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On memory (electronic or otherwise).

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For LEONARDO.

Our species transmits acquired information (and not only inherited information) from generation to generation. By doing so, it doubly contradicts nature. The Second Principle of Thermodynamics states that information contained within nature tends to be forgotten. Living organisms contradict that Principle by preserving and transmitting genetic information. They consitute a memory in defiance of the entropy of nature. There is a biological law, (Mendel's), which states that acquired information cannot be transmitted from organism to organism. Our species contradicts that law by having elaborated a cultural memory which progressively stores acquired information to which successive generations have access. This double negation of ours is only apparent: in the long run all the informations we have stored will of necessity return into the general tendency toward entropy: they will be forgotten. Still: this double negation of nature (although only temporary), constitutes our position. Human "dignity" (that aspect which distinguishes us from all the other known beings) may be defined as the fact that we have both a genetic and a cultural memory: that we are "historical beings". Electronic memories are about to radically transform our cultural memory, and the term "human dignity" will thus acquire a new meaning. The purpose of this contribution is to consider some of the aspects of that transformation.

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If "memory" is defined as a store for informations,(which is a definition open to serious objections), then we may find memories all over nature. They float like islands within the general stream toward entropy, islands which preserve some information for some time, before they dissolve within the tendency toward entropy from which they have emerged by accident. Hydrogene atoms and galaxies may serve as examples. They constitute negatively entropic epicycles which sit upon the the linear entropic tendency of nature. The most impressive example for such negatively entropic epicycles is constituted by the biomass which has recently emerged on the surface of our planet (a mere few thousands of millions years ago), and of which we oureselves are protuberances. The biomass consists of tiny drops wherein informations are encoded within complex molecules which are being progressively recopied. Errors occur during this process. Most of them are eliminated fromt the biomass (from the "genetic memory")thanks to very complex devices. They are called "unfeasable mutations". A few of those errors escape those devices, and they constitute what is called "biological evolution". Although our optimistic forefathers considered them to be a "positive thing", because due to them ever new informations are created within the biomass, from the point of view of "memory" they must be considered a serious drawback. They show that the biomass is not a trustworthy memory: instead of preserving information it "rpocesses" it. This has become important for future technical projects. Gen-

etic engineering may be defined as the attempt to store acquired information within the biomass, to transform the biomass into a cultural memory. It must take into account that every information stored there is subject to errors of transmission. (If genetic engineering were considered an "art", and if the artificial organisms it produces were considered "works of art", this is both a limitation and a challenge for future artists.)

Cultural memory is very much shorter than even the genetic one, and it is even less trustworthy. (Which is to say that "human dignity" is not a thing which merits limitless admiration.) Most of the informations we have acquired during our relatively short presence here have been obliterated from memory: not only documents have fallen into ashes, and buildings into ruin, but very probably whole cultures of the past have been forgotten. When people started to build a cultural memory (when they began to become humans) they seem to have had recourse to two types of memory supports (to two types of hardware). On the one hand to air waves, and on the other hand to stones, bones and other hard objects. There may have been other memory supports in use (like body gestures) but they will not here be considered. A memory support is an object which ~~is~~ permits information to be stored there (which permits to be "informed").

Air waves have the advantage that air is easily accessible, and that the human organism is equipped with organs which permit informing them (organs which may transform air waves into phonemes). Speaking comes almost naturally to us, although each individual language must be learned (acquired). This poses the question of the dubious relation between inherited and acquired information. But air waves have the disadvantage of being unstable and open to noise which deforms the information stored there. Thus information stored within air waves, ("oral information"), must be recovered quickly by a receiver and stored within his brain, in the hope that it be transmitted from there to other receivers. Such a process ("oral culture") is subject to numerous errors of transmission, due both to noise during the transmission, and to errors within the brains of the transmittors. Thus "oral cultures" are not, strictly speaking, historical ones.

Hard objects (like stones and bones) have the advantage to be relatively stable. A stone knife will preserve the information "how to cut" for tens of thousands of years. Information thus stored wthin hard objects constitutes our "material culture". But there is this disadvantage: informed objects (tools) are used not only as memory supports, but also as data banks: the knife does not only keep the information "how to cut", but it is also used for cutting. The use of the tool will wear out the information it carries. This is the problem of waste which is at present at the center of ecological preoccupations. Dis-informed objects constitute a pernicious type of memory failure. This is why objects came into use which were meant to be exclusively memory supports, and not also tools. Such "monuments" (for example the Venusses of Willendorf)were meant to avoid the problem of waste, but were of course subject to the Second Principle of Thermodynamics. And this is how far we got with cultural memory almost up to the present.

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However, a very ingenious invention was made relatively lately (some three thousand fivehundred years ago): the alphabet was invented. It is a code which transcodes the phonemes of spoken language into visual symbols. Those symbols may be impressed upon hard objects. This code was meant to somehow unite the advantages of oral culture with those of the material culture. It became possible to elaborate "monuments" (texts) which stored the information of spoken language within hard objects, and which permitted to be re-copied. This proved to be a very powerful method. A cultural memory was established (the "library") which permitted cumulative storage of acquired information. This was the beginning of history proper. And it meant a radical transformation of human thinking and acting. The linear structure of alphabetic writing produced a progressive, causal, "scientific" way of reasoning and of action. The acquisition and the storage of information became a disciplined, self-conscious process. The invention of the alphabet may be considered to be a decisive step toward humanisation.

As literal and literate culture thus slowly emerged from oral and material culture, (slowly, because it had to struggle against previous oral (mythical) and against material (magic) culture, and is still doing so), and as cultural memory became ever more closely identified with the library, a curious process of reification and sacralisation of the library developped. The library was not taken to be a store of acquired information into which we may feed informations acquired by ourselves (through writing), and from which we may recover informations acquired by others (through reading). It was rather taken to be a superhuman memory which transcends individual men, which hovers over them, and to which they must aspire. Thus the role fo cultural memory was inverted: instead of serving men to store acquired information for the use of future generations, it now demanded from men to serve it. This had profound effects on all commitments to culture (on all systems of values). Two examples for this reification and sacralisation of the library (of literal memory) must be presented, because they continue to inspire most of what is called "Western values":

The first example is Platonic: The library (transhuman memory) is a space ("topos uranikos") within which immutable, eternal informations ("ideas", "forms") are stored according to the rules of logic. This heavenly store is where we originally come from, but from which we have fallen into this world of mere appearances wherein all informations we may acquire are wrong informations, ("doxai"). While fallimg we have crossed the river of oblivion ("lethe), but those waters did not obliterate the heavenly, true informations: they only covered them up, and we must re-discover them ("a-letheia". To know therefore is not to acquire new information, but to remember forgotten eternal information. We can do so thanks to "theory" (which is disciplined contemplation of the heavenly library), and if we do so we become immortal.

The second example is Talmudic: The library (transhuman memory) is a meeting place where we can dialogue with each other. To be able to dialogue with somebody, we have to open ourselves up to him: we have to recognize ourselves within him, and to recognize him as our "other". We have to "love our neighbor".

In fact: to the extend to which we recognize our neighbor, to that extend he will be kept within our memory, (will become eternal within us), and to the extend to which we ourselves are recognized by our neighbors, to that extend wil shall become immortal within them. Within that transhuman memory which is the recognition of otherness, we are responsible for the immortality of our others. This is why memory is blessing ("zikhranah lebrakha"), and why the dead live on ("khayeh hamessim"). Now to recognize somebody as our other implies the recognition of Otherness, of Him who is entirely different from us (JHVH). To love one's neighbor implies love of the Entirely Other. Our neighbor is the only image of God, and through that image (through that medium) we may contemplate God Himself in all His splendor. Thus the transhuman memory, (the library which is the Holy script) is in fact God himself wherein we meet to become immortal through the love of each other.

If we follow the development of those two ideologies which are at the root of Western civilisation, we find that they are responsible for our existential identification. We identify ourselves as "subjects" (underlings) of that transhuman memory, and thus as subjects of an objective world. That identification is due to the fact that we reify our ability to store acquired information (as if that ability were a thing which we somehow carry within us), and that we assume this thing within us to be a kind of emanation from the superhuman library which hovers above us. Thus, concepts like "soul", or "spirit" (or even "ego") acquire their typically Occidental meaning, namely: that part of ourselves which is not subject to entropy, but subject to eternal information storage. As "bodies" we are part of the biological world, but as "spirits" we are opposed to it, we may know it, manipulate it, and submit it to our desires. All the "eternal" problems of Occidental ontology and epistemology, (like the problem of the relation between body and spirit, and the problem of the adequation of the "thinkimg thing" to the "extended thing") result from this reification. There are however symptoms at present which suggest that we are about to overcome this sort of existential identification. That we are about to no longer adhere to the belief in a transcendetal core within us. If this were indeed happening, it would imply a profound revolution in all our categories of thought and action.

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Electronic memories are simulations of the memory functions of the brain within inanimate objetcs. (A simulation here means an imitation which exaggerates a few aspects of the original while disregarding all the other aspects. Thus a lever is a simulation of the arm: it exaggerates its power to lift while disregarding all the other aspects of the arm.) In electronic memories the memory function of the brain is being transferred from out of the skull into the external world. This permits us to watch and to manipulate the process of storage of acquired information from the outside. To be sure: what we thus watch and manipulate is a very simplified form of brain memory, in which however a few aspects are much more performant than within

our cerebral organisation. Still: electronic memories provide us with a critical distance with regard to our faculty to store acquired information. And this critical distance will permit us, in the long run, to emancipate ourselves from the ideological belief that we are "spiritual being", subjects which face an objective world

The fact that electronic memories exaggerate some of our memory functions and thus render them far more performant than before will have no doubt profound effects on future civilisation. Let me briefly mention a few of these changes: Electronic memories may be informed more easily than cerebral memories, they keep those informations stored for a much longer period, and they permit an easy re-copying of those informations. This implies that we shall no longer attempt to store those informations within our brain, (a hopeless endeavor if we consider the amount of available informations at present), but that we shall instead feed those informations into the electronic memories. By this, our brain will be freed for other tasks, like the one to process the informations. This processing of informations is called "creativity": we may expect a veritable explosion of human creativity, once we have freed ourselves from all the mecanizable aspects of thinking. Another change to be expected is this: Electronic memories may be coupled with robots, so that the informations contained within them may be transcoded into gestures. "To work" is a gesture which imposes information upon an object. (For instance: a stone knife is the result of an imposition of the information "how to cut" upon a stone.) Thus the gesture of working will be transferred from ourselves on to automated machines, and we shall become free to "program" it, which means to elaborate the information to be fed into an electronic memory and then transcoded into the actual gesture. Man will no longer be a "worker" (homo faber), but rather an information processor, a player with information (homo ludens). The last change to be expected (and to be mentioned here) is this: It is possible to obliterate easily informations from electronic memories: they forget much better than does our brain. Now the validity of informations is limited in time, and that time is becoming ever shorter. (For instance: most informations concerning the physical sciences which were valid a generation ago are no longer useful.) Our brains are burdened with this sort of no longer valid informations, and this inhibits us from processing valid informations. Electronic memories permit a progressive critical elimination of information waste, and thus a disciplined progressive information accumulation. It may be said that this opens the way to "historical thought and action" in a new and more radical sense of that term. And accidentaly it shows that to forget is just as an important function of memory than is to remember.

But all these changes to be expected (and most of them have not been mentioned here), although they are very profound, do not go to the root of the present cultural revolution. The really revolutionary event is the fact that electronic memories provide us with a critical distance with regard to our capacity to acquire, to store and to transmit informations, to what used to be called our "spirit". Our praxis with electronic memories forces us into admitting that memory is not a thing, but a process, although that process involves a thing like

computer hardware or our body. This praxis forces us into admitting that there is no hard core within us which somehow mysteriously governs that process, and which we might call our "soul", or "spirit", (or even our "ego"), but that the process of acquiring, storing and transmitting informations is one that flows through us and involves not only the whole of present and past society, but in fact the whole of what we call "the world". It forces us into admitting that we are knots within a universal network of information flux, that those knots receive, process and transmit information, and that they are nothing at all if and when the relations which constitute them are un-knotted. In fact: our praxis with electronic memories forces us into admitting that what we call "I" is a knot of relations which, when unpealed, reveals itself to have no hook on which those relations may hang (like the proverbial onion).

Now of course this breaking out from the shell of individuality (of subjectivity), as it announces itself in our praxis with electronic memories, is not a sudden event, but has been preparing itself for many years in numerous fields of research. To quote a few examples: analytic psychology is able to show that what we call an individual psyche is nothing but the point of an iceberg of what might be called a collective psyche. Ecological studies are able to show that individual organisms must be understood to be functions of a relational context best called an ecosystem. Politological studies can show that "individual man" and "society" are abstract terms, (there is no man outside society, and no society without men), and that the concrete fact is intersubjective relations. This relational (topological) vision of our position coincides with the relational vision the physical and biological sciences propose to us with regard to the physical world. The physical objects are now seen to be knots within relational fields, and the living organisms are now seen to be provisional protuberances out from the flow of genetic information. Husserl's phänomenology is possibly the most adequate articulation of this relational vision, and it is becoming ever more adequate as our knowledge advances. It states (to put it in a nut shell) that what is concrete in the world we live in are relations, and that what we call "subjects" and "objects" are abstract extrapolations from these concrete relations. Still: although this abandon of the ideology of a "self" may have been a long process, it is our praxis with electronic memories which forces it upon us.

It is quite impossible to try and foresee the consequences of such an existential revolution. One thing however is certain: if we abandon the idea of possessing (or being) some identifiable hard core, and if we assume ourselves to be inbedded within a relational network, then the classical distinction between the sciences and the arts will no longer be valid. Because then the distinction between "objective knowledge" and "subjective experience" will become nonsense. If intersubjectivity will become the fundamental category of thinking and action, then science will be seen as a kind of art (as an intersubjective fiction), and art will be seen as a kind of science (as an intersubjective source of knowledge). The consequences of such a fusion are beyond imagination.

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Let me try to resume what I intended to argue in this contribution: Mankind is different from all other known beings by the fact that it acquires information, stores it, processes it, and transmits it to future generations. Mankind is anti-natural in this sense that it is committed against the entropy of nature. This unique human quality has been covered up, during history, by dense ideological fogs which prevented men from making full use of it. The most pernicious ideology was the one which reified that quality and led men to believe that they have (or are) a thing which is opposed to nature. With the invention of electronic memories a critical distance with regard to that quality has become possible, and we may now expect a more conscious use of it. That (partial) removal of ideological fogs will not render this quality of ours less mysterious, it will not "profanate" it. On the contrary: the mystery of this anti-entropic commitment of ours will become even deeper.

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References which might help the reader to localize this contribution within the context of the present discussion, and to criticize it:

I have tried to collect informations from heterogenous sources. My arguments are based on readings in the physical sciences, in biology, in psychology, in neurophysiology, and of course in what is now called "the sciences of communication". But my point is one of polemics with the French "philosophers of culture". The reader will find that I argue against some points advanced by Roland Barth, by Jean Baudrillard, by Abraham Moles, by Michel Serres, and many others. The reader should also keep in mind that this contribution was part of a round table at Ars Electronica at Linz, Austria, at which the following partners were present: Heinz von Foerster (Biophysician), Friedrich Kittler (semiologist), Jean Baudrillard (philosopher), Hannes Boehringer (linguist), and Peter Weibel (computer artist). Since most of them publish in the United States, it should not be too difficult to find their writings. To resume this attempt to localize this contribution: What I attempted to do was to oppose to the prevailing pessimism an alternative view of the possible future of our civilisation, more as an hypothesis than as a thesis to be defended.