particule et le monde* (Paris, éd. le Mail, 1985) not only offers a lucid analysis of the revolution in quantum mechanics but also places it in the broader cultural context.

15. As an analogy, think of our own – and hundreds of millions of other television viewers – surprise when we watched the first astronauts in a state of weightlessness. Even if it did not concern quantum mechanics per se, this sight showed, indeed proved, that a change in environmental conditions has an influence on our behavior and of the image we have of that behavior. It therefore showed that our ordinary perception of the world depends on the habitual conditions under which our perceptions are made. This kind of experience can be the source of an instructive skepticism.

16. Abner Shimony, "The Reality of the Quantum World," *Scientific American*, March, 1988, p. 88.

17. Roger Penrose, *The Emperor's New Mind, Concerning Computers, Minds, and the Laws of Physics*, Oxford/New York/Toronto, Oxford University Press, 1989. It is worth noting that the author, although a mathematician and physicist, gives special attention to artistic and aesthetic questions.

18. François Daumas, *Les Dieux de l'Égypte*, Paris, PUF 1965, p. 27.

19. Colette Goddard, "Les dieux que nous ne connaissons pas," *L'Été/Festival Avignon 1992, Le Monde*. An analogous comment could be made about philosophy,

Assumption or Dissolution of Complexity?

which almost everywhere – at least on the high school and university level – has been transformed into the *history* of philosophy. Equally, the philosophical *vocation*, “to seek wisdom,” has been replaced by the *profession* of historian! The authenticity of personal lived experience has become a matter of apprenticeship and academic mastery (in the form of performance, as at the theater?).

20. In English: news program (translator’s note).

21. See Benoît Mandelbrot, *Les Objets fractals, forme, hasard et dimension*, Paris, Éd. Flammarion 1975. There is also the travelling exposition, *Frontiers of Chaos – Computer Graphics Face Complex Dynamics*, which inspired a book co-authored by H.O. Petiggen and P.H. Richter, *The Beauty of Fractals – Images of Complex Dynamical Systems*, Berlin/Heidelberg/New York/Tokyo, Springer-Verlag 1986.

22. George Vecsey, *Herald Tribune*, August 11, 1992. For his part, the President of the International Olympic Committee, Juan Antonio Samaranch, announced at the close of the games that Olympic amateurism, which was the ideal preached by Baron Coubertin and his successors, was at an end; and he added that in the future the games would see the presence of more and more professionals. This is a very significant admission about the general tendency in sports – and all competitive activities – today.