Virtual Multiplicities

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The word "virtual" comes from the latin *virtus*, virtue, which itself comes from the latin *vir*, man. As for the word "real" it comes from the latin *res*, thing. One could say that the virtual is the man and the real is the thing. How does one resist the temptation of placing the virtual in opposition to the real, as a metaphor of the man who places himself "in" the world and who confronts things? The virtual opposes the real, as man does the world, in order to transform it and even transcend it.

When all is said and done, it is the very logic of the man's presence "in" the world that this calls into question, into play. Man's true reality is in his virtuality, in his virtual capacity to transform the world. His essence is to go beyond the world, as virtue goes beyond nature, as imagination transforms a thing, as form grasps matter, but is not held by it. The virtual is neither the opposite of the real (the unreal) nor the opposite of the actual (the potential). The virtual is like the leavening in dough. It unites and combines the poles, the forms and the forces, but only in order to transform them. It escapes all categorization for it exists to slip between categories. It constitutes, in the true meaning of the word, an "intermediary" reality—a *metaxu*—as Plato said.

The intermediary is a precious category for those who want to change the world, or to change their world, for all transformations imply a mediation, a transition, a union of distant states—occasionally so distant that one could not imagine that they could be related. The intermediary unites those that differ, it links together the most extreme differences by that which joins them.

The virtual, as we have said, is the intermediary par excellence, for it is the link between a real state and all of the multiplicities, all of the possibilities for the evolution of that state. The virtual is the

way between all future roads. It is therefore unique and multiple all at once. Unique by virtue of its intermediary position. Multiple by virtue of the infinite possibilities.

We are going to illustrate the virtual's remarkable position between unity and multiplicity, by means of several examples: the virtual image, virtual reality, virtual presence, the virtual space of networks, and virtual civilization.

Virtual Images

"Virtual images" are images calculated by computer from mathematical models, and displayed on a screen or with the help of special devices (stereoscopic glasses, relief projection). A great variety of virtual images exists. Some are calculated with realism sufficient to give the illusion of a completely reconstructed reality, as with the shipwreck of the Titanic in the film of the same name, or the tyrannosaurs in *Jurassic Park*. Other, less realistic, but more interactive, types of virtual image exist; electronic games for example, or real-time simulation stations. Still others, present in installations whose function is artistic, permit many forms of interaction between the spectator and the work. So virtual work seems endowed with a sort of life of its own. A life whose complexity depends directly upon the depth of the programming, and the richness of the models used.

Before we consider a virtual work of art, an interactive art installation for example, we should distinguish three levels. There is the fundamental idea of the work, its essential concept, or paradigm. There is the formal modeling of the idea in the form of algorithms and information programs. These can later be modified or have their parameters set by the spectator's interaction with the work. Finally, there are the images that the work produces for viewing.

For example, in the case of *Interactive Plant Growing* by artists Christa Sommerer and Laurent Mignonneau, the paradigm is simple. It is the idea of creating a direct, tactile link between the spectator, real plants, and virtual plants. By touching or stroking real plants, the spectator initiates a reactive loop in the plant. In effect,

108

any plant touched by a person emits a bio-electric signal that one can pick up, through the roots, for example. This signal, too weak to be perceived by man, but capable of being recorded by a sensor, can initiate the operation of a simulation algorithm and so permit virtual plants to be displayed on a screen. In order to control the growth of the synthesized plants, one can program these algorithms to take into account the way (force, intensity) in which the spectator is touching the plant. The effect is very surprising. A simple gesture, a single stroke of the hand on a cactus or a begonia leaf, sets off *illico* the germination of virtual forests; proliferating, and soon withering, if the spectator-gardener-demiurge does not continue to maintain her creation.

The models used in this work are diverse. There are dozens of algorithms or plant models capable of perfectly simulating not only the plant's exterior appearance but also its growth or its degeneration. These algorithms take the spectator's gestural interaction into account in order to give a particular, original form to each plant generated. From one plant "model," one can generate a multiplicity of different plants all belonging to the same "species." Finally, the images are generated. From one particular plant, one can generate a multiplicity of different points of view correspondent to the movements of a virtual camera in space.

So the fundamental idea of this work (to create a virtual garden from the interaction between the spectator and real plants) leads to a multiplicity of multiplicities set inside of each other. First the multiplicity contained in all of the virtual-plant-generating program's variations. Then the multiplicity of images generated each time the program is run.

The point that we would like to underline here is that the virtual favors the leisurely creation of multiplicities, above all of "tangled multiplicities." The models used in the virtual are sources of multiple images, but the models themselves are also prey to multiplicity: artificial life, auto-evolution, interaction, and retroactive loops. Finally, it is possible to use several different models to account for the same phenomenon. The models are themselves like images of a more abstract model: the generic idea, what we call the work's paradigm.

109

Virtual Realities

The recently popularized expression "virtual reality" covers a category of applications that involve virtual images. Digital simulation, "immersive" virtual reality, "augmented" reality and "virtualized" reality represent the four major kinds. Digital simulation has been known of since the 1950s when the first attempts to generate synthetic images in real time were created for programs simulating military flight. Immersive virtual reality is the most recent and dates from the mid-1980s when the miniaturization of screens allowed the construction of display headsets. The movement of the head or shifting of the gaze is captured by a sensor that triggers the calculation of images correspondent to the new point of view "in real time," theoretically, that is to say, without the eye being able to tell the difference (in practice, however, this is fairly difficult, even though advances have been significant). Compared to simulation, virtual reality adds a dimension of stereoscopic immersion "inside" the image and a deeper interaction with the image (via the use of the interactive glove, for example, or of bodysuits peppered with sensors).

Augmented reality is virtual reality narrowly combined with or superimposed upon reality. For example, the projection of virtual images on a real airplane cockpit during a real flight. The pilot, flying at night in real conditions, with no visibility, can benefit from the virtual reality that is presented to him in the form of images on his cockpit viewfinder or even on his helmet's visor. He "really" pilots thanks to a realistic (or merely geometric) representation of the terrain really being crossed. Another example is that of the surgeon who can superimpose virtual images (for example, images obtained by scanner that reconstruct the lower layers of the organs operated upon) over the quite real reality of the body that he is operating on. The real organ is thus bathed in the virtual image. It becomes an "enhanced" organ. The perception that one has of it is no longer limited to what one sees, but is complemented by other images that add invisible, hidden details, or quite simply abstract information.

Virtualized reality or reality-made-virtual originated from the inverse process. It is possible to use many photographs of one scene or from a film sequence, to create a numerical model of the entire scene. In this way a reality that really exists is made virtual, and is endowed with the status of a virtual object, which one can explore at leisure—as if it were a virtual reality.

In all of these of real/virtual hybrids, there is room for many tricks of multiplicity, notably in our relationship to space. The multiplicity occurs not only in the course of the model's operation, or in the viewpoint, it also becomes metaphorical. It is the real space which, on escaping frontal polarization of the cinema screen or the simulator, becomes the support and the integrator of images, languages, and transformations. In combining itself with virtual worlds, space becomes liquid and virtual. Space is no longer only a *topos*, a place, at the same time it becomes a *tropos*, a turning, a trope, a metaphor, a figure as fluid as the language itself.

The space of enhanced reality creates itself literally under our gaze and in part through our gaze. The "enhanced" space is not only the means of structuring our relationship to the image, or the screen on which our imagination is projected. It becomes an integrated reality: in the grip of the virtual and simultaneously quite real (for example, the virtual Gulf War, conducted across surveillance and simulation screens, or the unwell body of the patient that is being operated on, or the virtual office which really is connected to the world, or finally the virtual artwork in the process of really being born before our eyes). It is an integral reality, "enhanced" with all of the weight of the virtual, which binds itself deeply and intimately to the real, leaving no visible chinks that would permit the detection of the fault line, the gap between the projected image and the substratum that assumes and makes use of its perfection, of the seamless projection, in order to acquire more "reality." The virtual comes to augment the real, to render it more real than the real, more efficient, or more intelligible or more meaningful. Enhanced reality is reality, but more than ever a reality taken hold of by man and transformed by his own intelligence or by his desire. From now on, space, a fundamental perception which has since Kant been one and inescapable, multiplies itself by enhancing itself. One place, one point of view in the real world

111

is enhanced in all of the dimensions of the virtualities willed by man. For the first time in human history, space is entirely in the grip of language. Its original unity is dissolved in the virtual multiplicity of its "enhancements."

Virtual Presences

The virtual also serves in communication. As a technique of representation, virtual images can be used to represent man and therefore to represent him from afar. Let us distinguish between a few applications: telepresence, televirtuality, and virtual communities.

Telepresence permits action from a distance. One representative example is the Voyager space probe to Mars which was controlled from the earth by means of navigation and telerobotics. Televirtuality permits the virtual meeting of several real people in cyberspace by putting their avatars, or virtual clones, face to face. Each person is represented by a more or less realistic synthesized image that can develop interactively, under the control of its proprietor in the virtual space that the meeting shares. The virtual communities that establish themselves by means of televirtuality can be of different natures. Military, scientific, educational, and playful entertainment applications are already widely in use. All and sundry may henceforth participate in worldwide virtual communities in order to play at WarCraft2 or Diabolo, virtual games well known by adolescents, on a network.

From now on, multiple avatars, numerous pseudo-incarnations, infinitely replicable (and transformable) clones will proliferate apart from the natural unity of the person. This does not simply concern reproductions of the image, as in the time of photography described by Walter Benjamin, but rather a multiplication of effective forms of presence. Televirtuality is not a pseudo-presence, as for example the non-presence of the "announcer" on television, miming intimacy, but whose gaze only reflects the teleprompter's mirror. Televirtuality permits an effective presence, in the sense that it is an efficient presence, capable of translating itself by real actions, by concrete interactions with the other. The clone of the

112

synthesis is not only an image, it turns an intention into a media event, it conveys an action. From now on, a man can spread himself across the world, not only in the manner of the television image, but in the manner of *missi dominici*, of messengers charged with many tasks, processed in real time or delayed. Man can spread and divide himself, he can make himself present in all points of space, here and now, or wherever and whenever, in a manner more or less tangible, more or less realistic, more or less abstract. He can even mix himself with others. He can put himself into someone else's shoes, or invite others to come and visit his own point of view, his own vision of the world, real or virtual. The unity of the subject explodes in a myriad of atoms of conscious-ness that are like chains of instants of presence whose sum total could make up the man's entire existence, or even exceed it. In effect, all of these clones and avatars, invented to represent us from afar in time and in space, are also endowed, each to a differ-ent degree, with a kind of autonomy. These intelligent agents and other virtual assistants are not only identical copies, they escape us in some measure, enhanced as they are by artificial intelligence or by their interaction with the varied contexts in which they are called to travel.

Who are we in the future and where are we? We are the original matrix of our multiple clones. We are no longer only where we are, here and now. By the indirect path of telepresence we are where we act; we are where we think ourselves to be, where we communicate with others, thanks to multiple "me's" that are more or less faithful to their model.

The Virtual as a Network

The Internet, this network of networks, is, along with the "blue planet" seen from satellite, one of the two major icons of our times, a concrete symbol of the intrinsic unity of human destiny. The Internet is at once the universal and virtual world library, and the effective means to create the "Noosphere," the sphere of spirits that Pierre Teilhard de Chardin prophesied. We urgently need it in order to civilize globalization, which in actuality has been left to

113

itself, or more exactly to the "invisible hands" of market forces. The essence of the Internet and its unstoppable force is that the Internet is nothing more than a simple norm: the TCP/IP protocol. This norm possesses a unique and unrivaled advantage; it is accepted universally. The Internet is therefore a network unified (by its protocol) by many real networks (which are dissimilar). In the Internet's very structure, as it is made up of server sites, "mirror" sites appear, charged with duplicating the most often requested information, so as to avoid costly replication. The information available on a European site server that is asked for by Japanese or African net surfers is temporarily duplicated and rendered directly available in "caches" on the servers in their respective countries. This allows us to avoid sending the same information many times across transcontinental lines. The custom of creating mirror sites and "caches," which comes from the necessity to economize on busy lines, corresponds deeply to the spirit of the Internet, which is to create a sort of canvas of correspondences and hyperlinks. The Internet is like a symbolic hologram: from each "point of presence" on the Internet canvas, one theoretically has access to the totality of information on the entire "canvas." The Internet increases such access thanks to the uniqueness of the shared norm. Furthermore, the way the network is structured, the more an information is requested, the more it becomes available, redundant, all without eliminating the accessibility of information less often sought after.

The Virtual, Paradigm of Our Civilization

Now we see it: the virtual created from the multiple. The techniques of the virtual (digitizing, modeling, interaction, simulation, networking, etc.) make infinite duplications of copies and points of view, of the possibilities for access to information and its transformation, and of the interpretations that one can draw from their representations, but more generally, the virtual is in the process of becoming the fundamental paradigm of our civilization.

The civilization of the virtual will impose itself upon humanity as did in their time the iron age, the age of writing, and the indus-

trial age. Economic globalization, the development of the information society, and the "end of work" made possible by the productivity of machines have a fundamental common link. This link is the development of abstraction. Abstraction is a way of elevating oneself outside of the real, in order to evolve in the ideal world of concepts and representations. For one part, this travel outside of the real is productive. It permits a better understanding of the real, a better view of the complexity of reality. In this sense, the virtual helps us to better understand the real. In another sense, the virtual excursion outside of the real runs a very large risk: that of disembodying us, desensitizing us, severing us from our deepest human and social roots, in a word, dehumanizing us. The examples of this danger of generalized abstraction are plentiful already: the abstraction of electronic money and the virtual worth of speculators; the abstraction of goods and services which are increasingly dematerialized; the abstraction of the notion of the nation state, powerless in the face of global cyberspace; the abstraction of an "economy of attention" that reduces the Internet to *data-mining*; the abstraction of "virtual human communities" that virtually unite people scattered all over the surface of the Earth for intellectual, social, creative, political exchanges but which also become quite real ghettos isolating their participants, who become closer to their correspondents from Cupertino or Singapore than to their next-door neighbors.

In essence, the virtual is the work of the spirit, confronted with the infinite myriad of the phenomenon of reality, and doing its utmost to unify it, to give it sense. The virtual ceaselessly sends us back to the contemplation of the relationship between the model (unity of concept) and the image (infinite variability of representations and perceptions). The models themselves are no more than images of a model even more abstract, what we referred to above as the paradigm, images which reveal a sense, or purpose. The virtual is eminently multiple. It makes intermediary beings proliferate. It multiplies the variations and the possibilities. It ceaselessly widens the scope and breadth of its "copies." But in this disarray it also allows us to unify this multiplicity of images and of representations by subsuming them in ever higher levels of abstraction. The virtual obliges us, by the explosion of the real, to research with more con-

Philippe Quéau

stancy and determination a sense, an idea, an intuition, that boils down and that eventually becomes a sign. In this sense the virtual is a concrete image of man immersed "in" the world.

Translated from the French by Beatrice McGeoch

116