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How the Information Highway can Transform Education: Reflections on McLuhan's Vision

Abstract

Most persons now talk about the electronic highway or Infobahn with very little idea of what it means in practice. Amidst discussions of interactivity, we hear bout home shopping, video on demand, 500 channels of television, and dangers of becoming couch potatoes. At the same time, in spite of the hype and buzzwords, many important ventures are under way: such as a pilot project to scan in all the manuscripts of the Vatican Library and of the Luther Library (Wittenberg). Eight million images of the Canadian Museum of Civilization are being scanned in electronically. The Coalition for Networked Information (Washington) has plans to scan in the full text versions of ten million books. In the past a user was faced with the problem whether any electronic search would generate enough hits to be useful. Today the challenge is reversed; how will a user deal with too many hits.

The System for Universal Media Searching (SUMS, copyright 1994) was conceived to deal with this problem. How do we navigate when we have millions of visual images (paintings, technical drawings, photographs etc.) and tens of millions of pages of books on-line? The lecture will combine a demonstration of the SUMS prototype with both practical and philosophical reflections concerning the consequences of this approach not just for how we gain access to knowledge in new ways but also how this will affect our definitions of knowledge itself.

A generation ago﹥ Marshall McLuhan raised many theoretical issues concerning the use of new media. It seemed at the time that electronic media such as television were introducing a set of modalities fundamental different from those of print media introduced to the West at the time of Gutenberg. The latest developments in "multimedia" suggest that electronic media offer the possibility of a new synthesis of different media, rather than a simple replacing of earlier modes. The presentation and lecture, which will last 60 minutes, will address these issues, and the question of McLuhan's lasting legacy.

1. Introduction

Thirty years ago, Marshall McLuhan published *Understanding Media*[1] in which he raised many theoretical issues concerning the use of new media. It seemed at the time that electronic media such as television were introducing a set of modalities fundamentally different from those of print media introduced to the West at the time of Gutenberg. Lewis Lapham, in his introduction to a new edition of *Understanding Media*,[2] has analysed some of the reasons why McLuhan's claims are even more pertinent in 1994 and why, in retrospect, his work seems more prophetic now than when it was first written. The present essay suggests that McLuhan's distinctions have parallels with and are ultimately rooted in alternative approaches to knowledge. There is reason to believe that these distinctions are being affected by new electronic media, in which case the potential consequences of new technologies may well be more fundamental than even McLuhan claimed.

Although McLuhan contrasted the medium of print to electronic media, he often used this latter term as synonymous with a single medium, television, as if it were merely a question of print being replaced by television. We would suggest that the problem is more complex: that multi-media in fact offer new syntheses of different media, rather than a simple replacing of an earlier mode. These possibilities are fraught with dangers as well as potentials, some of which will be outlined.

Print	Electronic Media	Citizen	Nomad
visual	tactile	build	wander
mathematical	organic	experience	innocence
sequence	simultaneity	authority	power
composition	improvisation	happiness	pleasure
eye	ear	literature	journalism
active	reactive	heterosexual	polymorphous
expansion	contraction	civilization	barbarism
complete	incomplete	will	wish
soliloquy	chorus	truth as passion	passion as truth
classification	pattern recognition	peace	war
centre	margin	achievement	celebrity
continuous	discontinuous	science	magic
syntax	mosaic	doubt	certainty
self-expression	group therapy	drama	pornography
Typographic man	Graphic man	history	legend

Fig. 1 A series of McLuhan's oppositions between print and electronic media and a parallel list of differences between citizen and nomad by Lewis Lapham cited in his introduction to the new edition of *Understanding Media* (1994).

2. McLuhan's Distinctions

One of the factors that rendered McLuhan's approach so seductive was his ability to epitomize complex developments in the form of pithy quotes, throwaway lines, phrases (e.g., the global village) and provocative oppositions which seemed to synthesize a phenomenon in two words, without being naïvely reductionist (fig. 1). This technique was not new. Cultural anthropologists such as Rodney Needham[3] have since noted that such binary oppositions were characteristic of many "primitive" cultures, and have continued to fascinate persons ever since. In our century, Jean Gebser,[4] another of the major commentators on modern culture, used the same technique.

3. Alternative Models of Scholarship

In seeking to understand twentieth century examples of these oppositions it is important to recognize that they reflect alternative approaches to knowledge.[5] For the purposes of this paper, examples from art history, psychology and sociology will be used to suggest that shifts from one sense to another, e.g., eye to ear, cannot simply be explained as a shift from print to television.

Art history

Art historians were arguing about oppositions between tactile and visual sensibility long before the advent of television. Gombrich[6] argued that these were misleading. More recently, Gablik introduced another set of distinctions. In Progress in art, Gablik set out "to emphasize the logical rather than the perceptual character of art"[7] and explicitly took issue with the perceptual theories of Arnheim[8] and the Gestalt school. Arnheim's claim that "eyesight is insight"[9] could not, she claimed, explain how modern art had liberated itself from "figurative or representative elements."[10] Gablik wanted "an epistemological model of art history which is based on cognitive theory, rather than on a neurophysiological model of perception."[11] Inspired by the developmental concepts of jean Piaget, Gablik returned to ontogenetic-phylogenetic analogies which had been popular in the nineteenth century, involving comparisons between stages of development in an individual person and developmental stages in culture as a whole. However, she was careful to insist that culture does not simply recapitulate development in children and claimed instead that there were parallels.

Piaget had identified five stages in the development of a child. Gablik reduced these to three essential stages. First, there was a pre-operational stage (eighteen months to four years in the child), involving topological relations of space, an enactive mode of painting, and corresponding to ancient and mediaeval art in terms of cultural development. Second, there was a concrete-operational stage (six to fourteen years in the child), involving projective and Euclidean relations of space, and an iconic mode of painting, corresponding to the Renaissance in terms of cultural development. In this model, linear perspective was characterized by the static viewpoint of a single observer and separation of observer and the world. Third and finally, there was a formal-operational stage (above fourteen years in a child) involving indeterminate, atmospheric space, a symbolic mode of painting, and corresponding to modern art in terms of cultural development. In Gablik's view:

these stages in the development of art correspond to learning processes and to transformations in concepts of self and society (fundamental transformations, that is from one picture of the world to another).... I wish to assert that it is the transformational element in thinking that is actually the source of art's development. It has led pictorial imagery on the one hand toward greater mobility; on the other, it has brought about a complete independence from figurative or representational elements."[12]

Gablik served as a point of departure for a more serious treatment of these problems by Blatt and Blatt.[13] According to their view the tradition of Kant and neo-Kantians such as Cassirer had led to structuralism which attempts to: "define principles and cognitive structures that underlie all human intellectual endeavors.... This search for the underlying, unverbalized (unconscious) order in cognitive endeavors is a quest for the identification of the basic constructs through which individuals understand and organize their universe."[14] The Blatts cited evidence from a whole range of disciplines, to claim that such cognitive schemata had been used to understand neurological processes, memory, perception, information processing, linguistics, social order, structural anthropology, psychoanalysis and the development of children. They related this quest for structure to the search in art history for a: "vocabulary of form," "a matrix or scale of structured relationships"[15] and a larger quest to discover: "basic relationships of form and their processes of transformation," which they termed mental constructions, "cognitive schemata, patterns or gestalts."[16] They claimed that these conceptual explanations had replaced traditional perceptual explanations.

Gablik had specifically challenged the perceptual views of Arnheim and the Gestalt school. By contrast, the Blatts accepted the Gestalt school as yet another example of a quest for structure which had been making serious strides since the time of Kant. Historically, Kant himself had been very much concerned with the ways in which knowledge acquired through our senses affected our ideas. The Blatts did not mention this. Historically, there had been notable differences in the approaches of Kant and Hegel in this regard. Hegel was not mentioned in the Blatts' account. Historically, there had been major differences in approaches to knowledge which psychologists have classed as a struggle between nativism and empiricism. The Blatts' account gave the impression that nativism was the only valid school.

Martin Jay,[17] in a provocative book, linked these trends from perceptual to conceptual explanation to Hebraic connections. He referred to two French books by Rassial: *Is psychoanalysis a Jewish story?* (1981) and *The interdiction on representation* (1985). Jay[18] argued that anti-ocular debates were part of a larger clash between cultural traditions, namely, Greek versus Hebrew:[19] that the Greek tradition emphasized the visual, whereas the Hebrew tradition emphasized the verbal; one seeing, the other hearing, and that the rise of Protestantism, notably through Luther and Calvin, marked a return to Hebraic concerns with the verbal and hearing.[20]

According to Jay, Heidegger also played a significant role in re-introducing an Hebraic emphasis.[21] He cited Jonas' assessment that through Heidegger "the suppressed side of hearing gets a hearing after the long ascendancy of seeing and of the objectification which

it cast upon thought." Jay also drew attention to Derrida being Jewish who, along with Lyotard, claimed that "both Kant and Hegel associated the sublime with the Jewish taboo on representation."[22] Jay believed that a study of Levinas would "help reveal the unexpected links between the traditional iconoclastic Jewish attitude toward visual representation and a powerfully antiocular impulse in postmodernism."[23] According to this approach, the shift from perceptual to conceptual explanations was a source of present attacks on vision: a socalled phallogocentric view which some feminists now claim is a specifically male problem.

Psychology

In psychology there have been parallel trends away from a perceptual towards a conceptual approach, basic to which is again an assumption that development is a function of abstract, conceptual, mental processes rather than concrete, perceptual, visual experience. According to this interpretation the enormous literature on relations among vision, representation and reality are irrelevant to problems of development. Many factors have played a role in the rise of this cognitive or conceptual approach. One impetus has come from philosophers such as Goodman,[24] who used the concept of symbol as "a very general and colorless term" which "covers letters, words, texts, pictures, diagrams, maps, models and more." This approach undermined distinctions between visual images which are based on the physical world and mental images which are not. Structuralism, particularly as developed at Yale, played a role.

The rise of computers also played an important role. Kosslyn noted that: "Visual images are thought to be composed of representations like those that underlie our experience of seeing an object, and spatial information is supposedly represented in the same way in perception and imagination. If so it makes sense to think of visual images as having only a limited spatial extent ».[25] Citing the work of Paivio,[26] Minsky and Papert,[27] and Pylyshyn,[28] he found evidence to support the claim that images embody spatial properties but noted that spatial representation in the human brain: "probably involves a more abstract isomorphism like that found in a computer representation of co-ordinate space."[29] He held that it was entirely possible that such images were partly generated from abstract propositional structures in long term memory.

These discussions entail an important debate about the nature of imagery: whether there are links between physical and mental imagery; whether there are connections between external and internal images. Pylyshyn revitalized anti-imagery arguments which were summarized by Kossyln and Pomerantz,[30] and developed in a major book by Kosslyn, in which he claimed that "images are not pictures. The simple picture metaphor is clearly inadequate."[31]

Kosslyn made significant claims about the nature of mental imagery, suggesting a two - tiered model whereby images were stored in abstract form in long term memory and then assembled for internal display in much the way that images on a television screen can be created from files in a computer memory. Kosslyn, who used information processing as a point of departure,[32] developed a complex argument. He consciously rejected the

resonance metaphor of the Shaw and Bransford,[33] neo-Gibsonian school, whereby the mind was "likened to a tuning fork, which automatically responds appropriately to a particular stimulus configuration-without the necessity of a series for intervening processing stages."[34] Kosslyn formulated distinctions between propositional representation (description) and quasi-pictorial representation (depiction) in chart form (fig. 2). By the time Kosslyn reached his conclusions it was clear that visual images were thoroughly subordinate to verbal images:

> ...imagery is a way of representing information that may be especially perspicuous for performing some tasks. Not all thought processes involve imagery, nor is imagery in a privileged position as a form of internal representation. The information represented in an image is defined only vis-à-vis the interpretive procedures that can be satisfied when applied to an image. That is, if there were no description of a rear tire, for example, an image could serve to represent the information that a car has a rear tire; an image represents some information only by virtue of the fact that interpretive procedures exist to `read' a given spatial configuration as corresponding to an exemplar of some class. Thus we have attempted to study imagery in the context of a processing system, the whole of which defines how images can represent information.[35]

Propositional Representation (Description)	Quasi-Pictorial Representation (Depiction)
1. Relation	1. No distinct relation
2. Argument(s) 3. Syntax	2. No distinct arguments
	3. No clear syntax
4. Truth value 5. Abstract	4. Truth value only with a particular description
	5. Concrete
6. Not occur in spatial medium	6. Occurs in spatial medium
7. No abstract spatial isomorphism	7. Abstract spatial isomorphism
a) No necessary part/whole relations	a) Necessary part/whole relations
b) Size and orientation optional	b) Size and orientation necessary
c) Arbitrary marks	c) Non-arbitrary marks
8. No abstract surface property isomorphism	8. Abstract surface property isomorphism
a) No necessary part/whole relations	a) Necessary part/whole relations
b) Shape not necessary	b) Shape necessary
c) Arbitrary marks	c) Non-arbitrary marks.

Fig. 2. Properties of propositional and quasi-pictorial formats in Kosslyn (1980, 31).

Not surprisingly there were but ten figures, most of them charts, in this book of five-hundred pages. For according to Kosslyn's model, pictorial information per se was

ineffectual and presumably an illiterate mechanic could not learn about changing tires first hand. These ideas were restated in a more popular book by Kosslyn, where he noted:

> A number of disciplines seized on the notion that mental functions could be studied independently of consciousness. Out of the melding of artificial intelligence (which is concerned with making computers behave like thinking organisms), psychology, linguistics, and philosophy has emerged the alloy known as cognitive science; and the methods and tools of cognitive science have allowed psychologists to bring scientific rigor to fundamental questions of the human mind.[36]

What is intriguing is that these hypotheses about what could be the case are now treated by many as if they were undoubtedly so. Individuals such as Fred Brooks (North Carolina) who claim that we need IA (intelligence augmentation) not AI (artificial intelligence), are in a minority. Meanwhile, the phenomenon is spreading to the historical field with the result that individuals such as Crary[37] are devoting their energies to read into the evidence of nineteenth century sources the roots of this view: anachronism of a dangerous new type.

Sociology

Although the parallels are not immediately obvious, there have been related developments in sociology. Faigley,[38] rejected both positivism and the window pane theory of knowledge. He argued that reality is unknowable apart from language and went on to claim that writing "can be understood only from the perspective of a society rather than a single individual."[39] This Faigley termed the social perspective. Thralls and Blyler,[40] offered an important review of recent developments, identifying three emerging theoretical approaches: the social constructionist, the ideologic and the paralogic hermeneutic. Building on the ideas of Rorty,[41] that knowledge is the "social justification of belief' and Geertz,[42] who claimed that all knowledge was local, Bruffee,[43] claimed that "social construction understands reality, knowledge, thought, facts, texts, selves, and so on as community-generated and community-maintained linguistic entities" and hence argued that knowledge was social by nature rather than "individual, internal and mental."[44] I

n this approach, the vague notion of community moved to a central position, as did the notion that knowledge was merely a question of consensus. Hence the ways and means by which such beliefs were integrated into a community's "knowledge store" became more important than the question of truth. So called discourse conventions of professional societies such as engineers were studied as indices of community membership. Bruffee,[45] claimed moreover that "thought is internalized public and social talk ...and writing of all kinds is internalized social talk made public and social again." As a result collaboration[46] in the form of peer critiquing, peer tutoring, reader-response groups and group-writing projects emerged as fundamental approaches in learning and education. (Ironically these claims come increasingly from persons who have no writing skills themselves and espouse these new methods while blithely forgetting that a generation ago when individuals were not yet out of date no-one would have dared even think of themselves as educated unless they had a certain proficiency in writing).

A second, ideologic approach has been concerned with rhetoric as ideology and has focused attention on the ways in which communities establish conventions which "socially construct relations of domination." Interestingly enough the champions of this approach have been particularly interested in the use of new electronic technologies as ways of undermining authority. As Thralls and Blyler, citing Kiesler, Siegel and McGuire,[47] noted: "networking fosters democratization because the anonymity of networking interchanges eliminates many cues of status and authority."[48] Wellman[49] has explored the implications of networks on social interaction. Those concerned purely with power will prefer this approach to supposedly outmoded notions of knowledge, experience and competence.

A third, paralogic hermeneutic approach, emphasized the uncodifiable nature of interpretation, arguing that one should focus on "the rapport experienced by communicants as they interact," their point being that we have certain commonsense notions that exist independent of conceptual or constructionist schemes. This approach has given new meanings to the terms internalists and externalists. Internalists, they claim, assume a Cartesian split between the human mind and that which exists outside it, whereas externalists deny this split, arguing that understanding comes from "the give and take of communicative interaction." The implication, as will be discussed presently, is that there is no longer privacy or individuality.

Thralls and Blyler, raised the important question whether the ideologic and paralogic hermeneutic approaches can be incorporated within current professional communication courses without undermining them[50] and concluded no "if the ideologic approach is understood to mean critiquing and maybe even resisting the larger economic values of a commodity culture."[51] Interestingly enough, Schiller,[52] noted that "industry-university collaboration" threatens to reproduce private corporate interests and to reduce students to being tools of capitalist ideology.

Anson and Forsberg,[53] speak of "strategies for social and intellectual adaptation." Harris,[54] emphasizes the importance of like-mindedness. Kent[55] speaks of communicants needing to make "fewer guesses" about each others' interpretations. Such statements suggest a growing herd mentality, a trend towards homogenization and sterilization as if persons could be purified like milk, and a growing hubris that we can "know" the other without much effort. What was traditionally a lifetime's exploration of another individual is now reduced to a game of ever fewer guesses. Amid a rhetoric of democratization of the workplace that hides structures of authority, these approaches diffuse tensions away from an increasingly invisible boss while leaving no doubt that one has to please the employer. Traditional allegiance to an individual who also served as an authority figure in the positive sense of providing an example, are supposedly being replaced by allegiance to an impersonal firm which can then fire 500, 1000 or even greater numbers of authorities in the interests of "streamlining" or simply because profits have gone down.

The dangers of this so-called social perspective go far deeper than this. It is important to recognize, for example, that these approaches destroy any sense of privacy and effectively eliminate traditional concepts of the individual. In the past, the individual as conceived in the

West developed an inner world and one developed various skills including speech, writing, painting and other arts in order to communicate the beauties of these inner mindscapes. Now the claim is that there is no such thing as an inner world. Hence the knowledge that traditionally served as ingredients for this inner world can also be dismissed and one can pretend that the forms of communication can replace content. This is a new twist to McLuhan's concept of "the media is the message." Or perhaps we are witnessing one of the possible consequences -some would say these are the real consequences- of a completely media dominated society: that there is no longer even an awareness of content. Everything is form. Everything is a consensus that aims to be "politically correct" but succeeds only in being so bland that it lacks any real character.

It is frightening to note how these trends are building themselves into our software. On the surface the rhetoric is about choice. Complex programs offer alternative ways of configuring the graphical user interface (GUI)[56] and make one's choice of how many buttons one will use as expressions of freedom. Similarly, Mosaic on the World Wide Web provides everyone with a chance to make their home page look just a little different. But the underlying modalities are the same. To a certain extent they have to be else there would be no standards for what is now termed interprocess-communication. Yet with the exception of European vs. American ways of writing dates, there is hardly anything in our programs that builds in cultural differences, alternative ways of approaching, solving or expressing materials, and even events. It is perfectly possible to build into our systems a function to make us aware that any victory for one is also a defeat for another. Why do we not do this?

Languages such as French have a curious ambiguity between neutral and neuter, which helps explain why they often accuse North Americans of being insincere, not wishing to take a stand and even lying when they are actually trying very hard to make some polite comment, rather than taking a strong position. This is not to say that the French are necessarily right. Yet if we create our software purely as a reflection of our own culture, then we are implicitly excluding the possibility of other cultures using it to full capacity. Our electronic containers and shells for knowledge must not simply become distortion machines in an a priori sense. On the other hand, if we are determined only about their being safe and politically correct they will invariably reduce the spice of life's expression to a dull screened image of what exists in the worlds of physical experience and the imagination.

The historian of ideas will recognize that these so-called new approaches of social perspective are actually a twentieth century revival of strands of nineteenth century thought. One strand, perhaps most eloquently characterized by Kierkegaard emphasized the central importance of individuality, that we paradoxically cannot know another individual until we have plunged into the depths of our (potential) isolation and only then reach out. Another view, most brilliantly characterized by Marx, argued that the individual per se did not count, that power and reality ultimately lay only in groups and masses. Similarly, consciousness within the individual did not count, nay did not really exist. For consciousness too was a group phenomenon which increased as the masses increased in size. Thus quantity of groups was weighed against quality of individuals all

of which heralded in an uncanny way twentieth century concerns with students as basic income units (B.LU's) or merely as "warm bodies."

These latest developments might seem a natural evolution from the approach of Schutz [57] which drew on older philosophical traditions. In fact this so-called social perspective of the 1980's and 1990's has very little to do with perspective in its older senses and these two approaches can be seen as central to some of the fundamental struggles of our times. Integrally connected with the traditional concept of the individual is an emphasis on quality, independence, privacy and the development of a particular viewpoint. This is being opposed by a focus on groups that brings with it an emphasis on quantity, interdependence or often simply dependence, no sense of privacy and a concern with consensus. The individual emphasizes inner worlds, levels of meaning and the importance of spiritual gain all of which assume an interior dimension. By contrast the group tends to exteriorize everything, emphasizing exterior worlds, levels of discourse as if externalized speech were all, and is ultimately concerned with material gain. This is a phenomenon that Seeley has explored with acute insights.[58] The individual is traditionally a-political: the group is highly politicized. The individual has a firm sense of knowledge as facts and learning as a quest for truth. The group looks for knowledge in construction, interaction and claims that learning is a quest for agreement. The individual emphasizes content: the group prefers form. The individual strives to be rather than to seem (*esse quam videri*): the group strives to seem rather than to be (fig. 3).

Traditional Perspective	Social Perspective
individual	group
quality	quantity
independent	(inter-) dependent
privacy	no sense of privacy
particular viewpoint	consensus
inner worlds	exterior worlds
levels of meaning	levels of discourse
spiritual gain	material gain
a-political content	politicized
knowledge as	form
facts	knowledge as construction, interaction
truth	agreement, political correctness
be (substance)	seem (illusion)

Fig. 3. Basic differences between traditional perspective and so-called social perspective in its new form.

Those who are ideologically inclined may be tempted or may even feel compelled to link these contrasts with struggles between democracy and communism (which notwithstanding some shifts is not over), between party A versus party B, or more local tensions between two religions, sects, minorities or interest groups,. This is not our concern here.

What interests us rather is the extent to which these two positions affect everything from the person to society's concept of knowledge and even truth. It is equally striking how the group position entails a narrowing of choice. In the past the individual was seen as having both interior and exterior interests with a freedom to choose between a contemplative or an active life. In a group, where everything is externalized, this choice disappears: there is no longer room for the interior and only an external, active life remains.

The greater this tendency to externalize our personal worlds, the more it will manifest itself in our public codes and institutions. We have already noted Schiller's warnings concerning industry-university collaboration. However, it is likely that the problem runs even deeper. Businesses do more than convey notions of commodities to universities. They lead us to look at benchmarks in order that we are able to peg convincingly the hourly rate of another person. They lead us to think of ourselves and our students as commodities, as if there were nothing else but a barter system even in the realm of the human spirit. Hence, the trend to assess success of scholars by the size of their grants; the mania to quantify even when doing so is clearly at the expense of quality. In the past, distant wars were often a favoured method of diverting attention from domestic problems. Are the new trends towards distance education merely a variant on this theme, or do they truly reflect new dimensions of technology?

These two approaches affect profoundly how we deal with the past: one side assumes an historical approach, which emphasizes the importance not just of texts but all evidence of the past. Our studies[59] elsewhere have shown that a more detailed understanding of the past only became possible as methods for recording the past improved: that a refinement of the tools changed the criteria for evidence in discussing the past and conversely. By contrast, those who would have us believe that "it's history" simply means something is finished, passé, and useless; those who would have us believe that only the "now" counts, that eternity is only in an instant that is timeless, or that the timely is more important than time, are precisely those who wish to convince us that space in the perspectival sense does not count, that the particular which changes with time and space does not count and ultimately that it is only universals which matter.

From this emerge two fundamentally different approaches to the world. One searches for the eternal and enduring in those things that last over time and space. In this view, space is used to record objects, and time (history) confirms that which is enduring, confirms the value of a text, a painting or other monuments. So sources are important. This approach records changes in time and space but yearns for the unchanging. Hence, objects such as Greek temples become symbols of lasting and enduring things. The other approach seeks the eternal in the ephemeral, the moment, the now. In this approach, space is used not to record but rather to transform, alter and edit objects, while time (history) subverts the

value of a text, an image or any object which seemed enduring. The fact that a text of Hamlet undergoes different interpretations in the course of centuries is used as proof that one cannot rely on an original "source", but must privilege equally all editions. This approach tries to capture the now in a note, a dance or a performance and searches for what does not change with time and space in logic, structures, principles. Paradoxically those who emphasize the fleeting moment also champion the universal, the archetypal and the gestalt. The first approach emphasizes content: the second focuses on form.

The consequences of these different approaches are profound. They affect definitions of what visual means, what history is, where truth lies and the very meaning of knowledge. The first approach insists that the visual is separate from the verbal, because it recognizes that the visual allows a one-to-one correspondence to nature, in the recording of particulars. Hence the visual corresponds to what is seen, or at least can correspond to what is seen. When it does there is knowledge. The second approach speaks of the visual as if it were like the verbal and will thus refer to visual language, visual grammar, visual logic and propositional representation as superior to quasi-pictorial representation (cf. fig. 3). While speaking of the visual and visualization, the proponents of this school mean that which cannot be seen, that for which there is no one-to-one correspondence to nature.

The first of these approaches emphasizes the importance of history, the second denies history and tries to convince us that everything is news: that news is not just something to be seen or heard once a day, but rather something that can be continuous through a news channel. And paradoxically those who emphasize news are constantly reporting on the importance of structures of and patterns in groups, masses˃ movements, societies, whereas those who are historical focus on the role of individuals and personalities, the single, separate, specific, distinct, particular, personal, distinctive and definite as opposed to the communal, collaborative, general, and politically correct, i.e. that which fits in with and so blends with the mass as to be indistinct, indefinite, and impersonal.

All this may sound slightly familiar. It should. Earlier in this paper, a contrast was made between traditional and social perspective in sociology. Traditional perspective emphasized the individual, where social perspective focused on the group. Traditional perspective insisted on quality, independence, privacy, a particular viewpoint, inner worlds, levels of meaning, spiritual gain, an a-political (or non partisan) approach, content, knowledge as facts, truth, being and substance. By contrast, social perspective argued for quantity, interdependence and collaboration, no sense of privacy, consensus, exterior worlds, levels of discourse, material gain, being politicized and empowered, form rather than content, knowledge as construction and interaction, agreement rather than truth, seeming rather than being, illusion through image rather than substance.

The first approach accepts that there are objects, that there is "reality" and that truth and knowledge are discovered in time and space. Hence truth and knowledge deal with sources, with things that are real. The second approach challenges the value of words such as objects, reality, truth and even knowledge, arguing that whatever is valuable lies in the now, the momentary, the fleeting. Opinions differ as to what this means. Some claim that the now can include unchanging structures: logical principles, mathematical formulae. Others conclude that only performance is therefore of value: so the now is reduced to a film, a television

program, a play, a dance, a concert, or in its most extreme form to fleeting dance movement, an ephemeral note. Hence truth and knowledge, to the extent that it even makes sense to speak of them, lie in abstraction and in performance. The first approach finds knowledge and truth in static, concrete things: the second approach argues that, if they exist, they are to be sought in abstract concepts and dynamic acts (musical, theatrical). The first emphasizes content. The second emphasizes form.

Perhaps it is no coincidence that these two conflicting approaches underlie many of the debates concerning the so-called information highway, in which some emphasize information (content), while many emphasize the highway, in terms of pipelining (form), such that the medium becomes the message in a new sense. In fact we need both pipelining and content. In addition we need strategies for organizing and navigating through content else it will merely become a chaotic jumble, a plethora of choices to which we respond by ignoring it: exactly what happens when most persons are confronted with the riches of an extraordinary collection of books such as the British Library.

These contrasts are more than a snapshot of two passing stereotypes of "everyman" or "everyperson" as we find them on the street today. They reflect a much more profound pattern or struggle that has to do with basic conceptions of knowledge: a new version of
the struggle between universals and particulars. In this paper we examined recent trends in art history, psychology and sociology. Elsewhere we have discussed trends in other fields including ethnology, anthropology, psychiatry and linguistics.[60] It will be noted that these are precisely the so-called disciplines which have been taken over by those who are champions of the universals as opposed to the particulars. Initially this was reflected in the actual name of their school: they were structuralists. In the meantime, their names try to undermine their roots: they are post-structuralists, post-post structuralists, constructionists, de-constructionists, re-constructionists, even post-modernists.

They emphasize the importance of concepts over percepts; conceptual versus perceptual knowledge; abstract ideas over concrete experience. They speak of virtual as if it were reality itself. They pooh-pooh as retrograde anyone so naïve as still to believe in realism in any form. They refer to scholarship as if it were another branch of the news. They constantly emphasize the latest findings and describe as utterly out of date and not with it someone who dares to cite an article or book written more than a decade ago.
It is not surprising therefore that this approach emphasizes psychology, sociology, and politics, which they call a science (political science), while trying to undermine the study of history (time) - except of course their own-, and geography (space), in its physical sense, although they emphasize abstract, conceptual aspects of space. In this approach, subjects which are firmly rooted in reality are not really subjects.[61]

On the surface, the second of these approaches is winning. Hence the change in subjects in our schools: the new emphasis on process, on performance, on form rather than content. Hence a tremendous attention to the information highway where the emphasis is only on the highway. Hence an insistence on transforming everything into something virtual: virtual classroom, virtual (space) university, virtual resource centre, virtual museum (now something quite different from the phrase coined by André Malraux), and even, or

especially, virtual reality. Hence the undermining of time and space in the curriculum, such that history and geography are given less significance, or are carefully re-written to reveal progress in terms of moving towards abstraction. The twentieth century is described in terms of the death of perspective. As a result, abstract art and quantum physics gain new significance. And there is a curious downplay of experience in teaching, while emphasizing the importance of schooling, practice, performance; which in turn reflects the current fashion in business and in the workplace. Theories of truth and knowledge are not as abstract as they seem. They affect everything that we do.

It is vital that we recognize that these two approaches represent fundamental aspects of the human condition, that it is not a question of the one winning or the other losing, but rather a challenge of both complementing one another in the way that male and female, yin and yang do. We need certain persons to focus on knowledge and information in the sense of content, while others work on form, in the sense of pipelining or the highway. Else the information highway will be an empty and a dead-end road. Evolution is embracing not replacing. So the history of perspective as a metaphor is much more than a turn of phrase. It takes us into the central problems of learning and being, today and in the future. The origins of perspective came about through a re-definition of knowledge. If the one-sided approach to knowledge that has gained the upper hand continues to gain dominance, then more than the end of perspective is at stake. Perspective is not just linear. It is a central phenomenon.

Seen in this context McLuhan's distinctions between the effects of print and television emerge in a new light: the oppositions of visual versus tactile, of eye versus ear are not simply a function of a shift in medium. They can also be seen as oppositions between cultural traditions: Greek versus Hebraic, and/or schools of thought: perceptual versus conceptual. Some have implied that there are further parallels to be made between the Hebraic tradition, conceptual approaches and new media (Hollywood and New York). Which raises further questions. If we cannot say that electronic media are the source of these new approaches to knowledge, to what extent have these new media nonetheless helped in the shift?

4. Multimedia in a New Sense

This is an important question which should not be answered before making another basic point. McLuhan tended to refer to electronic media as if they were only one medium, television, and as if television would simply replace print. McLuhan's younger contemporaries often spoke of computers in similar terms, as if this too were only a single medium which was going to replace print, and therefore spoke avidly of the paperless society into which we were about to enter. The computer has done nothing of the sort. Nor will it. Although it has become the fashion to speak of computers and multimedia as practically synonymous, very few persons have stopped to reflect upon the meaning of this equation.

The term computer is actually a synedoche.[62] We refer to a part, the central processing unit, as if it were the whole. Computers are actually translation devices and because this translation is digital it means that the translation can be in both directions. We can take voice, translate it into a digital message on our screen and then output it again as voice or print. We

can take print, scan it such that it is digital and then decide to re-print it or choose to output it in a voice medium or video. We can take a threedimensional object, scan this into the computer, manipulate it as a two-dimensional image on our screen, and then output its dimensions either as printed co-ordinates, as a picture or even as a solid object, using stereo-lithography.

This makes the computer something very different than all previous innovations in media, which invariably set out to replace the earlier mode. Hence the advent of papyrus set out to replace cuneiform; manuscripts set out to replace papyrus; printing set out to replace manuscripts. Computers are embracing not replacing. They allow us not just to use multi-media, all the media, but also to translate them from one into another.

For this reason, McLuhan's provocative oppositions between print and television cannot be extended to include electronic media as a whole. The digital revolution is not simply about translating the old into some new media but rather about a new inter-operability between/ among all media. Electronic media will therefore not simply replace visual with tactile, the eye with the ear. The eye remains fundamentally important. Else, Paramount would not be starting a fifth television network. Nor would the visual aspects of multi-media be becoming more compelling as companies produce ever more CD-ROMs with basic repertories of images by the month.

At the same time the eye is not being developed in isolation. Electronic media are drawing new attention to interplay of these senses. Hence the latest developments of the IMAX corporation in terms of IMAX-Solido, entail stereoscopic images supplemented by fully three-dimensional sound systems, which give one the illusion one can locate precisely where objects are in space. This is eye plus ear, rather than eye versus ear or conversely. The latest developments in virtual reality are including more of the senses (sight, hearing, touch and even smell) rather than replacing sight by touch or some other sense in isolation.

5. Dangers

Some of the dangers implicit in trends towards conceptual approaches to knowledge have already been noted above in the section on alternative approaches to knowledge. There are in fact many dangers. They include: passivity, narrowing our definitions of humanity, eroding distinctions between reality and illusion (i.e. concepts of truth); eroding trust, violence and militarism, and presenting business as life's only model; each of which will be outlined briefly.

Passivity

Much has been written about the way television tends to make persons into passive viewers or couch potatoes. A great deal of effort goes into programming such that enjoyment is defined as the producers doing one's work for one. Everything is pre-packaged, pre-digested. There is no need to be troubled. Even one's daily ration of disasters is presented by a comfortable and usually very attractive anchor-person. So one can hear about war and death and not feel alarmed. It is all distant, and the television helps us maintain that feeling

by further distancing us from the events. Paradoxically if we did not have television we would never have this "first-hand" view of events. Indeed, news in its modern sense would not exist. So the insistence on news which comes through television at once confronts us with others' suffering while assuming that we accept it as a given. If every viewer became actively engaged as a result of every news item we would live in a revolutionary world indeed. So live news deadens our response to new events and assumes our passivity.

There is a more subtle side to this problem that is often overlooked. From at least the time of Cicero it has been customary to hold that learning should be accompanied by pleasure (Cicero used the Latin verb *delectare).* In the United States this notion crystallized into a concept of entertainment, which became more than a simple pleasure principle. It became a way of getting one's mind off the concerns of the moment, a way of distracting one from one's worries, a type of escapism that was elevated almost into a philosophy. In comedy, laughter was achieved by physical spoofs, external action. In adventure and suspense, external action again became the measuring stick, such that Europeans often dismiss American films because they are all action and nothing ever changes; whereas Americans criticize European films for having no action and too many changes. In the United States, action became synonymous with amusement, fun and most things positive. Critics such as Neil Postman have examined the implications of this quest.[63]

Because entertainment became linked with distraction, the idea of leading us out of our worries, it is not surprising that it became associated with the word education which comes from the Latin verb, to lead out of *(educare).* This has since led to new amalgams of the two terms in the form of edu-tainment, and related neologisms such as info-tainment and info-mercial. The side effects of this seeming medicine are subtle and not a little disturbing. Education was traditonally a leading out that came as a result of an active quest for truth and understanding. Education is now becoming a leading out that is assumed to, some would say "supposed to" -in both senses- happen through action. If there is no action, there is no teaching would seem to be the equation that we are being asked to adopt. Hence theoretically an active teacher, or better still, an action teacher, is preferable to a quiet teacher. But while active, the result is not so much activity as a passive viewing of that activity, so the act of learning becomes its own version of a spectator sport. The student must be free to learn what they want, but they must also be free just to observe rather than actively engage in the process. Or they do become active, and the form becomes all, threatening to replace entirely any sense of content.

Alternatively the discussions turn on the shells of learning not the kernels, the process not the facts. Even when interactivity is invoked, it usually just means making choices among a number of alternatives that someone else has carefully designed, like a giant multiple choice game in which someone has already tallied up all the multiples. Small surprise therefore that education which should lead us out of ignorance too often only leads young persons out of school; entering life expecting entertainment and action, discovering it is not and then just resigning themselves to a nine to five fate. Hence there are curious ways in which the electronic media and particularly through the passivity which the edutainment approach brings, can lead to an erosion of hope.

Narrowing our definitions of humanity

McLuhan's fascination with the effects of media came partly from his study of the history of the liberal arts. His interest was less in the quadrivium (arithmetic, geometry, music and astronomy), than in the trivium (grammar, dialectic and rhetoric). He noted that each branch of the trivium had different concerns: grammar focused on structure; dialectic on logic, the truth of the statement, or content; whereas rhetoric emphasized the effects of a statement, or form. McLuhan became intrigued with how changing media shifted emphases from one of these disciplines within the trivium to another: for instance, how the advent of print shifted emphasis away from rhetoric to focus on dialectic and grammar, whereas the advent of television, he was convinced, led to a new emphasis on rhetoric, i.e. on effects rather than on truth, on form rather than on content. His own studies were prompted to a certain extent by the school of new criticism which he encountered as a doctoral student in Cambridge in the late thirties, and presaged in an extraordinary way not only subsequent trends towards what is now termed reception theory (*Rezeptionsgeschichte* which has grown famous through Jauss and other members of the Constance school), but also how the television media led individuals to focus increasingly even exclusively on their image.

The development of electronic (multi-)media is introducing new parameters not foreseen by McLuhan. There is new emphasis on the logic of computers (content, dialectic) and the great successes in this domain are posing new dangers. For we risk finding that our interim models for simulations of reality and artificial intelligence may, can, or even will encroach on our conceptions of reality and intelligence. Elsewhere in this paper we noted how information processing theories of perception are subtly transforming serious persons' conceptions of how vision works, and creating more limited models of the complexities of human perception. These problems extend to fields which have established themselves through a long tradition of experiment. In psychology, for instance, experiments which emphasize the links with a physical world are now becoming suspect. One reason given is the need to economize on mice which is valid from the standpoint of cruelty to animals. But these trends are also a result of the shift from perceptual to conceptual knowledge outlined above. So experiments with real mice in psychology can be replaced by simulated mice, and students can be led to make conclusions about the limits of the "real" world on the basis of limited simulations imposed by instructors.

These problems extend to medicine where experiments with real cadavers can be replaced by virtual cadavers, which do not stink and will give students a more comfortable, regular and regulated view of the body. The quest for simulating reality risks teaching students to look only for the symptoms that have been simulated, rather than being attentive to the complexities of reality. It is well known that a local doctor who has only seen a small range of illnesses will tend to see everything through the lens of their limited experience, whereas a doctor at a large urban hospital, confronted with many more examples, will be aware of many more alternatives. This argument is being turned slightly by those in favour of simulations. There are a number of very rare conditions which even a doctor in one of the large urban centres is not likely to encounter in the course of his ordinary experience. Having simulations of these available, claim the proponents of this approach, gives doctors access to cases that

they would not usually have. All this is true as long as the simulations complement and not replace real experience.

This approach is spreading to all the experimental sciences. Experiments in physics and chemistry can increasingly be simulated. The world to be studied is a simulated world, not the physical world. The inconvenient exceptions to the rule, the challenges of understanding individuals who do not fit the pattern can be eliminated at best, or relegated to minorities which, rhetorically at least, have equal rights.

These problems also extend to artificial intelligence, where the emphasis is too often only on the first word; robotics, where simplified models of mechanical behaviour threaten to impinge on our perceptions of what human behaviour could be, rather than conversely; in cognitive "science", and other branches of science. The logic of the computer and the models we create for it may be formidable, but the truly formidable dimensions of the human spirit cannot be reduced to simple logical parameters. So we must be attentive lest in striving to use the computer to widen our horizons, we do not limit those very horizons.

Eroding truth

There is a danger that our concept of truth will be eroded if we can no longer distinguish clearly between reality and illusion. Indeed some pessimists would argue that computers re already so thoroughly eroding our distinctions between the real and the simulated, between the perceptual and the conceptual, that most of us are no longer able to distinguish clearly between which is which. When the simulation involves fantastic creatures as in the Abyss (1989), the melting of realistic figures in ways we know to be impossible in everyday experience as in *Terminator ll* (1991), or involves animals we know to be extinct as in Jurassic *Park (1993),* then it is relatively easy to remind ourselves that these highly convincing images do not, indeed cannot, have a one-to-one correspondence with reality. On the other hand, when the simulation entails a Harrier jet in an entirely realistic contemporary cityscape as in *True Lies* (1994), there is no way of telling whether or not this has a one-to-one correspondence with the physical world. The title *True Lies is* itself something to give cause for thought. It brings to mind the Institute for Disinformation, which all diplomats from Russia attend before going abroad.

Some individuals hail a film such as *Forrest Gump* (1994), as a marvelous example of the potentials of the new technologies, as proof of how cleverly one can mix live video footage with imaginary characters in arriving at a convincing narrative. Others are rightly worried that this could be eroding our ability to distinguish between the real and fictive. What is news and what is a fictive reconstruction of these events? CNN's version of events during the Iraq war was not simply a passive recording. It reported events deliberately in favour of one side and yet did so as if this were completely objective. One needed only to watch reports by the BBC or from Iraq of the same war in order to arrive at a very different picture.

As long as there have been reporters, there has been the problem that everyone reports from their own point of view. The new problem is a more subtle one. Actual events are being

interspersed in and with fictional events. Hence there was a fictional movie of the war just about the time the actual war in Iraq was occurring. Multimedia plays a central role in these developments. On transatlantic flights one now frequently encounters a serious documentary, which effectively uses music as a commentary to dramatize one event and satirize another. This curious combination frequently trivializes the event being displayed.

As Rushkoff [64] has recently noted, this interplay of reality and fiction is even more strikingly evident in television police and courtroom series, where real life events and fictional commentaries become fully intertwined. In cases such as O. J. Simpson, the dividing line between reality and fiction is almost impossible to determine. In the context of rhetoric about collaborative approaches, participatory democracy and interactivity, the boundaries between the physical world and celluloid world are being consciously eroded.

Eroding trust

Recent films such as Quiz Show (1994) give some idea of the complex issues involved. We are told of the way in which the public was deliberately deceived in the case of the quiz show *Twenty One,* which was rigged in a fashion similar to the more notorious $64,000 *Question.* Viewers thought they were seeing true battles of wits when, in fact, some of the players had deliberately been given the answers ahead of time and simply acted as if they were attempting to recall the answer. When I discussed the implications of this film with one young person who saw the film, they were surprised by my concern. They pointed out that viewers at the time enjoyed the show. The television producers and sponsors made money and no one was hurt. So what was the problem? Why get excited?

My answer went back to the simple principle of trust and suggested that the struggles between democracy and communism could well be seen more fruitfully as a conflict between two models of society: democracy which uses trust as its fundamental assumption and communism which starts from distrust as a basic premise.[65] If we cannot trust that what is being presented as reality has anything to do with reality, we are undermining our relationships and the basis of what is called society; inviting the same kinds of problems that arise when one lies.[66] Given their techniques of splicing and editing, films and videos give a sense of correspondence, when they are frequently undermining the correspondence principle. So electronic media can undermine our sense of truth and erode our sense of trust or faith.

Violence and militarism

Another recent film, Toys (1992), concerned a family toy company that had always made peaceful toys and was being subverted to make war toys. The film pointed to dangers of toys being used to prepare persons for war by encouraging children to play war games so realistic that they gradually forgot to distinguish between imaginary games and the real thing and unwittingly perfected the skills necessary for killing persons. To many viewers this was simply another one of those Christmas spirit films that come out at the end of the year. Not many persons were aware that it came out in the very month that Disney invested 10 million dollars in Battletech, a company which makes virtual reality war games, quickly

becoming available in shopping plazas in the United States. At the recent SIGGRAPH meeting (Orlando, August 1994), students were offered very clear incentives to become involved in combat games.

Even wonderful technology such as Silicon Graphics typically comes with software that entails crashing cars on earth, crashing planes while flying them, shooting jets out of the sky or exploding planets in space. To show off the potentials of the system requires motion and action and companies seem unwittingly to use violent actions to get the biggest bang for their buck. Or is this a subtle way to create a new generation of both users and producers of violence in an age when defence budget cuts are threatening the continued stability of companies that were traditionally involved with the military. It is no secret that many of these companies have in recent years turned increasing attention to education. The question is, have they really changed markets, or are they using education to restore interest in their former market? So there is a way in which the electronic media are also eroding our sense of love. All three of the theological virtues of faith, hope and love are in danger.

Business as life's only model

Some of the dangers concerning commercialism and commercialization are almost proverbial. We read about these regularly in newspapers, and see them in the other mass media: that the Internet is being acquired by multinationals who also have clear plans to buy up and monopolize content to the extent that they will control access to knowledge on a pay by use basis, which would mean that access is by wealth rather than by ability. Often there is a sense that those who claim to be designing the future are doing so purely as an economic proposition. If we reduce all the potentials of what could be communicated to a narrow-minded quest of who can make the most money per transaction, then the whole venture will be too expensive to ever achieve. The revolution is about the human spirit, about domains of being that have traditionally been in the realm of religion and medicine. Those who insist on reducing all domains to commerce, miss the point of why this is important.

Other dangers in this context are more subtle, but no less real. In a world where there is ever more need for planning, there is an ever greater demand to quantify the extent of persons' training and skills. At the Neurope Lab in France, Pierre Levy[67] is developing his *arbres de connaissances,* which sound as if they are "trees of knowledge" in the tradition of Ramon Lull and yet are more like "trees of skills " or "hierarchies of competencies." A problem is how does one decide where a new task or skill fits into the "tree". On the surface this a problem for cladistics, but then, as any person engaged in the complexities of morphology and phylogeny knows, there are no easy answers in deciding when and when not to create a new branch, twig or leaf. In the present version of the French project, the trees are constituted differently every time one changes the comparisons and numbers of persons. Hence the "trees" give an impression of great precision to a process that is in fact very fluid. At present there is also an assumption that as new tasks appear one can judge from existing lists of skills who is most suited. In all this there is a danger that one will give more weight to persons who adapt and fit in more quickly, which is fine for "yes man" positions, but actually the opposite of that which is required for more responsible positions. We must be very attentive to methods of visualization[68] introducing distortions which themselves remain invisible.

We need also to take precautions that those who see computers strictly as a deal, do not deal all the cards, for too often they speak about the electronic highway or Infobahn with very little idea of what it means in practice. Amidst discussions of interactivity, they speak mainly about home shopping, video on demand, 500 channels of television without much concern whether this is really what persons want or need.

6. Potentials

Fortunately, a majority of those actively engaged in creating the emerging highway are motivated by ideals of freedom and open access. And in spite of the hype and buzzwords, many important ventures are under way. This spring in Lisbon, representatives of twenty two of the greatest research libraries of Europe (including the British, Bibliothèque Nationale, Wolfenbüttel and the Vatican) agreed to work with the Research Libraries Information Network (RLIN) to create a common standard for library catalogue entries. In 1994 alone approximately one million European titles will be added to the master list.

A whole series of projects foresee the entry of full text versions of great collections. There is a pilot project to scan in all the manuscripts of the Vatican Library (Rome) and of the Luther Library (Wittenberg). Eight million images of the Canadian Museum of Civilization (Ottawa) are being scanned in electronically. The Coalition for Networked Information (Washington) has plans to scan in the full text versions of ten million books.

Both the French and Canadian governments have plans to make all the images in their museums and galleries available for educational purposes. Similar discussions are under way in Germany, Italy, Greece, and Britain. Parks Canada is exploring means of making all its visual materials available on the Internet. Some corporations are making serious efforts to buy up whole collections of images in an attempt to control content, but fortunately, politicians and civil servants at the national and international level are becoming conscious of the need to keep heritage and culture in public hands. Hence whereas a user in the past was faced with the problem whether any electronic search would generate enough hits to be worthwhile, today the challenge is reversed: how can a user deal with too many hits?

As my programmer, Jonathan Shekter, keeps saying, the revolution is not in the computer but in the networking of computers, in being able to collaborate systematically at a distance. The technology already exists to enable scholars to view full texts and pictures at a distance, to download them, edit them, incorporate them into new texts, hyper-texts, hyper-iconic-documents etc. The System for Universal Media Searching (SUMS ©1994)[69] is being developed to permit systematic navigation through millions of visual images (paintings, technical drawings, photographs etc.) and tens of millions of pages of books online. For the first time in history it is becoming possible to gain access to the vast repositories of world culture without actually having to travel there physically.

Even more astounding are the opportunities that are emerging with the latest developments in pattern recognition. The Excalibur Corporation, in conjunction with IBM, is exploring how these techniques can be used in recognizing artistic motifs in an electronic version of the

Alinari Photographic Collection and samples from the Vatican Collection. In the past such problems were strictly in the domain of connoisseurs (Morelli, Berenson, Lord Clark, Kurz). This is not to say that this profession will be made redundant. Rather, it is likely that much of what used to be boring rote work can be automated, leaving experts free to concentrate on subtleties deserving of their attention.

One of the challenges is to ensure that the system supports more than a single approach which pretends to be objective: i.e., we need a software that includes both sides of the oppositions which McLuhan believed he had identified: visual as well as tactile; eye as well as ear and so on. We need to ensure that various alternative views of knowledge are properly reflected in this initiative: that the system supports different and opposing viewpoints.

The problems of distinguishing truth from reality may seem overwhelming, yet we should remind ourselves that these problems are as old as realism itself. In the realm of print we have developed straightforward and sometimes very complex methods for determining accuracy and reliability. One of the most basic is footnotes and references. Another is review committees which screen the reliability and value of a contribution. That is why something published by a major press such as Oxford is in another league than the *National Enquirer* which boasts the "largest circulation of any paper in America." We need similar criteria for the new media: electronic equivalents of footnotes not just for texts but also for images: methods for determining the pedigree of images.[70]

A further challenge lies in keeping that access open and to make content available both in the developed and developing countries. In the past it was customary for the advanced countries to give physical aid to less advanced countries. We need to redefine aid as including access to knowledge. Bodies such as the Canadian International Development Agency (Ottawa) are exploring these possibilities as are certain branches of U.N.E.S.C.O.

We need to go further by providing both hardware and software that reflects and encourages viewpoints other than those of the giver. We need to help other cultures to write their own histories and describe their cultures in their own terms rather than simply reading about themselves through the mirror of countries who claim to be helping them. We need software to create alternative viewpoints, to give us alternative interpretations, because every viewpoint is another prism towards richer understanding. Only thus can the full potentials of the computer and the many splendoured electronic possibilities of its media be realized. In the process we shall gain new access to knowledge and find ourselves having new understanding of what it means to know. The potentials of the revolution that is multimedia lie not in knowledge in isolation but in the sharing thereof.

7. Conclusions

Marshall McLuhan, in his *Understanding Media (1964),* suggested a fascinating set of distinctions between the medium of print and that of television, which he tended to see as synonymous with electronic media. We have shown that these distinctions need to be seen in a larger context which takes into account alternative approaches to knowledge. We acknowledged that new media may well have been instrumental in emphasizing some of

these alternatives more than others. At the same time we claimed that electronic media in the form of computers involve a translation into different media and a complete interoperability between media, rather than being intrinsically or necessarily linked with one medium or one viewpoint. Which leads us to conclude as Pirsig did in *Zen and the art of motorcycle maintenance,*[71] that technology is neutral. It is up to humans to use it intelligently or otherwise.

If we use the new technologies foolishly all the dangers outlined above could become reality: passivity, a narrowing of our definition of reality, erosion of truth, trust and indeed all three of the theological virtues of faith, hope and charity; ever greater violence and militarism and an ever more dominant materialism whereby business is seen as life's only model. We risk finding ourselves spending all our energies on form without content, on process without substance, on shells without kernels, where getting there is no longer half the fun but all the trouble- a scenario most of us have glimpsed on a day when the computer which is supposed to be simplifying our lives does not quite function and we spend all our time in problems of making the system go rather than getting on with our writing and research. Even worse all this could happen without our being aware of it: we could let electronic media rob us of most of our freedoms without realizing that it is happening.

Alternatively, if they are used well, the same electronic media can be used to achieve all the positive complements to those dangers, namely: activity, a widening of our definitions of reality, a deeper sense of truth and of the virtues of faith, hope and love, a more peaceful and more spiritual approach. That is how the information highway can transform education and every other aspect of our lives. Whether it will depends on us, not them.

While McLuhan's claims may have raised more questions than answers, there is no doubt about the enduring importance of McLuhan's legacy. Perhaps more than anyone else he taught us to be attentive to the possible double-edged sword that technology brings. More gadgets do not necessarily mean a better world. Replacing imperfect humans with perfect instruments may seem progress, but offers no enduring solution. We need to be attentive that our hardware and software become instruments for inclusion rather than exclusion. The medium is the message, said McLuhan. We must ensure that multi-media becomes a means of conveying multiple messages rather than reducing everything to an abstract corporate plan; one ideological programme or any glib, single party line. Only a technology which helps us to think more freely is a technology for which it is worth striving.
Perspective Unit, McLuhan Program

Acknowledgments

idealism is helping to make the so-called Information Highway a reality. Indeed, if there were more like him and his colleagues Jordan Christensen, David Pritchard, Avenindra Utukuri, Daniel Skutelsky, Andrew McCutcheon, Jeff Zakrzewski, Sean Graham, and Ming Lim, then we might soon have a Knowledge Highway, which is what we need.

Biography

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Notes

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[33] *Perceiving, Acting, Knowing*, ed. R. Shaw and J. Bransford, Hillsdale: Lawrence Erlbaum, 1977

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[35] Ibid., p. 456.

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[37] Jonathan Crary, Techniques of the observer. On vision and modernity in the nineteenth century Cambridge, Mass.: MIT Press, 1990.

[38] Lester Faigley, *Assessing writers'knowledge and processes of composing,* Norwood: Ablex Publ. Corp., 1985. (Writing research).

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[40] Nancy Roundy Blyler, Charlotte Thralls, *Professional communication: the social perspective,* Newbury Park: Sage, 1993.

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[42] Clifford Geertz, *Local knowledge: further essays interpretive anthropology,* New York: Basic Books, 1983.

[43] K-A. Bruffee, "Social construction, language and the authority of knowledge", *College English,* 48, 1986, pp. 773-790, particularly p. 774.

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[45] KA. Bruffee, "Collaborative learning and the conversation of mankind", *College English,* 46, 1984, pp. 635-652, particularly p. 641. Cf. Kenneth A. Bruffee, *Collaborative learning; higher education and the authority ofknowledge,* Baltimore: Johns Hopkins University Press, 1993.

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[48] Thralls and Blyler, 1993, p. 22.

[49] Barry Wellman, *Social structures: a network approach,* Cambridge: Cambridge University Press, 1988

[50] Ibid., p. 22.

[51] Ibid., p. 32.

[52] Herbert I. Schiller, "Corporate sponsorship. Institutionalized censorship of the cultural realm", *Art Journal,* New York, vol. 50, n. 3, Fall 1991, pp. 56-59.

[53] C. M. Anson and L.L. Forsberg, "Moving beyond the academic community", *Written communication,* vol. 7, n. 2, 1990, pp. 200-231, particularly p. 202.

[54] J. Harris, The condition of postmodernity an inquiry into the origins of cultural change, London: Blackwell, 1989.

[55] T. Kent, "On the very idea of a discourse community", *College composition and communication, vol.* 42, n. 4, 1991, pp. 425-446, particularly p. 433.

[56] Much of the pioneering work on graphical user interfaces was and is still being done at Xerox Park in Palo Alto. Among the best known practitioners at present are Shneiderman, Laurel, Baecker and Mantei. See: *Directions in human computer interaction,* ed. Albert Badre and Ben Shneiderman, Norwod: Ablex Publishing Co., 1982. See also Ben Shneiderman's three main books on the subject:
Designing the user interface: strategies for effective human computer interaction, Reading, Mass.: Addison-Wesley, 1987, 1992; *Hypertext hands on: an introduction to a new way of organizing and assessing information*, Reading, Mass.: Addison Wesley, 1989 and *Sparks of innovation in human and computer interaction*, Norwood, NJ.: Ablex Publishing Co., 1993. Brenda Laurel has written two important books in the field: *The art of computer interface*, Norwood: Addison-Wesley, 1990 and *Computers as theatre*, Norwood: Addison-Wesley, 1991. The theories expressed in the latter of these are particularly provocative, for they exemplify beautifully the consequences of linking closely the notions of entertainment and education in the form of edu-tainment, as discussed later in this paper. The result is a focus on a compelling presentation that hides the cultural tradition from which it comes.
Ronald M. Baecker has published *Readings in human-computer interaction: a multidisciplinary approach,* Los Altos: Morgan Kaufmann, 1987 and *Human factors and typography for more readable programs,* Reading, Mass.: Addison-Wesley, 1989. Marilyn Mantei is best known for editing the *CHI `86 conference. Human factors in computing systems: CHI `86 conference proceedings*, April 13-17, Boston 1986, Oxford: Association of Computing Machinery, 1986.
While emphasizing the need to consider human factors in technology, the majority of the above contributions tackle that problem in an abstract way, independent of cultural and historical traditions. For instance, there are topics that one culture will discuss, while another will not. Some cultures express discontent and anger by externalizing, whereas others internalize it. Software is not yet taking these dimensions sufficiently into account.
[57] Alfred Schutz, Collected papers, ed. Maurice Natanson, Hague: M. Nijhoff, 1962, 3 vol., particularly, vol. I, pp. 18-19, 25, 31 ff.; vol II, pp. 5, 60, 117, 121, 123, 125 ff., 133 ff., 141, 147, 156, 158 ff., 160,166 ff, 170 ff., 180 ff., 194 ff., 218 ff., 244 ff.$_>$ 254, 258, 266, 312, ff., 320, 326 ff., 353.
[58] See: John Seeley, *The Americanization of the unconscious*, New York: Universal Science Publishers, 1967. Cf. Christopher Lasch, *The cult of narcissism*, New York: Warner books, 1979. See also the present author's: "Percezione, prospettiva e rappresentazione nell America Settentrionale": *Specchi americani. La filosofia europea nel nuovo mondo, ed. Caterína Marrone*, G. Coccoli, G. Santese , F. Ratto, Rome: Castelvecchi, 1994, pp. 287-345. (*Contatti 6, III convegno di studi filosofici di San Sepolcro*).
[59] See, for instance, the author's: Literature on perspective, Munich: Saur, (in preparation).
[60] Ibid., chapter V.
[61] At the University of Toronto, for example, the Faculty of Forestry was recently eliminated.

[62] or a more thorough discussion of this aspect of computers see the author's: "Electronic Media and Visual Knowledge", *Knowledge Organization* (formerly International Classification), Frankfurt, vol. 20, no. 1, 1993, pp. 47-53.

[63] Neil Postman, *Amusing ourselves to death: Public discourse in the age of showbusiness*, New York: Viking, 1985.

[64] Douglas Rushkoff, *Media virus. Hidden agendas in popular culture*, New York: Ballantine Books, 1994, pp. 45-66.

[65] See: Igor S. Kon, *Freundschaft.Geschichte und Socialpsychologie der Freundschaft als sociale Institution und individuelle Beziehung*, Hamburg: Rowohlt, 1979. The original Russian title is: Druschba. *Istoriko-filosoflaj otscherk*, Leningrad, 1979. This book is fascinating because it offers detailed accounts of how little individuals trust one another in Russia; offering percentages for the degree of trust between child and parent, student and teacher, man and wife etc.

[66] On this topic it is instructive to read a book by the wife of a president of Harvard university: Sissela Bok, *Lying. Moral choice in public and private life*, London: Quartet Books, 1980.

[67] For writings by this important thinker see Pierre Levy, *Les technologies de l intelligence: l'avenir de la pensée à l'ère informatique,* Paris: La Découverte, 1990, (Science et société), and his: *La machine univers: création, cognition, et culture informatique*, Paris: La Découverte, 1990. (Science et société).

[68] For another discussion of related problems see: Richard Wright, "Art and science in chaos: contesting readings in scientific visualization", *ISEA 94. The 5th international symposium on electronic art catalogue*, ed. Minna Tarkka, Helsinki University of Art and design, 1994, p. 56. I am grateful to Professor de Kerckhove for this reference.

[69] For more information on SUMS the reader is referred to the following articles in books: "A Databank on Perspective", *Metodologia della ricerca: orientamenti attuali. Congresso internazionale in onore di Eugenio Battisti*, Milan, 1991, *Arte Lombarda*, vol. , 1994, pp. (in press); "The Electronic Highway and Education: New Doors to keep Open", *Learn tec 93, Europäischer Kongress für Bildungstechnologie und betriebliche Bildung,* Tagungsband, ed. Uwe Beck, Winfried Sommer, Berlin: Springer verlag, pp. 423-434; "Computers and the Transformation of Knowledge", *The* Challenge ofLifelong Learning in an Era of Global Change, Couchiching Institute on Public Affairs, 1993 Conference Proceedings, Toronto, pp.23-25; "Can Museum Computer Networks Change Our Views of Knowledge?", *Museums and Information. New Technological Horizons. Proceedings,* Ottawa: Canadian Heritage Information Network, (1992), pp. 101-108; "Databanks in Education", *The 12th E.CO.O. and the 8th LCT.E. Joint Conference,* Toronto, (May 1991), pp.412-418; "Knowledge Packages", *The 12th E.CO.O. and the 8th LCT.E. Joint Conference*, Toronto, (May 1991), pp.757-759; "A New Classification for Art", *Die Klassifikation und ihr Umfeld. Proceedings 10. Jahrestagung der Gesellschaft für Klassification eV*, eds. P. O. Degens et al., (Frankfurt, Indeks Verlag, 1986), pp.77-84, (Studien sur Klassifikation, Bd. 17). "Multidimensional Bibliography and Classification, Eröffnungsvortrag": Anwendungen in der *Klassifikation. Proceedings 8 Jahrestagung der Gesellschaft für Klassifikation eV*, ed. Rolf G. Hensler (Teil I), (Hof Geismar, 1984), (Frankfurt, Indeks Verlag,

1984), pp.57-75.(Studien zur Klassifikation, Bd. 14 SK 14); "Thoughts on the Reorganization of Knowledge", *Automatisierung in der Klassifikation* eV, ed. Ingetraut Dahlberg (Teil I), Königswinter/Rhein, 5.-8. (April 1983), (Frankfurt: Indeks Verlag, 1983), pp.141-150. (*Studien zur Klassifikation*, Bd. 13, SK 13);

In addition there are the following articles in refereed journals: "A System for Universal Media Searching, (SUMS)", *Computers and the History of Art*, London, 1994 (in press); "Conceptual Navigation: Views beyond Windows", Sistema Terra, Rome, 1993 (in press); "Progress in Art," *AICARC Journal, Zurich*, 1989 (In press); "A Front-end for Multi-valent, Multi-cultural Searching", *ALT News 04,* Applied Learning Technologies in *Europe,* February 1994, pp. 8-9,14; "Past Imprecision for Future Standards: Computers and New Roads to Knowledge", *Computers and the History of Art*, London, vol. 4.1, 1993, pp. 17-32; Guest Editor of the first issue of *Knowledge* Organization (formerly *International Classification*), including an editorial "Computers and the Visual Arts"〉 Frankfurt, vol. 20, no. 1, 1993, pp. 2-3; "McLuhan, Museums and Education", Museums and Technology: special issue of *The Muse*, Ottawa, vol. IX, no. 2, (Summer-Fall, 1991), pp.78-85.

[70] See the author's: "Elektronische Medien, Die Wiedergeburt der Perspektive und die Fragmentierung der Perspektive": *Illusion und Simulation*, ed. Stefan Iglhaut, Munich: Klaus Boer Verlag, 1994 (in press).

[71] Robert M. Pirsig, *Zen and the art ofmotorcycle maintenance*, New York: Morrow, 1974.