SUBJECT: THE BAG

FROM: VILÉM FLUSSER (BY WAY OF MICHAEL STAPLEY
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DATE: MON, 12 OCT 1998 10:23:03 +0100

Omnia me mecum porto. In plain English: Everything that I've written and published in the last eighteen months is kept in a bag. The bag was stolen recently from a car parked outside a Paris hotel. It was found again in a nearby street with the contents intact. The thief found no value in them. A discarded literary judgment.

The bag can be seen as a part of my *memory*. Whoever reads the papers it contains and the way they are ordered will recognize me, in a limited though intense way. I intend here to examine and analyze the bag. Not as if I myself were interesting but because the thief, if he had inspected the contents more carefully, would have found himself in the company of historians, archeologists, paleontologists, psychoanalysts, and similar researchers.

What is at issue here is a yellow leather bag equipped with a zipper. It contains different colored folders. One contains my correspondence from June 1972 until now, including copies of my letters and letters addressed to me. Some of my letters have remained unanswered, and some of those that I have received I have never replied to. The letters are ordered chronologically. Another folder is titled: "unpublished papers." It contains about thirty essays in Portuguese, English, or German concerning art criticism and phenomenology, the originals of which were sent to newspapers. These papers are unordered. Another folder is titled "published papers." It contains about ten essays published during my stay in Europe. They are arranged according to their date published. A further folder is titled "*La Force du Quotidian*" and contains a book manuscript—fifteen essays about things in our environment—it will be released in December in Paris. Another is titled "*Ça existe, la Nature*?" and contains eight essays. Both folders are arranged according to their content. A further is titled "New York" and contains outlines for a lecture about the future of television that I plan to hold next year at the Museum of Modern Art. Another is titled "Rio" and contains essays that my publisher in Rio de Janeiro will bring out soon. Another is titled "Talks" and contains outlines for lectures that I have held and will hold in Europe. They are not ordered. Another is titled "*Bodenlosigkeit*" and contains a hundred pages of an autobiography that I began and never completed. Another is titled "*Biennal*" and contains references to the "*XII Bienal des Arts*" in Sao Paulo. The last has the title "*Documentatos*" and contains "self-referential" certificates from government offices, universities, and other institutions. This is then the semantic and syntactical dimension of the bag.

The folders are firstly arranged *syntactically*. They are arranged in three classes:

(A) Dialogues (the correspondence folder)
(B) Discourses to others (lectures and manuscripts)
(C) Discourses about myself (documents)

The first class would have given the thief a view into the structure of my relationships with others, what connects me to them, who rejects me, and who I reject. The second class would have allowed the thief to see me from "within," and how I try to make myself public. The third class would have allowed him to see me in the way the establishment does, my mask, via which I play my public role.
The knowledge that the thief thus gains would be problematic for the following reasons: (1) The authenticity of the papers would need to be checked (2) The authenticity of the documents contained therein would have to be checked. The thief would be required to make a close reading of the texts and of their contexts. The folders are also arranged semantically.
Again they are arranged into three classes:

(A) Factual information (documents, sections of letters, lectures, and manuscripts).
(B) Interpretations of facts (lectures and manuscripts)
(C) Expressions of emotion and value (letters, and beneath the surface in most manuscripts).

The first class would have offered the thief a view into my "objective-being-in-the-world." The second the way in which I maintain a distance therefrom. The third a view of my "subjective and intersubjective-being-in-the-world." From this he might have held the keys to the subjective and objective position we find ourselves in. All this, of course, cautiously. The facts could be misunderstood or misinterpreted, and the emotions and values expressed dishonestly, as much by me as by others. The thief would have to "decode" and "de-ideologize" the messages contained in the bag.
The folders are also arranged structurally. Again there are three classes:

(A) Chronological arrangement
(B) Logical arrangement
(C) Disorder.

The first structure puts us in mind of geological and botanical formations. The second of encyclopedia and computers. The third of genetic information. Together they reveal a picture of the structure of the human memory. What is missing however is a "formal structure" of the kind found in "alphabetical arrangement." Without this the thief might have concluded a defect in my way of thinking. The interaction of the ordered and disordered structures in the bag would have given the thief the opportunity to contribute to Jaques Monods problem "coincidence and necessity." The bag is a fertile hunting ground for "structural analysis."
Finally the folders are arranged according to their relationship to the bag itself. Two classes result:

(A) Folders that are in the bag so that they can be kept in mind.
(B) Folders that are there to keep things that are not there in mind.

The letters, manuscripts, and essays belong to the first class, the unfinished autobiography to the second. This reveals two functions of the bag(and of memory): to keep things in the present and to bring things into the present. The real situation is nevertheless much more complex. Some papers in the bag point to the future (the "New York" folder and the unpublished manuscript); thus proving the function of memory, namely to construct designs for the future. The thief could have recognized all of this. Not, however, this: This article itself which the reader has before him is found in the bag in the folder titled "published papers." The article is not only concerned with the bag, it is not just a "metabag" but a part that the thief could not have studied. The thief could never have recognized this aspect of the bag.
I always carry the bag with me. We all do this only my bag is more readily available. The question is: can our bags be stolen from us? Or would they always be found again a few blocks away, intact? Put differently; firstly: are we lighter and therefore progress more quickly into the future when our bags are lifted from us? And secondly; are these living or dead weights in our bags? The bag is too complicated to give a satisfactory answer to these questions. In any case it's good that from now on the questions themselves are kept safely in the bag.

[This text dates from 1972; it first in appeared in *Nachgeschichten* (Düsseldorf: Bollmann, 1990). Translated from German (1998) by Michael Stapley.]

SUBJECT: SEARCH ENGINES: METAMEDIA ON THE INTERNET?

FROM: HARTMUT WINKLER <WINKLER@TFM.UNI-FRANKFURT.DE>
DATE: TUE, 29 SEP 1998 16:15:07 +0200

We use them daily, and don't know what we're doing. We don't know who operates them or why, don't know how they're structured, and little about the way they function. It's a classic case of the black box—and all the same, we're abjectly grateful for their existence.
Where, after all, would we be without them? Now that the expanse of web offerings has proliferated into the immeasurable, isn't anything that facilitates access useful? After all, instantly available information is one of the fundamental Utopias of the data universe.
Nevertheless, I think the engines are worth some consideration, and propose research should concentrate on the following points. First, the specific impetus of blindness that determines our handling of these engines. Second, the

conspicuously central, even “powerful” position the engines meanwhile occupy on the net—and this question is relevant if one wants to forecast the medium’s development trends. Third, I am interested in the structural assumptions on which the various search engines are based. Fourth, and finally, a reference to language and linguistic theory that shifts the engines into a new perspective and a different line of tradition.

1

The main reason search engines occupy a central position on the net is that they are started infinitely often; in the case of Altavista, accessed 32 million times per workday, if the published statistics can be trusted. Individual users see the entry of a search command as nothing more than a launching pad to get something else, but to have attracted so many users to a single address signifies a great success. The direct economic consequence is that these contacts can be sold, making the search engines eminently suitable for the placement of advertising and therefore among the few net businesses that are in fact profitable. With remarkable openness, Yahoo writes: “Yahoo! also announced that its registered user base grew to more than 18 million members...reflecting the number of people who have submitted personal data for Yahoo!’s universal registration process.... ‘We continued to build on the strong distribution platform we deliver to advertisers, merchants, and content providers.’ ”

Second, and even more important, the frequency of access means the overall net architecture has undergone considerable rearrangement. Thirty-two million users per day signify a thrust in the direction of centralization. This should put on the alert all those who recently emphasized the decentral, antihierarchic character of the net, and link its universal accessibility with far-reaching hopes for basis democracy.

All the same—and that brings me to my second point—this centralization is not experienced as such. The search engines can occupy such a central position only because they are assumed to be neutral in a certain way. Offering a service as opposed to content, they appear as neutral mediators. Is the mediator in fact neutral?

2

The question must be addressed first of all to the design of the search engines. Steve Steinberg, my main source for the factual information in the following text, described the things normal users don’t know about the search engines and, even more important, what they think they don’t need to know in order to use them expediently (“Seek and Ye Shall Find (Maybe),” *Wired* 4.05 [May 1996], 108ff.). Steinberg’s first finding is that providers keep secret the exact algorithm on which their functioning is based (ibid., 175). Since the companies in question are private enterprises and the algorithms are part of their productive assets, the competition has, above all, to be kept at a distance; only very general information is disclosed to the public, the details remain in the dark of the black box. So if we operate the search engines with relative blindness, there are good economic reasons for this.

Three basic types of search engine can be distinguished. The first type is based on a system of predefined and hierarchically ordered keywords. Yahoo, for instance, employs human coders to assign new websites to the categories; the network addresses are delivered by email messages or hunted down by a search program known as a spider. In 1996, the company registered 200,000 web documents in this way.

The above figure alone indicates that coding through human experts is quick to meet its quantitative limitations. Of the estimated total volume of 30–50 million documents available on the net in 1996 (ibid., 113), Yahoo was offering some 0.4 percent; current estimates suggest that the total volume has meanwhile grown to 320 million websites.

However, the problems of the classification system itself are even more serious. The twenty thousand keywords chosen by Yahoo are known in-house (with restrained self-irony?) as "the ontology." But what or who would be in a position to guarantee the uniformity and inner coherence of such a hierarchy of terms. If pollution, for example, is listed under "Society and Culture"/"Environment and Nature"/ "Pollution", then the logic can be accepted to some degree, but every complicated case will lead to classificatory conflicts that can no longer be solved even by supplementary cross-references.

The construction of the hierarchy appears as a rather hybrid project, but its aim is to harness to a uniform system of categories millions of completely heterogenous contributions from virtually every area of human knowledge. Without regard to their perspectivity, their contradictions and rivalries.

Yahoo's "ontology" is thus the encumbered heir of those real ontologies whose recurrent failure can be traced throughout the history of philosophy. And the utilitarian context alone explains why the philosophical problem in new guise failed to be identified, and has been re-installed yet again with supreme naiveté. If the worst comes to the worst, you don't find what you're looking for—that the damage is limited is what separates Yahoo from problems of philosophy.

The second type of search engine manages without a predefined classification system and, even more important, without human coders. Systems like AltaVista, Inktomi, or Lycos generate an "inverted index" by analyzing the texts located. The search method employed is the full-text variant, word for word, meaning that in the end every single term used in the original text is contained in the index and available as a search word. This is less technically demanding than it might appear. For every text analyzed, a row is created in a huge cross-connected table, while the columns represent the general vocabulary; if a word is used in the text, a bit is set to "yes," or the number of usages is noted. An abstract copy of the text is made in this way, condensed to roughly 4 percent of its original size. The search inquiries now only make use of the table.

Since the system is fully automatic, the AltaVista spider can evaluate 6 million net documents every day. At present, some 125 million texts are represented in the system.

The results of a search are, in fact, impressive. AltaVista delivers extremely useful hit lists, ordered according to an internal priority system. And those who found what they were looking for are unlikely to be offended by the fact that AltaVista too keeps its algorithm under wraps.

There are some problems nevertheless. It is conspicuous that even slight variations in the query produce wholly different feedback; if you try out various queries for a document you already know, you will notice that one and the same document is sometimes displayed with high priority, sometimes with lower priority, and sometimes not at all. This is irritating, to say the least.

The consequence, in general terms, is that often one does not know how to judge the result of a search objectively—it remains unclear which documents the system does not supply because either the spider has failed to locate them or because the evaluation algorithm does indeed work otherwise than presumed. Even if the program boastfully claims to be "searching *the web*," the singular form of the noun is illusory, of course, if you consider the fact that even 125 million texts are only a specific section of the overall expanse. Furthermore, users for their part can register only the first 10, 50 or, at most, 100 entries. They too scarcely have the possibility of estimating how this section relates to the rest of the expanse in terms of content.

The second and main problem is however present already in the basic assumption. A mechanical keyword search presupposes that only such questions will be posed as are able to be clearly formulated in words, and differentiated and substantiated through further keywords. Similarly, nobody will expect that the system is able to include concepts of similar meaning alongside the query, or can exclude homonyms. Search engines of this type are wholly insensible to questions of semantics or, to make it more clear: their very point is to exclude semantic problems of the type evident with Yahoo. Yet that is not to say that the problems themselves are eradicated. They are imposed on the users through the burden of having to reduce their questions to unambiguous strings of significants, of having to be satisfied with the mechanically selected result. All questions unable to be reduced to keywords fall through the screen of the feasible. Technical and scientific termini are relatively suitable for such a search, humanistic subjects are less suitable, and once again this emerges as that "soft"—all too soft—sphere that should be circumvented from the outset, if one is unwilling to fall into the abyss.

But the problem of semantics has not been ignored, and efforts in this direction have led to the third type of search engine. Systems like Excite by Architext, or "Smart," claim to search no longer mechanically with strings of significants, but on the basis of a factual semantic model. In order to be able to discriminate between articles on oil films and ones on cinema films, such programs examine the context in which the respective concepts figure.

"The idea is to take the inverted index of the Web, with its rows of documents and columns of keywords, and compress it so that documents with roughly similar profiles are clustered together—even if one uses the word 'movie' and one uses 'film'—because they have many other words in common" (Steinberg, 175). The result is a matrix where the columns now represent concepts instead of mechanical keywords. The exciting thing about this type of engine is that it progresses from mechanical keywords to content-related concepts; and also that it obtains its categories solely on the basis of the entered texts, of a statistical evaluation of the documents.

[The engine] learns about subject categories from the bottom up, instead of imposing an order from the top down. It is a self-organizing system.... To come up with subject categories, Architext makes only one assumption: words that frequently occur together are somehow related. As the corpus changes—as new connections emerge between, say O. J. Simpson and murder—the classification scheme automatically adjusts. The subject categories reflect the text itself"; "this eliminates two of the biggest criticisms of library classification: that every scheme has a point of view, and that every scheme will be constantly struggling against obsolescence. (Ibid.)

Other designs, such as the Context system by Oracle, attempt to incorporate analyzes of the syntax, and by doing so find themselves in the minefield of how to model natural language—a problem that has been worked upon in the field of AI since the sixties, without convincing results having been produced so far. The evaluation of such systems is more than difficult; and it is even more difficult to make forecasts about the possible chances of developments.

For that reason, I would like to shift the focus of the question from the presented systems' mode of function and their implications and limitations to the sociocultural question of what their meaning is, what their actual project is in the concurrence of discourses and media.

3

The path from the hierarchic ontologies over the keyword search and on to the semantic systems shows, in fact, that it is a matter of a very fundamental question beyond the pragmatic usage processes. The search engines are not a random "tool" that supplements the presented texts and facilitates their handling. On the contrary, they appear as a systematic counterpart on which the texts are reliant in the sense of a reciprocal and systematic interrelation. My assertion is that the search engines occupy exactly that position which—in the case of non-machine-mediated communication—can be claimed by the system of *language*. (And that is the main reason why search engines interest me.)

Language, as Saussure clearly showed, breaks down into two modes of being, two aggregate states. Opposite the linear, materialized texts in the external world—utterances, speech events, written matter—exists the semantic system that, as a knowledge, as a language competence, has its spatially distributed seat in the minds of the language users. Minds and texts are therefore always opposite each other.

If access to the data network is now organized over systems based on vocabulary, and if these systems are being advanced in the direction of semantically qualifying machines, then this means that language itself, the semantic system, the lexicon, is to be liberated from the minds and technically implemented in the external world. In other words: not just the texts are to be filed in the computerized networks, but the entire linguistic system. The search engines, with all their flaws and contradictions, are a kind of advance payment on this project.

Search engines, then, represent *language* in the network. And this has com-

Napoleon and Hitler obviously both lost their wars, although they had different ways of organizing science and research. The text is in no way a monocausal explanation why Germany lost the war. But it is clearly writing against the myth of the efficient German organization of war technology, science, and economy. This myth is not more convincing, because of rivalries and problems of defining different realms of competence within the state apparatus. In Germany there was no organization possible like it was in Bletchley Park, Bell Labs, or other Allied powers centers.
Please pay attention to Gödel—Mr. Why?—because he had a unique way of dealing with mathematics and philosophy apart from strategic state or economic organizations. He had problems with staff in general—with one or more Captain Singhs; he concentrated on combining his critique of closed formal systems with his desire to establish a platonic foundation for the mathematical universe. It was J. Robert Oppenheimer—may be a Captain Singh but definitely the director of the Institute for Advanced Studies at Princeton—saying: "Believe it or not doctor, but there is the greatest logician since the days of Aristotle." Gödel refused to undergo surgery and died as a result; was this a refusal to be related to Aristotle? But please let me know more about the legendary passenger liner "Nancow-ry"
—Ex Karanja, of the P&O, BI Lin.
[Nils Roeller <nils@khm.uni-Koeln≠.de>,Gödel and Captain, Fri, 11 Jul 1997 12:23:25 +0800]

pletely changed the emphasis. The engines face the texts not as additional tools but as the "actual" structure that the texts merely serve; a machine for opening up, but at the same time a condensation that represents the body of texts as a whole.

4

The conjecture that it is a matter of the language admits a new perspective on the internal organization of search engines. And it becomes clear that engines have prominent predecessors in the history of knowledge and historical notions of language.
It is difficult not to see in the hierarchically composed structure of the Yahoo pyramid of concepts those medieval models of the world described for us by writers such as Bolzoni in her history of mnemonics (L. Bolzoni, "The Play of Images," in P. Corsi, ed., *The Enchanted Loom*, NY: Oxford, 1991, 16–65). A large fourteenth-century panel shows the figure of Jesus in the center of the tree of life, whose branches and leaves all contain stations in his earthly existence, his path to the Cross and his transfiguration. A second picture, this time from the thirteenth century, shows a horse-mounted knight who is riding, sword drawn, toward the Seven Deadly Sins, which are divided up into a scheme of fields branching of step-by-step into the infinite diversity of the individual sins (ibid., 27–29). Bolzoni explains that such schemes initially served didactic mnemonic purposes; order and visualization made it easier to note the complex connections. But their actual meaning goes further. The implicit ambition of these systems was to bring the things of the world into a consistent scheme, namely into a necessarily hierarchic scheme that no less necessarily culminated in the concept of God. Only the concept of God was capable of including all other concepts and furnishing a stable center for the pyramidal order. The linguistic structure (the cathedral of concepts) and the architecture of knowledge were superimposed over each other in this "order of things." This metaphysical notion of language has become largely alien to us today. But is it really alien?
As far as Yahoo's surface is concerned, if you will permit the abrupt return to my subject, it manages without an organizing center. The user faces fourteen, not one, central categories from which the subcategories branch off. Thus, the pyramid has lost its tip. Or would it be more appropriate to ask what has taken God's place?
In a model of the world created by Robert Fludd, an English encyclopedist of the Renaissance, God had already abandoned the center position ("*Integrae Naturae speculum artisque imago*" [1617], British Library). Retained has been a system of strictly concentric rings that contains the things of the world, encompassing a range from minerals to the plants and animals of nature up to the human arts and finally the planetary spheres. The center is occupied by a schematic diagram of the earth, a forerunner of that blue ball the astronauts radio-relayed to earth. The representation looks like a mandala in which viewers can absorb themselves in order to take up contact with a cosmic whole. The new, secularized solution becomes even more distinct in the memory theater of the Italian Camillo, which, frequently discussed in the meantime, itself belongs to the history of technical media. At the begin-

ning of the sixteenth century, Camillo built a wooden construction resembling a small, round theater (see, for example, F. A. Yates, *Gedächtnis und Erinnern*, Weinheim 1991, 123ff.). Those who ventured inside were confronted by a panel of 7 x 7 pictures Camillo had commissioned from highly respected painters of the period. The horizontal division corresponded to the seven planetary spheres, the vertical division to seven stages of development from the first principles up to the elements, to the natural world, to the human being, to the arts and, finally, the sciences. In this way, every field in the matrix represented a certain aspect of the cosmos. The images were merely there to convey the general picture, whereas behind them were compartments with the texts written by the great writers and philosophers. It was in these compartments, then, that the user looked for sources, concepts and further information. To this extent, the whole thing was a system of access, and the analogy with search engines becomes evident in the clear separation between the access to the texts and the texts themselves.

Camillo's theater has finally brought the human being, the viewer, into the center of the construction. The surface of the images is oriented to his view, and solely the beholder's perspective joins up the forty-nine fields in the matrix. Exactly that appears to me to be the logic on which Yahoo is based. The very lack of the pinnacle in the pyramid of concepts defines the position taken by the user. Like in the optical system of the central perspective, the "royal overlooking position" is reserved for the user/beholder.

Yahoo is indeed an "ontology"; but not because Yahoo and likewise ontologies are arbitrary. It is more because they keep things in their place, and define for the user a position relative to this place. Its ontology offers an ordered world. And anything threatening to be lost in the chaotic variety of available texts can take one final respite in the order of the search engine.

The solution, however, is historically outdated, and has been abandoned in the history of philosophy. Because any positively defined hierarchy of concepts is perspectival and arbitrary, it soon reveals those points of friction that represent the beginning of its end. Does this make the solution of the keyword- or semantics-based engines more modern?

It must indeed appear to be so at first glance. The strategy of making the search words dependent on the empirically collected content of the network documents—the texts—imitates the mechanism of language itself. Or the mechanism, to be more precise, by which language arrives at its concepts.

Linguistic theory tells us that the synchronous system of language is created through the accumulation and condensation of an infinite multitude of concrete utterances. The place where condensation takes place is the language user's memory, where the concrete utterances are submerged; linear texts are obliviated into the structure of our language capability; on the basis of concrete texts, this structure is subject to constant modification and differentiation. Our faculty of language is an abstract copy of speaking—speech and language (discourse and system) are systematically cross-linked. (For a more detailed analysis, see my book *Docuverse*, Munich: Boer, 1997.) What this means for the isolated concept is that it accumulates whatever the tangible contexts provide as meaning. It isn't a one-time act of definition that assigns it a place in the semantic system, but the disor-

derly chain of its usages; concepts stand for and typify contexts, concepts encapsulate past contexts.
The semantic search engines imitate this accumulation by typifying contexts in order to arrive at concepts—in this case the search concepts. As outlined above, the table of search words is created as a condensed, cumulated copy of the texts. A statistical algorithm draws together comparable contexts, typifies them, and assigns them to the search concepts as the equivalent of their meaning.
A system imbued with such dynamism is superior to the rigidly predefined systems, even if the statistical algorithm only imperfectly models the mechanisms of natural language. More complex, closer to intuition, it is bound to offer less centers of friction. So, once again, what's the objection?

5

It's important to remember that, despite all the advances made, the actual fundamental order has remained constant. Just as in Camillo's wooden theater, we are dealing not with only two instances—a set of reading/writing/searching subjects approaching a second set of written texts—but also with a third instance, namely a system of access that has placed itself between the first two like a grid, or raster.
And if the access system in Camillo's media machine served to break down the infinite expanse of texts into a manageable number of categories from which the position—from a strictly central perspective—was defined for the observing subject, then this fundamental order remains intact also.
This image makes it clear that it is not necessarily better if the raster cannot be felt. It's almost the other way round: the less resistance offered by the access system, the more neutral, transparent, and weightless it seems, and the more plausible appears the suspicion that it cannot be a question of the nature of thing, but of a naturalization strategy.
The raster of categories *must* purport to be transparent if it does not want to rouse the problems that Yahoo rouses. To avoid the reproach of being arbitrary and exercising a structuring influence on the contents accessed, the raster must instill in the users the impression of being purely a "tool" subject only to utility—the key in the customers' hand that opens any Sesame, a compliant genie with no ambitions of its own.
This puts the veil of secrecy cast over the algorithms in a somewhat different light. Far more important than the rivalry between different product suppliers is the wish to actually dispose over a neutral, transparent access machine—and this wish is something the makers share with their customers, and probably with us all. At the basis of the constellation emerges an illusion that organizes the discourse.
Since there is no such thing as algorithms without their own weight, the metadiscourse has to help them out and salvage transparency by means of mere assertions. In the usage of the salutary singular ("searching the web"), in the way the algorithms are kept under wraps, in the emphasis on the performance as opposed to the limitations that might be more defining, and in the routine promises that, thanks to Artificial Intelligence, new and even more powerful systems are in the pipeline (see, for example, PointCast

<http:// www.pointcast.com>). In the unawareness and unwillingness to know on the part of the customers, and in the primacy of a practice that mostly, in any case, doesn't know what it's doing.

Data processing—and one feels almost cynical in bringing up this point—was propagated with the ideal of creating a very different type of transparency. The promise was to create only structures that were in principle able to be understood—the opposite, in fact, of natural language; to confine itself to the structural side of things, but to escribe this in a way that would not only admit analysis, but apparently include the latter from the outset. If programs have now, as Kittler correctly notes, begun to proliferate like natural-language texts, then this is not because the programs (and already even the search engines) have been infected by the natural-language texts. It is because of our need for both: for unlimited complexity and the narcissistic pleasure of having an overview, the variety of speaking and the transparency with regard to the objects, a language without metaphysical hierarchic centering that still maintains its unquestionable coherence.

That our wish is once again doomed to failure is clear from the fact that any number of search engines of different design are competing with each other in the meantime, and that metasearch engines are now said to be able to search through search engines. So there we sit on God's deserted throne, opposite us the infinite universes of texts, in our hands a few glittering, but deficient, machines. And we feel uneasy.

[Translated from German by Tom Morrison.]

SUBJECT: A MEANS OF MUTATION: NOTES ON I/O/D 4 THE WEB STALKER

FROM: MATTHEW FULLER <MATT@AXIA.DEMON.CO.UK>
DATE: MON, 12 OCT 1998 01:16:59 +0100

During 1997 and 1998 a series of legal and media confrontations were made in the United States and elsewhere. Amongst those involved were Microsoft, Netscape, and the U.S. Department of Justice. The key focus of contention was whether Microsoft, a company that has a near complete monopoly on the sale of operating systems for personal computers, had—by bundling its own web browser, Internet Explorer with every copy of its Windows '95/98 OS—effectively blocked Netscape, an ostensible competitor in browser software, from competing in a "free" market ("ostensible" because the nearly identical browsers toegther form if not an economic then a technical-aesthetic monopoly). This confrontation ran concurrently with one between Microsoft and Sun Microsystems, developers of the language Java.

The "browser wars" involved more than these three relatively tightly constructed and similar actors, though. Millions of internet users were implicated in this conflict. The nature of the proprietary software economy meant that for any side, winning the browser wars would be a chance to construct the ways in which the most popular section of the internet—the world wide web—would be used, and to reap the rewards. The conflict took place in a U.S. court and was marked by the deadeningly tedious superformalized rituals that mark the abstraction of important decisions away from those in whose name they are made. Though the staging of the conflict was located within the legal and juridical framework of the U.S. it had ramifications wherever software is used.

On connecting to a URL, HTML appears to the user's computer as a stream of data. This data could be formatted for use in any of a wide variety of configurations. As a current, given mediation by some interpretative device, it could even be used as a flowing pattern to determine the behaviour of a device completely unrelated to its purpose. (Work it with tags? Every <HREF> could switch something on, every <P> could switch something off—administration of greater or lesser electric shocks for instance). Most commonly it is fed straight into a browser.

What are the conditions that produce this particular sort of reception facility? Three fields that are key amongst those currently conjoining to form what is actualized as the browser: economics, design, and the material. By material is meant the propensities of the various languages, protocols, and data types of the web.

If we ask, "What produces and reinforces browsing?" There is no suprise in finding the same word being used to describe recreational shopping, ruminant digestion and the use of the web. The browser wars form one level of consistency in the assembly of various forms of economy on the web.

Websites are increasingly written for specific softwares, and some elements of them are unreadable by other packages (for example, the I/O/D "shout" HTML tag). You get Netscape sites, Explorer sites, sites that avoid making that split and stay at a level that both could use—and therefore consign the "innovations" of these programs to irrelevance. This situation looks like being considerably compounded with the introduction of customizable (and hence unusable by web-use software not correctly configured) Extensible Markup Language tags.

Bloatware—49% of software features are never used, 19% rarely used, 16% sometimes, 13% often, 7% always. Size of software is growing, Windows went from 3M lines of code (Windows 3.1) to 14M lines (Windows 95) to 18M (Windows 98). [Ninfomania NewsFeed]

What determines the development of this software? Demand? There is no means for it to be mobilized. Rather more likely, an arms race between on the one hand the software companies and the development of passivity, gullibility, and curiosity as a culture of use of software.

One form of operation on the net that does have a very tight influence—an ability to make a classical "demand"—on the development of proprietary software for the web is the growth of online shopping and commercial information delivery. For companies on the web this is not just a question of the production and presentation of "content," but a very concrete part of their material infrastructure. For commerce on the web to operate effectively, the spatium of potential operations on the web—that is everything that is described or made potential by the software and the network—needs to be increasingly configured toward this end.

That there are potentially novel forms of economic entity to be invented on the web is indisputable. As ever, crime is providing one of the most exploratory developers. How far these potential economic forms, guided by notions of privacy; pay per use; trans- and supra-nationality; and so on. will develop in an economic context in which other actors than technical possibility, such as the state, monopolies, and so on is open to question. However, one effect of net-commerce is indisputable. Despite the role of web designers in translating the imperative to buy into a post-rave cultural experience, transactions demand contracts, and contracts demand fixed, determinable relationships. The efforts of companies on the web are focused on tying down meaning into message delivery. While some form of communication may occur within this mucal shroud of use-value-put-to-good-use the focal point of the communication will always stay intact. Just click here.

Immaterial labor produces "first and foremost a social relation [that] produces not only commodities, but also the capital relation" (see M. Lazzarato, "Immaterial Labor," in this volume, and P. Virno, *Radical Thought in Italy*, Minneapolis: Minnesota University, 1996, 142). If this mercantile relationship is also imperative on the immaterial labor being a social and communicative one, the position of web designers is perhaps an archetype, not just for the misjudged and cannibalistic drive for a "creative economy" currently underway in Britain, but also within a situation where a (formal) language—HTML—explicitly rather than implicitly becomes a means of production: at one point vaingloriously touted as "How to Make Loot."

Web design, considered in its wide definition: by hobbyists, artists, general purpose temps, by specialists, and also in terms of the creation of websites using software such as Pagemill or Dreamweaver, is precisely a social and communicative practice, as Lazzarato says, "whose 'raw material' is subjectivity." This subjectivity is an ensemble of preformatted, automated, contingent and "live" actions, schemas, and decisions performed by both softwares, languages, and designers. This subjectivity is also productive of further sequences of seeing, knowing, and doing.

A key device in the production of websites is the page metaphor. This of course has its historical roots in the imaginal descriptions of the Memex and Xanadu systems—but it has its specific history in that Esperanto for computer-based documents, Structured Generalized Markup Language (SGML) and in the need for storage, distribution, and retrieval of scientific papers at CERN. Use of metaphor within computer interface design is intended to enable easy operation of a new system by overlaying it or even confining it within the characteristics of a homely futuristic device found outside of the computer. A metaphor can take several forms. They include emulators where say, the entire workings of a specific synthesizer are mapped over into a computer where it can be used in its "virtual" form. The computer captures the set of operations of the synthesizer and now the term *emulation* becomes metaphorical. Allowing other modalities of use and imaginal refrain to operate through the machine, the computer now *is* that synthesizer—while also doubled into always being more. Metaphors also include items such as the familiar "desktop" and "wastebasket." This is a notorious

In the one-to-one future, companies will do their best to get their hands on as much of your original writing as they can. They'll subscribe to discussion lists, sort through usenet, hang out in chat rooms, and, depending on the scruples of your internet service provider, scour your outgoing email. Survey data is one thing. Your own language is another. At first, they'll be able learn something about you by virtue of where you choose to express yourself. Then, after they've compiled enough of your ASCII, they'll use natural-language-processing technology to add tidbits of psychographic data on you to their databases. And finally, when the technology matures, they'll be able to start using your language and vocabulary patterns to sell products back to you in highly personalized email messages. Individual-level statistics could be sold to direct marketers, couponers, publishers...or even health-insurance companies. In the one-to-one future, your insurance premiums could be adjusted on a near-real-time basis based on your recent food-purchase patterns. Buy a steak and sour cream, your premium goes up. Buy bran cereal and nonfat milk, and your premium goes down. And, given the appropriate networked calendar software, they could even schedule you for an appointment with your managed-care specialist should your purchases of foods with high levels of saturated fats reach a critical level. In the one-to-one future, however, consumers will not only have aggregated and personalized content. They'll have aggregated and personalized commerce. But in the one-to-one future, personalization won't be limited to just one product category. Instead, consumers will be able to find an online seller who sells a particular lifestyle, defined as a mix of products and services. The seller, in effect, becomes a "commerce editor," presenting the books, clothes, records, movies, shoes, cars, computers, electronics, home furnishings and personal-care products that define a particular lifestyle. The seller will be able to deploy a wide variety of technologies in order to reach the target customer (that is, text, graphics, audio, video, push, chat, discussion, and so on) and can create an online shopping experience that correlates with the customer's personal aesthetics, sense of taste and desired level of interactivity. In the one-to-one future, these thousands of online sellers will be able to focus on the act of selling—creating and maintaining relationships with customers. Meanwhile, the "traditional" e-commerce retailers will be able to focus on retailing—exploiting their economies of scale in sourcing, storing, transacting and fulfilling product. The one-to one-future will not only displace the creators of mass culture but also the creators of micro culture—fine artists. When every piece of information we consume becomes customized for our unique wants and needs, we will

case of a completely misapplied metaphor. A wastebasket is simply an instruction for the deletion of data. Data does not for instance just sit and rot as things do in an actual wastebasket. That's your backup disk. Actual operations of the computer are radically obscured by this vision of it as some cosy information appliance always seen through the rearview mirror of some imagined universal.

The page metaphor in web design might as well be that of a wastebasket.

While things have gone beyond maintaining and re-articulating the mode of address of arcane journals on particle physics the techniques of page layout were ported over directly from graphic design for paper. This meant that HTML had to be contained as a conduit for channeling direct physical representation—integrity to fonts, spacing, inflections, and so on. The actuality of the networks were thus subordinated to the disciplines of graphic design and of graphical user interface simply because of their ability to deal with flatness, the screen. (Though there are conflicts between them based around their respective idealizations of functionality). Currently of course this is a situation that is already edging toward collapse as other data types make incursions onto, through, and beyond the page—but it is a situation that needs to be totaled, and done so consciously and speculatively.

Another metaphor is that of geographical references. Where do you want to go today? This echo of location is presumably designed to suggest to the user that they are not in fact sitting in front of a computer calling up files, but hurtling round an earth embedded into a gigantic trademark "N" or "e" with the power of some voracious cosmological force. The web is a global medium in the approximately the same way that the World Series is a global event. With book design papering over the monitor the real processes of networks can be left to the experts in computer science...

It is the technical opportunity of finding other ways of developing and using this stream of data that provides a starting point for I/O/D 4: The Web Stalker. I/O/D is a three-person collective based in London, whose members are Simon Pope, Colin Green, and myself. As an acronym, the name stands for everything it is possible for it to stand for. There are a number of threads that continue through the group's output. A concern in practice with an expanded definition of the techniques/aesthetics of computer interface. Speculative approaches to hooking these up to other formations that can be characterized as political, literary, musical, etc. The production of stand-alone publications/applications that can fit on one high-density disk and are distributed without charge over various networks.

The material context of the web for this group is viewed mainly as an opportunity rather than as a history. As all HTML is received by the computer as a stream of data, there is nothing to force adherence to the design instructions written into it. These instructions are only followed by a device obedient to them.

Once you become unfaithful to page-description, HTML is taken as a semantic mark up rather than physical markup language. Its appearance on your screen is as dependent upon the interpreting device you use to receive it as much as its "original" state. The actual "commands" in HTML become loci for the negotiation of other potential behaviours or processes.

Several possibilities become apparent. This data stream becomes a phase space, a realm of possibility outside of the browser. It combines with another: there are thousands of other software devices for using the world wide web, waiting in the phase space of code. Since the languages are pre-existing, everything that can possibly be said in them, every program that could possibly be constructed in them is already inherently pre-existent within them. Programming is a question of teasing out the permutations within the dimensions of specific languages or their combinations. That it is never only this opens up programming to its true power—that of synthesis.

One thing we are proposing in this context is that one of the most pressing political, technical, and aesthetic urgencies of the moment is something that subsumes both the modern struggle for the control of production (that is of energies), and the putative postmodern struggle for the means of promotion (that is of circulation) within the dynamics of something that also goes beyond them and that encompasses the political continuum developing between the gene and the electron that most radically marks our age: the struggle for the means of mutation.

A file is dropped into the unstuffer. The projector is opened. The hard drive grinds. The screen goes black. The blacked out screen is a reverse nihilist moment. Suddenly everything is there.

A brief description of the functions of the Web Stalker is necessary as a form of punctuation in this context, but it can of course only really be fully sensed by actual use (see <http://www.backspace.org/iod>). Starting from an empty plane of color, (black is just the default mode—others are chosen using a pop-up menu) the user begins by marqueeing a rectangle. Using a contextual menu, a function is applied to the box. The box, a generic object, is specialized into one of the following functions. For each function put into play, one or more box is created and specialized

Crawler: The Crawler is the part of the Web Stalker that actually links to the web. It is used to start up and to show the current status of the session. It appears as a window containing a bar split into three. A dot moving across the bar shows what stage the Crawler is at. The first section of the bar shows the progress of the net connection. Once connection is made and a URL is found, the dot jumps to the next section of the bar. The second section displays the progress of the Web Stalker as it reads through the found HTML document looking for links to other URLs. The third section of the bar monitors the Web Stalker as it logs all the links that it has found so far. Thus, instead of the user being informed that connection to the net is vaguely "there" by movement on the geographic TV-style icon in the top right hand corner the user has access to specific information about processes and speeds.

Map: Displays references to individual HTML documents as circles and the links from one to another as lines. The URL of each document can be read by clicking on the circle it is represented by. Once a web session has been started at the first URL opened by the Crawler, Map moves through all the links from that site, then through the links from those sites, and so on. The

lose the ability to enjoy, or even tolerate, the singular statement of an individual painter, sculptor, photographer, or printmaker. "If they're not going to paint what I like," the consumer of the future will ask, "why should I buy it?" This means that artists who intend to support themselves with their work will have to adopt market research techniques to make sure they're creating works that targeted segments of collectors will actually enjoy. Alternatively, the art market could become solely commission-based, where buyers work with artists to custom-create a piece that fits with their tastes, their politics, their personalized color scheme. [M. Sippey <msippey@≠viant.com>, One-to-one Future, Mon, 21 Sep 1998 08:02:29 -0700] mapping is dynamic—"Map" is a verb rather than a noun.

Dismantle: The Dismantle window is used to work on specific URLs within HTML documents. URLs at this level will be specific resources such as images, email addresses, sound files, downloadable documents, and so on. Clicking and dragging a circle into the Dismantle window will display all URLs referenced within the HTML document you have chosen, again in the form of circles and lines.

Stash: The Stash provides a document format that can be used to make records of web use. Saved as an HTML file it can also be read by "browsers" and circulated as a separate document. Sites or files are included by dragging and dropping URL circles into a Stash.

HTML Stream: Shows all of the HTML as it is read by the Web Stalker in a separate window. Because as each link is followed by the crawler the HTML appears precisely as a stream, the feed from separate sites is effectively mixed.

Extract: Dragging a URL circle into an extract window strips all the text from a URL. It can be read on screen in this way or saved as a text file.

"A Kansas City company, Applied Micro Technology Inc., is about to begin selling a device for censoring language in TV broadcasts (intended for the protection of children). It works only on closed-captioned broadcasts. If a banned word is found in the closed caption, the sound is muted and the closed caption displayed with a milder word substituted. The original design just matched on words, causing DICK VAN DYKE to turn into JERK VAN GAY. This was obviously inadquate, so it was extended to recognize context. The designer, Rick Bray, says that it now catches 65 out of 66 "offensive words" in the movie Men in Black (for example), and so he now allows his children to see it, and so they're pleased with the device." [T. Byfield <tbyfield@panix.com>, Four Allegories, Sat 14 Mar 1998, 10:51:41 -0500]

The Web Stalker performs an inextricably technical, aesthetic, and ethical operation on the HTML stream that at once refines it, produces new methods of use, ignores much of the data linked to or embedded within it, and provides a mechanism through which the deeper structure of the web can be explored and used.

This is not to say much. It is immediately obvious that the Stalker is incapable of using images and some of the more complex functions available on the web. These include for instance: gifs, forms, Java, VRML, frames, etc. Some of these are deliberately ignored as a way of trashing the dependence on the page and producing a device that is more suited to the propensities of the network. Some are left out simply because of the conditions of the production of the software—we had to decide what was most important for us to achieve with available resources and time. This is not to say that if methods of accessing this data were to be incorporated into the Stalker that they would have been done so "on their own terms." It is likely that at the very least they would have been dismantled, dissected, opened up for use in some way.

Another key factor in the shape of the program and the project as a whole is the language it was written in: Lingo, the language within Macromedia Director—a program normally used for building multimedia products and presentations. This is to say the least a gawky angle to approach writing any application. But it was used for two reasons—it gave us very good control over interface design and because NetLingo was just being introduced, but more importantly because within the skill base of I/O/D, that was what we had. That it was done anyway is, we hope, an encouragement to those who have the "wrong" skills and few resources but a hunger to get things done, and a provocation to those who are highly skilled and equipped but never do anything.

Previous work by artists on the web was channeled into providing content for websites. These sites are bound by the conventions enforced by browser-type software. They therefore remain the most determining aesthetic of this work.

The majority of web-based art, *if it deals with its media context at all* can be understood by four brief typologies:

incoherence (user abuse, ironic dysfunctionality, randomness to mask pointlessness)

archaeology (media archaeology, emulators of old machines and software, and structuralist materialist approach)

retrotooling (integrity to old materials in "new" media, integrity as kitsch derived from punk/jazz/hip hop, old-style computer graphics, and "filmic references"—the Futile Style Of London; see the "FSOL" section of the IOD website)

deconstruction (conservative approach to analyzing-in-practice the development of multimedia and networks, consistently re-articulating contradiction rather than using it as a launching pad for new techniques of composition).

Within the discourse networks of art, including critical technique; license to irresponsibility; compositions-in-progress of taste stratification and breaks; institutions; finance; individual survival strategies; media; social networks; legitimation devices; at least potential openness to new forms; and avowed attentiveness to manifestations of beauty, there were dynamics that were useful to mobilize in order to open up possibilities of circulation and effect for the Web Stalker. However, at the same time as the project was situated within contemporary art, it is also widely operative outside of it. Most obviously it is at the very least, a piece of software.

Just as the Stalker is not-just-art, it can only come into occurrence by being not just itself. It has to be used. Assimilation into possible circuits of distribution and effect in this case means something approaching a media strategy.

Operating at another level to the Web Stalker's engagement within art were two other forms of media that were integral to the project: stickers (bearing a slogan and the I/O/D URL) and freeware. Both are good contenders for being the lowest, most despised grade of media. That the Web Stalker is Freeware has been essential in developing its engagement with various cultures of computing.

The Web Stalker has gone into circulation in the low hundreds of thousands. Responses have ranged from intensely detailed mathematical denunciations of the Map and a total affront that anyone should try anything different; to evil glee, and a superb and generous understanding of the project's techniques and ramifications.

While for many, the internet simply *is* what is visible with a browser, at the same time it is apparent that there is a widespread desire for new nonformulaic software. One of the questions that the Stalker poses is how program design is taken forward. Within the limitations of the programming language and those of time, the project achieved what it set out to do. As a model of software development outside of the superinvested proprietary one this speculative and interventional mode of production stands alongside two other notable radical models: that of free software and that derived from the science shops, (wherein software is developed by designers and programmers in collaboration with clients for specifically social uses). Unlike these others it is not so likely to find itself becoming a model that is widely adoptable *and* sustainable.

In a sense then, the web stalker works as a kind of "tactical software" but it is also deeply implicated within another kind of tacticity—the developing street knowledge of the nets (see G. Lovink and D. Garcia, "The ABC of Tactical Media" <http://www.waag.org/tmn/>). This is a sense of the flows, consistencies and dynamics of the nets that is most closely associated with hackers, but that is perhaps immanent in different ways in every user.

Bringing out and developing this culture however demands attention. In some respects this induction of idiosyncratic knowledges of minute effects ensures only that while the browser wars will never be won, they are never over. So long as there's the software out there working its temporal distortion effects on "progress." So long as there's always some nutter out there in the jungle tooled up with some VT100 web viewer, copies of Mosaic, Macweb, whatever.

At the same time we need to nurture our sources of this *ars metropolitani* of the nets. During recent times and most strongly because of the wider effects of specific acts of repression, hacking itself has often become less able to get things going because it has (a) been driven more underground, (b) been offered more jobs, and (c) been less imaginatively willing or able to ally itself with other social currents.

Software forges modalities of experience—sensoriums through which the world is made and known. As a product of "immaterial labor" software is a social, technical, and aesthetic relation that is embodied—and that is at once productive of more relations. That the production of value has moved so firmly into the terrain of immaterial labor, machine embodied intelligence, style as factory, the production of subjectivity, makes the evolution of what was previously sectioned as "culture" so much more valuable to play for—potentially always as sabotage—but, as a development of the means of mutation, most compellingly as synthesis.

Synthesis is explicitly not constitutive of a universe of synchronization and equivalence where everything connects to everything. Promising nothing but reconstitutive obliteration to "worlds" where everything means only one thing: virtual office, virtual pub, virtual gallery, virtual nightclub, however many more sonic gulags passing as virtual mixing decks. What is so repulsive about this nailed-down faithfulness is not so much that its darkside is about as disturbing as a blacklight lightbulb, or that it presents a social terrain that has been bounced clean by the most voracious of doormen—the miserable consciousnesses of its producers—but that it is continually dragging this space of composition, network, computer, user, software, socius, program production, back into the realm of representation, the dogged circular churning of avatars through the palace of mundane signs, stiffs reduced if at all possible to univocal sprites, rather than putting things into play, rather than making something happen.

Synthesis incorporates representation as a modality. Representation is not replaced but subsumed by the actualization of ideas and the dynamism of material through which, literally "in the realm of possibility," it becomes contingent. But this is not to trap synthesis within the "inherent" qualities of materials. "Truth to materials" functions at once as both a form of transcendence through which by the purest of imputations interpretative schema can pluck out essences and as a form of repressively arch earnestness. This is a process of overflowing all ideal categories.

The Map makes the links between HTML documents. Each URL is a circle, every link is a line. Sites with more lines feeding into them have brighter circles. Filched data coruscating with the simple fact of how many and which sites connect to boredom.com, extreme.net or wherever. (Unless it's been listed on the ignore.txt file customizable and tucked into the back of the Stalker). Every articulation of the figure composing itself on screen is simply each link being followed through. The map spreads out flat in every direction, forging connections rather than faking locations. It is a figuration that is *immutably* live. A processual opening up of the web that whilst it deals at every link with a determinate arrangement has no cutoff point other than infinity. Whilst the Browser just gives you history under the Go menu, the Map swerves past whichever bit of paper is being pressed up to the inside of the screen to govern the next hours of clickthrough time by developing into the future—picking locks as it goes.

From there, in unison with whichever of the other functions are applied, a predatory approach to data is developed. Sites are dismantled, stored, scanned to build up other cultures of use of the nets. That the software is cranky, that things become alien, that it is not the result of years of flowcharted teams, that it forces (horrific act) PC users to use alt, ctrl, delete to quit the program is not in question.

All the while, synthesis keeps running, keeps mixing. Producing sensoriums, modes of operation, worldviews that are downloadable (that is both traceable and open), mixable, measurable, assimilable (but not without risk of contamination), discardable, perhaps even immersive. This is a poetics of potential that is stringent—not just providing another vector for perpetually reactive opportunism—yet revelling in the possibility always also operating within the most intensified sounds: a hardcore methodology.

Aggregates are formed from the realm induced by the coherence of every possibility. Syntactics tweaks, examines, and customs them according to context. This context is not preformatted. It is up for grabs, for remaking. Synthesis determines a context within which it is constitutive and comes into composition within ranges of forces. Everything—every bit, every on or off fact—is understood in terms of its radical coefficiency, against the range of mutation from which it emerged and amongst the potential syntheses with which it remains fecund. It is the production of sensoria that are productive not just of "worlds" but of the world.

SUBJECT: THE LANGUAGE OF NEW MEDIA

FROM: LEV MANOVICH <HTTP://JUPITER.UCSD.EDU/~MANOVICH>
DATE: MON, 26 OCT 1998 20:10:54 -0800 (PST)

1. CATEGORIES

New media requires a new critical language—to describe it, to analyze it, and to teach it. Where shall this language come from? We can't go on simply using technical terms such as "a website" to refer to works radically different from each other in intention and form. At the same time, traditional cultural concepts and forms prove to be inadequate as well. Image and viewer, narrative and montage, illusion and representation, space, and time—everything needs to be redefined again.

To articulate the critical language of new media we need to correlate older cultural/theoretical concepts and the concepts that describe the organization/operation of a digital computer. As an example of this approach, consider the following four categories: *interface, database, navigation, and spatialization.* Each of these categories provides a different lens through which to inquire about the emerging logic, grammar, and poetics of new media; each brings with it a set of different questions.

Database: After the novel and later cinema privileged narrative as the key form of cultural expression of the modern age, the computer age brings with it a new form—database. What are the origins, ideology and possible aesthetics of a database? How can we negotiate between a narrative and a database? Why is database imagination taking over at the end of the twentieth century?

Interface: In contrast to a film, which is projected upon a blank screen and a painting which begins with a white surface, new media objects always exist within a larger context of a human–computer interface. How does a user's familiarity with the computer's interface structure the reception of new media art? Where does interface end and the "content" begin?

Spatialization: The overall trend of computer culture is to spatialize all representations and experiences. The library is replaced by cyberspace; narrative is equated with traveling through space (*Myst*); all kinds of data are rendered in three dimensions through computer visualization. Why is space being privileged? Shall we try to oppose this spatialization (that is, what about time in new media)? What are the different kinds of spaces possible in new media?

Navigation: We no longer only look at images or read texts; instead, we navigate through new media spaces. How can we relate the concept of navigation to more traditional categories such as viewing, reading, and identifying? In what ways do current popular navigation strategies reflect military origins of computer imaging technology? How do we demilitarize our interaction with a computer? How can we describe the person doing the navigation beyond the familiar metaphors of "user" and "flâneur"?

2. GENRES

The next step in articulating the critical language of new media involves defining genres, forms, and figures that persist in spite of constantly changing hardware and software, using the categories as building blocks. For example, consider two key genres of computer culture: a database and navigable space. (That is, creating works in new media can be understood as either constructing the right interface to a multimedia database or as defining a navigation method through spatialized representations.)

Why does computer culture privilege these genres over other possibilities? We may associate the first genre with work (postindustrial labor of information processing) and the second with leisure and fun (computer games), yet this very distinction is no longer valid in computer culture. Increasingly, the same metaphors and interfaces are used at work and at home, for business and for entertainment. For instance, the user navigates through a virtual space both to work and to play, whether analyzing financial data or killing enemies in Doom.

3. APPLICATION

New media theory also should trace the historical formation of these categories and genres. Here are examples of such an analysis.

Exhibit 1: Dziga Vertov, *Man with a Movie Camera*, USSR, 1928

Vertov's avant-garde masterpiece anticipates every trend of new media of the 1990s. Of particular relevance are its *database* structure and its focus on the camera's *navigation* through space.

Computer culture appears to favor a database ("collection," "catalog," and "library" are also appropriate here) over a narrative form. Most websites and CD-ROMs, from individual artistic works to multimedia encyclopedias, are collections of individual items, grouped together using some organising principle. Websites, which continuously grow with new links being added to already existent material, are particularly good examples of this logic. In the case of many artists' CD-ROMs, the tendency is to fill all the available storage space with different material: documentation, related texts, previous works, and so on. In this case, the identity of a CD-ROM (or of a DVD-ROM) as a storage media is projected onto a higher plane, becoming a cultural form of its own.

Vertov's film reconciles narrative and a database by creating narrative out of a database. Records drawn from a database and arranged in a particular order become a picture of modern life—and simultaneously an interpretation of this life. *A Man with a Movie Camera* is a machine for visual epistemology. The film also fetishizes the camera's mobility, its abilities to investigate the world beyond the limits of human vision. In structuring the film around the camera's active exp

Exhibit 2: Evans and Sutherland, *Real-time Computer Graphics for Military Simulators*, USA, early 1990s.

Military and flight simulators have been one of the main applications of real-time 3-D photorealistic computer graphics technology in the seventies and the eigties, thus determining to a significant degree the way this technology developed. One of the most common forms of *navigation* used today in computer culture—flying through spatialized data—can be traced back to simulators representing the world through the viewpoint of a military pilot. Thus, from Vertov's mobile camera we move to the virtual camera of a simulator, which, with the end of the Cold War, became an accepted way to interact with any and all data, the default way of encountering the world in computer culture.

Exhibit 3: Peter Greenaway, *Prospero's Books*, 1991.
One of the few directors of his generation and stature to enthusiastically embrace new media, Greenaway tries to re-invent cinema's visual language by adopting computer's *interface* conventions. In *Prospero's Books*, cinematic screen frequently emulates a computer screen, with two or more images appearing in separate windows. Greenaway also anticipates the aesthetics of later computer multimedia by treating images and text as equals.
Like Vertov, Greenaway can be also thought of a *database* filmmaker, working on a problem of how to reconcile database and narrative forms. Many of his films progress forward by recounting a list of items, a catalog that does not have any inherent order (for example, different books in *Prospero's Books*).

Exhibit 4: Tamás Waliczky, "The Garden" (1992), "The Forest" (1993), "The Way" (1994), Hungary/Germany. Joachim Sauter and Dirk Lüsenbrink (Art+Com), *The Invisible Shape of Things Past*, Berlin, 1997.
Tamás Waliczky openly refuses the default mode of *spatialization* imposed by computer software, that of the one-point linear perspective. Each of his computer animated films "The Garden," The Forest," and "The Way" utilizes a particular perspective system: a water-drop perspective in "The Garden," a cylindrical perspective in "The Forest", and a reverse perspective in "The Way." Working with computer programmers, the artist created custom-made 3-D software to implement these perspective systems.
In "The Invisible Shape of Things Past" Joachim Sauter and Dirk Lüsenbrink created an original *interface* for accessing historical data about Berlin. The interface devirtualizes cinema, so to speak, by placing the records of cinematic vision back into their historical and material context. As the user navigates through a 3-D model of Berlin, he or she comes across elongated shapes lying on city streets. These shapes, which the authors call "filmobjects", correspond to documentary footage recorded at the corresponding points in the city. To create each shape the original footage is digitized and the frames are stacked one after another in depth, with the original camera parameters determining the exact shape.

Exhibit 5: Computer Games, 1990s.
Today computer games represent the most advanced area of new media, combining the latest in real-time photorealistic 3-D graphics, virtual actors, artificial intelligence, artificial life and simulation. They also illustrate the general trend of computer culture toward the *spatialization* of every cultural experience. In many games, narrative and time itself are equated with the

movement through space (that is, going to new rooms, levels, or words.) In contrast to modern literature, theater, and cinema that are built around the psychological tensions between characters, these computer games return us to the ancient forms of narrative where the plot is driven by the spatial movement of the main hero, traveling through distant lands to save the princess, to find the treasure, or to defeat the Dragon.

[This text is based on the program of the symposium “Computing Culture: Defining New Media Genres,” which I and my collegues organized in the spring of 1988 at Center for Research in Computing and the Arts, University of California, San Diego. See <http://jupiter.ucsd.edu/~cul≠ture/symposium.html>. Edited by Mathew Fuller.]

SUBJECT: PHENOMENOLOGY OF LINUX

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DATE: TUE, 17 JUN 1997 20:29:54 -0400 (EDT)

Beyond the traditional division of graphic user interface (GUI) and text-based interface, the unix and linux system/s create a unique environment problematizing machine, boundary, surface, and structure.
The environment has implications far beyond a kinesic study of a particular technology; these tend toward an (un)accountancy of splintering or sputtering, stuttered linkages, microsutures, scanning intention across or among traditionally “isolated” platforms. Begin with the apparent file structure:

1. Working within the files, there are several domains: the formal tree-organization of the operating system (beginning with the root and ascending/descending); the *accumulation* or *heap* of files within the local directory (these files may or may not be related beyond their common path); and the *imminent domain*, the file or files currently open or in the process of being modified (these are nonexclusionary).

2. The graphic interface opens to shells as well, and since the interface devolves from a *blank screen*, there is simultaneously *potential* (click anywhere on it) and absence (nothing visible), reflecting upon the human operator / monitor interface as well.

3. *Errors* may or may not be characterized by *error messages*, which are inscribed by a process evolving from the root cause; there is then both the symptom (program *x* misbehaving) and the message (Error: <etc.>) that intersect: the message may be the (only visible) symptom, and the symptom itself may carry the message.

4. It is easy to assume that source code is equivalent to bones and operable

binaries to flesh; or the kernel as fundament, and file structure as slough. I would rather argue for a system of cubist plateaus of intersecting information regimes, with vectors/commands operating among them. In this sense it is information that is immanent within the operating system, not any particular plateau-architecture.

5. Language moves among performative, declarative, and neutral /dev/nul regimes; again, the boundaries are blurred, even on a technical level. Programs, more properly *scripts* (an apt word, since code is inscribed) call up different languages, shells, other programs, internal or external conduits (see below); internal and external interpenetrate here.

6. The division between GUI and text-based net access is blurred; shell accounts use IP and can open X Window and browsers, just as browser GUIs can share window space with shells.

7. The *space* of the operating system is problematized since machines carve out what I call *fractal channeling*, ports and commands rapidly shuttling back and forth between traditionally external netspace and internal vehicle space. Channels may open to other shells which may open to other channels; loopback channels operate within the local vehicle (internally), for example, and may be used to communicate with incoming on a local talk application. In shell-to-shell, both are equivalent on the screen: think of this as *screen-resonance* or system of strange attractors.

8. Furthermore, within the screen-resonance there are the spaces of the user/s on the system, partly application-dependent, shuttling among persons, tenses, and semantico-grammatical categories (Whorfian, in other words). Two linked talkers may be opened in relation to a net browser on an X Window while top (a program monitoring machine processes) is also running, and files are being transferred from a cdrom to hard drive. Attention moves among these spaces/applications, blurring distinctions; the talkers, for example, may demand considerable psychological investment, while anomalies in one or more of the other applications also call for immediate examination and response. If errors etc. appear, the anomalies (in relation to the normative ongoing chat) may best be described phenomenologically by Schutz's relevance theory, consider lifeworld strata, projects, and presentifications—in spite of the fact that all of this is primarily *read* and *written to*, inscribed and counterinscribed.

9. One might argue that the fractured domain in its entirety is never grasped—nor is there a "domain" and "entirety" at all. If we extend inscription and counterinscription, taking into account fuzzy and fractal channeling (deconstruction of category object/arrow theory), we can work toward a loosely defined sememe undergoing continuous and fairly rapid transformations, which are not necessarily charted from either interior or exterior (meta-) positions. The traditional metapsychology of the user splits, just as it splits beneath the sign of morphing gender in MOOs and IRC; it

is always already possible for theory to take morphing into account (as if morphing is *being-accounted-for* and therefore *accountable*), but this is a posteriori; in fact the splitting problematizes *any* metapsychology insofar as the mind is considered a somewhat closed (hydraulic model) frame, as opposed to a fuzzy communicative systemics paralleling the description herein of the operating system itself.

10. It is not difficult to see, not the operating system as mind, but both mind and operating system as challenging dyadic conventions of interior/exterior, grammatical tense and person, and so on. As I have mentioned before, Merlin Donald takes steps in this direction; one can also consider an accumulation or sememe of *flows* moving among bodies, organs, and so on, along the lines of Deleuze and Guattari.

11. Within and without all of this, the *cyborg* model, based on the suturing of disparate epistemes, becomes oddly antiquated; it accounts well for prosthetics, robotics, and machine/organism navigation, but remains based on traditionally separate ontological domains. Instead, think of spread epistemes and ontologies—for example, the distinction between declarative and performative becomes oddly confused in the case of basic HTML coding (that is. without “refresh” or JavaScript), which flows texts around screens.

12. Finally one might bring up postmodernisms, with their flows, part-objects, relativities, multiculturalisms, incommensurability of commensurable languages (and commensurability of incommensurable language)—as well the postmodern architectures, with their deconstructions, skewlines, and exposures/doublings, baring the systems, decomposing them. And it is true that such architectures have their equivalent among the operating system architectures; the operating system kernel for example may be equivalent to the control center of a building, and the communicative flow through a building has its equivalence with the fractal channeling described above. Nevertheless, I would not want to push this analogy, to the extent that the postmodern is representative of a *stage* (that is, post-Fordism among other things), and not necessarily the (de)construct of a broken episteme more or less permanently on the (broken) horizon and always-having-been-present. For the operating systems under consideration may be likened to the production of a *scanning electron microscope*, a case in which scanning is related to phenomenological intentionality instead of the discrete world of envisioned objects and flows described in, say, Gibson’s work. The difference, yet to be accounted for, never to be accounted for, lies between the optical circularity of the phenomenology of the image produced by the light microscope, and the exaggerated dimensionality and exploratory scanning of any electron microscope, such as the tunneling or even the recent development of the scanning probe, which promises to “image single electrons,” one might almost say, bits and their own architectures down to that very *level* (*Scientific American* July 1997.)

[See <http://jefferson.village.virginia.edu/~spoons/internet_txt.html>.]

SUBJECT: FABRICATED SUBJECTS: REIFICATION, SCHIZOPHRENIA, ARTIFICIAL INTELLIGENCE

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DATE: WED, 5 AUG 1998 14:24 EDT

Schizophrenia is the ego crisis of the cyborg; it is inevitable. Cyborgs are the fabrications of a science invested in the reproduction of subjects it takes to be real, a science whose first mistake was the belief that cyborg subjects were autonomous agents, that they existed outside any web of pre-existing significations. Prestructured by all comers, but taken to be pristine, the artificial agent is caught in the quintessential double bind. Fabricated by the techniques of mass production, the autonomous agent shares in the modern malady of schizophrenia. This piece tells the story of that cyborg, of the ways it has come into being, how it has been circumscribed and defined, how this circumscription has led to its schizophrenia, and the ways in which it might one day be cured.

THE BIRTH OF THE CYBORG: CLASSICAL AI

The cyborg was born in the fifties, the alter ego of the computer. It was launched into a world that had already defined it, a world whose notions of subjectivity and mechanicity not only structured it but provided the very grounds for its existence. It was born from the union of technical possibility with the attitudes, dreams, symbols, concepts, prejudices of the men who had created it. Viewed by its creator as pure potentiality, it was, from the start, hamstrung by the expectations and understandings that defined its existence.

Those expectations were, and are, almost unachievable. The artificial subject is an end point of science, the point at which knowledge of the subject will be so complete that its reproduction is possible. The twin births of Cognitive Science and Artificial Intelligence (AI) represent two sides of the epistemological coin: the reduction of human existence to a set of algorithms and heuristics and the re-integration of those algorithms into a complete agent. This resulting agent carries the burden of proof on its back; its "correctness" provides the objective foundation for a complex system of knowledge whose centerpiece is rationality.

Make no mistake, rationality is the central organizing principle of classical AI. The artificial agent is fabricated in a world where "intelligence," not "existence," is paramount, an "intelligence" identified with the problem-solving behavior of the scientist. For classical AI, the goal is to reduce intelligent behavior to a set of more or less well-defined puzzles, to solve each puzzle in a rational, ideally provably correct, manner, and, one day, to integrate all those puzzle-solvers into an agent indistinguishable (within a sufficiently limited framework) from a human.

That limited framework had better not exceed reason. Despite early dreams of agents as emotionally volatile as humans, the baggage of an engineering background quickly reduced agenthood to rationality. Allen Newell, one of the founders of AI, stated that the decision procedure of an agent must follow the "principle of rationality:" any agent worthy of its name must always pursue a set of goals, and may only take actions it believes help achieve one of its goals ("The Knowledge Level," *CMU CS Technical Report* CMU-CS-81-131, July 1981). In this system's narrow constraints, any agent that defies pure rationality is declared incomprehensible, and hence scientifically invalid.

Given these expectations, it was ironic when the artificial agent began to show signs of schizophrenia. Designing a rational decision procedure to solve a clearly defined puzzle was straightforward; combining these procedures to function holistically in novel situations proved to be nearly impossible. Bound in the straitjacket of pure rationality, the cyborg began to show signs of disintegration: uttering words it did not understand upon hearing, reasoning about events that did not affect its actions, suffering complete breakdown in situations that did not fit into its limited system of preprogrammed concepts. It could play chess like a master, re-arrange blocks on command in its dream world, configure computer boards; but it could not see, find its way around a room, or maintain routine behavior in a changing world. It was defined and fabricated in an ideal, Platonic world, and could not function outside the boundaries of neat definitions. Faced with an uncertain, incompletely knowable world, it ground to a halt.

THE PROMISE OF ALTERNATIVE AI

Understanding that the cyborg was caught in a rational, disembodied double bind, some AI researchers abandoned the terrain of classical AI. Alternative AI—a/k/a Artificial Life, behavior-based AI, situated action—sought to treat agents by redefining the grounds of their existence. No longer limited to the Cartesian subject, the principle of situated action shattered notions of atomic individualism by redefining an agent in terms of its environment. An agent should be understood in terms of interactions with its environment. "Intelligence" is not located in an agent but is the sum total of a pattern of events occurring in the agent and in the world. The agent no longer "solves problems," but "behaves"; the goal is not "intelligence" but "life."

Redefining the agent's conditions of existence breathed new life into the field, if not into the agent itself. Where once there had been puzzle-solvers and theorem-provers as far as the eye could see, there were now herds of walking robots, self-navigating cans-on-wheels and insect pets. Alternative AI gave the cyborg its body and lifted some of the constraints on its behavior. No longer required to be rational, the artificial agent found new vistas open to itself.

It did not, however, escape schizophrenia. Liberated from the constraints of pure reason, practitioners of alternative AI, unwittingly following the latest trends in postmodernism, embrace schizophrenia as a factor of life. Rather than creating schizophrenia as a side effect, they explicitly engineer it in: the more autonomous an agent's behaviors are, the fewer traces of Cartesian ego left, the better. May the most fractured win!

Dear "Nettimers": Allow me to introduce myself to you all. My name is Nathan Myhrvold, and I'm a Group Vice President at Microsoft. One of my responsibilities is identifying new opportunities for us to explore. Over the past several years, I have taken a special interest in the intersection of multimedia and networking. It is my impression that many of you understand just how complex this intersection will be. At Microsoft we take great pride in the quality of our work, but we occasionally find the answers to our quests off our Campus, in vibrant and creative communities of every kind. Nettime is one such community, I believe. You were brought to my attention by Mark Stahlman. In a recent meeting he recommended that I take a look at your mailing list. So I set aside some time to look through your archives; and overall I was extremely impressed with what I found. I was particularly struck by the "rhythm" of your conversations: so many people from so many countries able to identify and work toward a common set of goals, while accepting the necessary tensions and conflicts that advance entails. Believe me when I say that part of my job is to research these kinds of things; so I hope you will accept my compliment when I say it is very rare to find this dymanic on a mailing list. When I investigated the individual efforts of the Nettime list's contributors, I was even more impressed by this commonality, because you are individually pursuing very disparate efforts. At Microsoft, we believe that a very important transformation is taking place. Things that many people take for granted—I am thinking of the mass media at one extreme, and individual creators at the other—will give way to a more complex and multivalent publishing environment. In this developing world, distributed efforts such as Nettime will be truly decisive. That is why I am writing to you now. On behalf of the Microsoft Corporation, I would like to extend an invitation to you Nettime to hold your next meeting on our Redmond Campus. Needless to say, we will make arrangements for travel and lodging costs for up to a total of 300 attendees. As a token of our gratitude, Microsoft will underwrite reasonable expenses incurred in the process of publishing your proceedings. (Mark mentioned to me that the list's maintainers would like to publish a hard-copy anthology of your prior publications.) Of course, I recognize that some members of your group may be hesitant about this invitation for various reasons. I trust that your experiences here will convince you that these reservations can be set aside for the time being in favor of the common pursuit of a better world for all. That is what I am working toward, and I believe the same is true of all "Nettimers." Thank you for your consideration, and I look forward to hearing from you soon. I hope you will accept my apologies in advance when I request that you refrain from publicly forwarding my specific contact information. [allegedly from Nathan Myhrvold <nathanm@microsoft. com>, An Invitation the "Nettime" Mailing List, Tue, 31 Mar 1998 14:20:21 -0800]

At the same time, that schizophrenia becomes a limit point for alternative AI, just as it has been for classical AI. While acknowledging that schizophrenia is not a fatal flaw, alternativists have become frustrated at the extent to which it hampers them from building extensive agents. Alternativists build agents by creating behaviors; the integration of those behaviors into a larger agent has been as much of a stumbling block in alternative AI as the integration of problem-solvers is in classical AI. Despite their differences in philosophy, neither alternativists nor classicists know how to keep an agent's schizophrenia from becoming overwhelming. What is it about the engineering of subjectivities that has made such divergent approaches ground on the same problem?

FABRICATING SCHIZOPHRENIAS

Certainly, classical and alternative AI have very different stakes in their definitions of artificial subjectivity. These different definitions lead to widely divergent possibilities for constructed subjects. At the same time, these subjects share a mode of breakdown; could it be that these agent-rearing practices, at first blush so utterly opposed and motivated by radically dissimilar politics, really have much in common?

The agents' schizophrenia itself points the way to a diagnosis of the common problem. Far from being autonomous and pristine objects, artificial agents carry within themselves the fault lines, not only of their physical environment, but also of the scientific and cultural environment that created them. The breakdowns of the agent reflect the weak points of their construction. It is not only the agents themselves that are suffering from schizophrenia, but the very methodology that is used to create them—a methodology that, at its most basic, both alternative and classical AI share.

In classical AI, the agent is problem-solver and rational goal-seeker, built using functional decomposition. The agent's mind is presumed to contain modules corresponding roughly to problem-solving methods. Researchers work to "solve" each method, creating self-contained modules for vision, speaking and understanding natural language, reasoning, planning, learning, etc. Once they have built each module, the hope is to glue them back together without too much effort to generate a complete problem-solving agent. This is generally an untested hope, since integration, for classicists, is both undervalued and nonobvious. Here, schizophrenia appears as an inability to seamlessly integrate the various competencies into a complete whole; the various parts have conflicting presumptions and divergent belief systems, turning local rationality into global irrationality.

For practitioners of alternative AI, the agent is a behaver, and the preferred methodology is behavioral decomposition. Instead of dividing the agent into modules corresponding to the abstract abilities of the agent, the agent is striated along the lines of its observable behaviors it engages: hunting, exploring, sleeping, fighting, and so on. Alternativists hope to avoid the schizophrenia under which classicists suffer by integrating all the agent's abilities from the start into specific behaviors in which the agent is capable of seamlessly engaging. The problem, again, comes when those behaviors must be combined into a complete agent: the agent knows what to do, but not when

to do it or how to juggle its separate-but-equal behaviors. The agent sleeps instead of fighting, or tries to do both at once. Once again the agent is not a seamlessly integrated whole but a jumble of ill-organized parts.
Fundamentally, in both forms of AI, an artificial agent is an engineered reproduction of a "natural" phenomenon and consists of a semirandom collection of rational decision procedures. Both classical and alternative AI use an analytic methodology, a methodology that was described by Marx long before computationally engineering subjectivities became possible: "the process as a whole is examined objectively, in itself, that is to say, without regard to the question of its execution by human hands, it is analyzed into its constituent phases; and the problem, how to execute each detail process, and bind them all into a whole, is solved by the aid of machines, chemistry, &c" (K. Marx, *Capital*, trans. Moore and Areling, vol. 1, NY: International, 1967, 380). In AI, one analyzes human behavior without reference to cultural context, then attempts, by analysis, to determine and reproduce the process that generates it. The methodology of both types of AI is objective analysis, with the following formula:

1. Identify a phenomenon to reproduce.
2. Characterize that phenomenon by making a finite list of properties that it has.
3. Reproduce each property in a rational decision procedure.
4. Combine the rational decision procedures, perhaps using another rational decision procedure, and presume the original phenomenon results.

The hallmarks of objectivity, reification, and exclusion of external context are clear. Through their methodology, both alternative and classical AI betray themselves as, not singularly novel sciences, but only the latest step in the process of industrialization.

In a sense, the mechanical intelligence provided by computers is the quintessential phenomenon of capitalism. To replace human judgement with mechanical judgement—to record and codify the logic by which rational, profit-maximizing decisions are made—manifests the process that distinguishes capitalism: the rationalization and mechanization of productive processes in the pursuit of profit.... The modern world has reached the point where industrialisation is being directed squarely at the human intellect. (N. Kennedy, *The Industrialization of Intelligence*, London: Unwin Hyman, 1989, 6)

This is no surprise, given that AI as an engineering discipline is often funded by big business. Engineering and capital are co-articulated; fueled by money that encourages simple problem statements, clearcut answers, and quick profit unmitigated by social or cultural concerns, it would in fact be surprising if scientists had developed a different outlook. Reificatory methods seem inevitable. But reification and industrialization lead to schizophrenia—the hard lesson of Taylorism. And the methodology of AI replicates Taylorist techniques. Taylor analyzed workers' behavior to optimize the physical relation between worker and machine. The worker was reduced to a set of functions, each of which was optimized with no regard for the worker's psychological state. Workers were then ordered to act according to the generated optimal specifications; the result was chaos. Workers' bodies fell apart under the strain of repetitive motion. Workers' minds could not take the stress of mind-numbing repetition. Taylorism fell prey to the limits of its own myopic vision.

Taylorism, like AI, demands that rationalization encompass not only the process of production, but the subject itself. "With the modern "psychological" analysis of the work process (in Taylorism) this rational mechanization extends right into the worker's "soul": even his psychological attributes are separated from his total personality and placed in opposition to it so as to facilitate their integration into specialized rational systems and their reduction to statistically viable concepts" (G. Lukács, "Reification," in *History and Class Consciousness*, trans. Livingstone, Cambridge, MIT, 1971, 88). This rationalization turns the subject into an incoherent jumble of semirationalized processes, since "not every mental faculty is suppressed by mechanization; only one faculty (or complex of faculties) is detached from the whole personality and placed in opposition to it, becoming a thing, a commodity" (ibid., 99). At this point, faced with the machine, the subject becomes schizophrenic. And just the same thing happens in AI; a set of faculties is chosen as representative of the desired behavior, is separately rationalized, and is reunited in a parody of holism. It is precisely the reduction of subjectivity to reified faculties or behaviors and the naive identification of the resultant system with subjectivity as a whole that leads to schizophrenia in artificial agents. When it comes to the problem of schizophrenia, the analytic method is at fault.

SCHIZOPHRENIZATION AND SCIENCE

Where does this leave our cyborg? Having traced its schizophrenia to the root, it would seem the antidote is straightforward: jettison the analytic method, and our patient is cured. However, the cyborg cannot recover because its creators cannot give up analysis. The analytic method is not incidental to present AI, something that could be thrown away and replaced with something better, but rather constitutive of it in its current form.

First and foremost, both classical and alternative AI understand themselves as sciences. This means that they desire objectivity of knowledge production in their domain. For something to be objective, the cultural and contingent conditions of its production must be forgotten; like the capitalist commodity-structure, "[i]ts basis is that a relation between people takes on the character of a thing and this acquires a 'phantom objectivity,' an autonomy that seems so strictly rational and all-embracing as to conceal every trace of its fundamental nature in the relation between people" (ibid., 83). Objectivity requires reification as an integral part of scientific methodology, since it insists that the knowing subject must be carefully withheld from the picture. The scientist must narrow the context in which the object is seen to exclude him- or herself, as well as any other factors that are unmeasurable or otherwise elude rationalizing. "The 'pure' facts of the natural sciences arise when a phenomenon of the real world is placed (in thought or in reality) into an environment where its laws can be inspected without outside interference." (G. Lukács, "Orthodox Marxism," in *History and Class* Consciousness, 6). Objectivity requires simplification, definition, and exclusion; in AI it requires the analytic method.

The analytic method, after all, makes two movements: it first reduces an observed phenomenon to a formalized ghost of itself, then takes that formalized, rationalized object as identical to the phenomenon. Formalization requires that one define every object and its limited context in terms of a finite number of strictly identifiable phenomena; it requires reification. This formalism is itself a requirement of objectivity; as the cognitive scientist László Mérö puts it, "The essence of the belief of science is objectivity, and formalization can be regarded as its inevitable but secondary outgrowth" (*Ways of Thinking*, trans. A. C. Gösi-Greguss, ed. V. Mészáros. New Jersey: World Scientific, 1990, 187). The other part of the analytic method, the identification of science's view of an object with that object, is also necessitated by objectivity. Otherwise, if some part of the phenomenon were allowed to escape, what would be left of science's claims to absolute truth?

Thus, the analytic method is a direct result of AI's investments in science and the concomitant demands of objectivity. And if science inexorably leads to schizophrenia, it is precisely because it takes its limited view of the subject for the subject itself. Only allowing for rational, formal knowledge, pure science is always exceeded by the subject, which, appearing as in a broken mirror, seems to be incomprehensibly heterogeneous.

BEYOND SCHIZOPHRENIA? TOWARD A NEW AI

Again, where does this leave our cyborg? Far from being a liberation from rationality by alternative AI, its schizophrenia is the symptom of their under-the-table return to objectivity. Alternative AI makes an important and laudable move in recognizing schizophrenic subjectivity as part of the domain of AI and abandoning pure rationality. Its notions of embodiment and environmental embeddedness of agents and can be revolutionary. However, alternative AI does not go far enough in escaping the problems that underlie desire for rationality. If "[s]chizophrenia is at once the wall, the breaking through this wall, and the failures of this breakthrough," then alternative AI has reached the point of schizophrenia-as-wall and stopped (G. Deleuze and F. Guattari, *Anti-Oedipus*, trans. Hurley, Seem, and Lane. New York: Viking, 1977, 136).

In particular, "not going far enough" means that alternative AI is still invested in the traditional notions of epistemological validity and in pure objectivity. Far from abandoning traditional ideas of objectivity, engineering, and agent divorced from context, alternative AI and ALife in particular have shown an even stronger commitment to them. Creating subjectivities as an engineering process and artificially fabricated subjectivity as a form of objective knowledge production are central to ALife as currently practiced. *Alternative AI is seen as simply more scientific than classical AI*.

Alternativists believe that, by connecting the agent to a synthetic body and by avoiding the most obviously mentalistic terminology, they have short-circuited the plane of meaning-production, and, hence, are generating pure scientific knowledge. Rather than the free-floating, arbitrary signifiers of classical AI, alternative AI uses symbols "grounded" in the physical world. Classical AI is "cheating" because it does not have the additional "hard" constraint of working in "the real world"—a "real world" that, alternativists fail to recognize, always comes prestructured.

What is odd about this mania for objectivity is that the very concept of a hard split between an agent and the environment of its creation necessitated by objectivity really should have been threatened by the fundamental realization of alternative AI: that agents can only be understood with respect to the environment in which they live and with which they interact, an environment that presumably includes culture. In this light, the only way objectivity is maintained for alternativists is to leave glaring gaps in the defined environment where one might expect an agent's cultural connection. These definitions exclude, for example, the designer of the agent and its audience, both physical and scientific, who are in the position of judging the agentness, schizophrenia, and scientific validity of the created agent. Alternative AI fails to realize its own conception—when it should realize its own complicity in the agent's formation it instead remains tethered to the same limiting notions of objectivity as classical AI.

At the same time, the difficulty alternative AI has in introducing more radical notions of agenthood has a clear source—it would require changing not only the definition of an agent, but some deep-seated assumptions that structure the field, defining the rules by which knowledge is created and judged. But at the same time, the very schizophrenia current agents suffer provides a possible catalyst for changing the field. The hook is that even the most jaded alternativists recognize schizophrenia as a technical limitation they would give their eyeteeth to solve. It is the solution of the problem of agent integration by means going beyond traditional engineering self-limitations, exclusions, and formalizations that will finally allow the introduction of nonobjective, nonformalistic methodologies into AI's scientific toolbox.

What will these methodologies look like? The fundamental requirement for the creation of these agents is jettisoning the notion of the "autonomous agent" itself. The autonomous agent by definition is supposed to behave without influence from the people who create or interact with it. By representing the agent as detached from the process that creates it, the relationship between designer and audience is short-circuited, mystifying the agent's role in its cultural context.

Instead of these presuppositions, essential for schizophrenizing the agent, I propose a notion of agent-as-interface, where the design of the agent is focused on neither a set of capacities the agents must possess nor behaviors it must engage in, but on the interactions the agent can engage in and the signs it can communicate with and to its environment. I propose the following postulates for a new AI:

1. *An agent can only be evaluated with respect to its environment, which includes not only the objects with which it interacts, but also its creators and observers*. Autonomous agents are not "intelligent" in and of themselves, but rather with reference to a particular system of constitution and evaluation, including the explicit and implicit goals of the project creating it, that project's group dynamics, and the sources of funding that both facilitate and circumscribe the directions in which the project can be taken. An agent's construction is not limited to the lines of code that form its program but involves a whole social network, which must be analyzed in order to get a complete picture of what that agent is.

2. *An agent's design should focus, not on the agent itself, but on the dynamics of that agent with respect to its physical and social environments*. In classical AI, an agent is designed alone; in alternative AI, it is designed for a physical environment; in a new AI, an agent is designed for a physical, cultural, and social environment, which includes the designer of its architecture, the agent's creator, and the audience that interacts with and judges the agent, including the people who engage it and the intellectual peers who judge its epistemological status. The goals of all these people must be explicitly taken into account in deciding what kind of agent to build and how to build it.

3. *An agent is, and will always remain, a representation*. Artificial agents are a mirror of their creators' understanding of what it means to be at once mechanical and human, intelligent, alive, a subject. Rather than being a pristine testing-ground for theories of mind, agents come overcoded with cultural values, a rich crossroads where culture and technology intersect and reveal their co-articulation.

Under this new AI, agents are no longer schizophrenic precisely because the burden of proof of a larger, self-contradictory system is no longer upon them. Rather than blaming the agent for the faults of its parents we can understand the agent as one part of a larger system. Rather than trying to create agents that are as autonomous as possible, that can erase the grounds of their construction as thoroughly as possible, we understand agents as facilitating particular kinds of interactions between the people who are in contact with them.

Fabricated subjects are fractured subjects, and no injection of straight science will fix them where they are broken. It is time to move beyond scientifically engineering an abstract subjectivity, to hook autonomous agents back into the environments that created them and wish to interact with them. Their schizophrenia is only the symptom of a deeper problem in AI: it marks the point of failure of AI's reliance on analysis and objectivity. To cure it, we must move beyond agent-as-object to understand the roles agents play in a larger cultural framework.

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SUBJECT: ON THE IMPLEMENTATION OF KNOWLEDGE: TOWARD A THEORY OF HARDWARE

FROM: MIKE HALVERSON <MIKE.HALVERSON@RZ.HU-BERLIN.DE>
DATE: WED, 7 OCT 1998 00:14:41 +0200 (MET DST)

The world in which we have lived for the last forty years is no longer broken up into stones, plants, and animals but into the unholy trinity of hardware, software and wetware. Since computer technology (according to the heretical words of its inventor) is at the point of "taking control," the term hardware no longer refers to building and gardening tools but to the repetition, a million times over, of tiny silicon transistors (A. Turing, "Intelligente Maschinen," in B. Dotzler and F. Kittler, eds., *Intelligence Service*, Berlin, 1986, 15). Wetware, on the other hand, is the remainder that is left of the human race when hardware relentlessly uncovers all our faults, errors, and inaccuracies. The billion-dollar business called software is nothing more than that which the wetware makes out of hardware: a logical abstraction that, in theory—but only in theory—fundamentally disregards the time and space frameworks of machines in order to rule them.

In other words, the relationship between hardware, wetware and software remains a paradox. Either machines or humans are in control. However, since the latter possibility is just as obvious as it is trivial, everything depends on how the former is played out. We must be able to pass on to the coming generations—if not as the legacy of these times then as a kind of message in a bottle—what computer technology meant to the first generation it effected. In opposition to this, though, is the fact that theories from the outset turn everything they are at all able to describe into software, that they are already beyond hardware. There exists no word in any ordinary language that does what it says. No description of a machine sets the machine into motion. It is true that implementation, in the old Scottish double-meaning of the word—at once the becoming an implement and the completion or deployment—is indeed the thing that gives plans or theories their efficiency, but at the price of forcing them into silence.

In this crisis, the only remaining remedy is also just as obvious as it is trivial. This essay, instead of attempting a general theory of hardware which cannot be accomplished, turns first of all to history, in order to take the measure of what computer technology calls innovation, with the aid of a familiar hardware: writing. For reasons connected to the city of Berlin, in this year, I further focus on one single hardware: the implementation of the knowledge produced by universities. With the double prerequisites of high technology and the scarcity of finances, a kind of knowledge that needs knowledge hardware can probably do no damage.

1

Ernst Robert Curtius, who knew what he was talking about, called universities "an original creation of the [European] Middle Ages" (*Europäische Literatur und Lateinisches Mittelalter*, 4th ed., Bern, 1963, 64). Even this great medievalist, however, did not bother to clarify the kind of material basis this creation was founded upon. The academies of antiquity, the only comparable institutions, got by with hardware that was more modest and more plentifully available. In Nietzsche's wicked phrasing, Plato himself, in all his Greek "innocence," made it clear "that there wouldn't even be a Platonic philosophy if there hadn't been so many lovely young boys in Athens, the sight of whom was what first set the soul of the philosopher into an erotic ecstasy, leaving his soul no peace until he had planted the seed of all high things in that beautiful soil" (*Twilight of the Idols* 6.3). The cultural legacy of a time in which the free citizens and the working slaves remained strictly separated coincided, then, with biological heredity.

The youths who attended the early medieval universities, on the other hand, were monks. Their task involved neither procreation nor beauty, but work. Since the time of Cassiodor and Benedict, when it was allowed to fall to the level of a lowly craft or trade, this has consisted of writing. Every stroke of the quill on parchment, even if its meaning was lost to the writer, still as such delivered a flesh wound to Satan (Cassiodorus, *De institutione divinarum litterarum*, J. P. Migne, ed., *Patrologia latina* LXX, 1144ff.). Thus it came to be that monasteries, cathedral schools and universities began to produce books incessantly. Unlike the academies or schools of philosophy in antiquity, they were founded on a material basis that cast the transfer of knowledge between the generations in a form of hardware. In place of an amorous rapture between philosophers and young boys, an Arabic import came up between professors and students: the simple page (H. A. Innis, *Empire and Communications*, London 1950). In the writing rooms maintained by every university, under the direction of lecturers, the old books multiplied to a mass of copies. Hardly had the new university been founded when these copies, for their part, forced the founding of a university library. The newly acquired knowledge was multiplied in letters that were sent from scholar to scholar, soon demanding the founding of a university postal system. Long before modern territorial states or nation states nationalized the universities, the dark Middle Ages had already truly implemented this knowledge.

It is well known that, as a legacy of this time when every university had at its disposal its own medium of storage (a library) and its own medium of transmission (a postal system), only the libraries remain. It is possible that the *universitas litterarum*, the community of those versed in writing, was a bit too proud of its literacy to keep it secret as did the cleverer professions. The fastest and largest premodern postal system, reaching all across Europe, is thought to have been maintained by the butchers; but, as Heinrich Bosse has pointed out to me, whenever the butchers had to appear before the court, however, they would strategically deny their writing and reading abilities. It then came to be that, without much ado, the university postal service was merged with the state post upon which Kaiser Maximilian and his royal rivals founded their states. The abolition of the butcher post, however, was only achieved much later by the same kaisers and kings. Bans and prohibitions that were just as draconian as they were repetitive helped spark the Thirty Years War.

In much the same way as the university postal services, which perished due to the vanity of those trained in writing, the university writing rooms have also disappeared. For Gutenberg's invention of moving type was not aimed at the multiplication of books but at their beautification. Everything that previously flowed with the sweat of calligraphers, unable to entirely avoid making copying mistakes, into handwritten texts and miniatures was to become standardized, free of errors, and reproducible. Precisely this new beauty, however, made it possible to break knowledge down into software and hardware. Universities appeared, on the one hand, whose equally slow and unstoppable nationalization replaced the production of books with that of writers, readers and bureaucrats. On the other hand, that Tower of Babel of books also emerged, whose thousands of identical pages had all the same page numbers, and whose equally unfalsifiable illustrations put before the eyes that which the pages described (H. M. Enzensberger, *Mausoleum*, Frankfurt, 1973, 9). Once Leibniz submitted the organizing of authors and titles to the simple ABCs, entire state and national libraries (such as those here in Berlin) were founded upon this addressability. At the same time, this alliance between text and image, book printing and perspective, gave rise to technical knowledge per se.

It is no accident that Gutenberg's moving letters have been called history's first assembly line. For it was the compiling of drawings and lettering, and of construction plans and instruction manuals, which first made it possible for engineers to build further and further on the shoulders—or rather on the books—of their predecessors, without being in any way dependent on oral tradition (M. Giesecke, *Der Buchdruck in der frühen*, Frankfurt, 1991, esp. 626–30). Beyond the universities and their lecturing operations, going all the way back to the succession model of masters and journeymen, technical drawings and mathematical equations promoted a kind of knowledge that could even take book printing as its own basis. Even the aesthetic-mathematical revolutions, bearing fruit in Brunelleschi's linear perspective and Bach's well-tempered clavier, were based upon measuring devices like the darkroom or the clock whose complex construction plans could first be handed down through printed matter. The fact that Vasari placed the invention of the camera obscura, that technically implemented perspective, in the same year as Gutenberg's book printing was, of course, a mistake—but it was significant. In technical media, such as photography or the phonograph, precisely the same discoveries are at work, but with the difference that no longer is any hand, and thus no artistry, necessary to mediate between the algorithm and the machine. Perspective has its origin in the beam path of the lens; frequency analysis in the needle's cutting process. Instead of monks, scholars or artists (in the lovely words of photography pioneer Henry Fox Talbot) with analog media "nature" itself guides "the pencil" (H. von Amelunxen, *Die aufgehobene Zei*, Berlin, 1989, 27ff., esp. Talbot's letter to the *Literary Gazette*, February 2, 1839, v. Amelunxen [30]).

However, the analog media of the greater nineteenth century pay a price for this self-sufficiency. The more algorithmic the transmission of their input data, the more chaotic is the storage of their output data. The immense storage facilities, holding in images and sounds that which was once known as history, replace history with real-time, but they also replace addressability with sheer quantity. In spite of film philology (to use Munich University's bold neologism), no one can skim through celluloid or vinyl like they can in the philologist's books. For this reason, it is precisely the act of implementing optical and acoustic knowledge in Europe which has resulted in boundless ignorance. At the same historical moment that nation states were giving their populations democratic law in the form of general obligatory schooling, the people themselves saw writing fade away into high-tech arcana. Their unreadable power, systematically drifting away from the populations, has passed from World War I's military telegraph system to the expanded directional radio of World War II and, finally, to the computer networks of today. The father of all transmission-technological innovations, however, has been war itself. In a strategic chain of escalation, the telegraph appeared in order to surpass the speed of messenger postal services; radio was developed to solve the problem of vulnerable undersea cables; and the computer emerged to make possible the codification of secret—and interceptable—radio communications. Since then, all knowledge that gives power is technology.

2

Weighed on a moral scale, the legacy of this time may therefore as a complete catastrophe. From a more knowledge-technological estimation, it is, rather, a quantum leap. This strategic escalation has led to the fact that today a historically incredible line of succession holds sway. Living beings transmitted their hereditary information further and further, until millions of years later a mutation interrupted them. Cultures transmitted acquired, and thus not quite hereditary, information ever further with the help of their storage media, until centuries later a technical innovation revolutionized the storage media themselves. Computers, on the other hand, make it truly possible to optimize storage and transmission in all their parameters for the first time. As a legacy of the Cold War, which coupled the mathematical problems of data processing with the telecommunication problems of data transmission, they have produced rates of innovation which irrevocably surpass those of nature and cultures. Computing capacities of computer generations double, not over the course of millions of years, and not over hundreds of years, but every eighteen months (according to Moore's so-called empirical—but as yet only affirmed—law). It is an implementation of knowledge which has already surpassed every attempt at its retelling.

Nevertheless, three points can perhaps be emphasized. First, all the man-years of engineering work possible will no longer suffice for the designing of new computer architectures. Only the machines of the most up-to-date generation are at all capable of sketching out the hardware of the coming generations as a circuit diagram or transistor design. Second, all of the hardware to which such designs refer are is further stored in software libraries,

Until Zip disks arrived, the main form of data conveyancing between machines were 1.4MB floppy disks. These were too small for data storage, and useful mainly as a way of working on documents between machines. Designers sometimes used tapes, but these were mainly limited to professionals. When 100MB Zip disks were introduced, they were promoted as a portable storage medium, particularly for holding internet downloads. The Iomega catch-phrase was “For your stuff.” With this medium, the content of the internet changed from hot data flows to cool data shelves. Images, programs, and audio could be gathered for use offline. Information became stuff. “Pepsi Stuff '97” was the drink manufacturer's GeneratioNext campaign, promoted by sports stars. In the mode of frequent-flier points, purchase of Pepsi comes with credit that can be redeemed for “Pepsi Stuff,” which includes sports clothing. Posters feature famous faces with the slogan “Get Stuff.” This slogan is an icy reduction of the consumerist worldview. First, it has that violent edge demanded of the unbridled consumer id, telling the world to “get stuffed.” Second, it enframes the world as substance for ingestion: stuff always waits, ready to be grabbed, ripped open, and thrown down some orifice. Slam dunk. Stuff never speaks. You get it or you don't. One of the lists circulating around the internet currently is the “Stuff of religion”: here the world's faiths are reduced to the attitude toward stuff. So Taoism translates as “Stuff happens,” Catholicism claims “If stuff happens, I deserve it,” and atheism goes “There is no stuff.” No doubt Heidegger would add “Stuff stuffs.” Like a B-grade horror movie, “Revenge of Stuff” terrorizes idylls of poetic being, coagulating thought into huge sticky masses of crispy-fried fizzy-fluffy humongous awesome-cool crunchy stuff! The problem with stuff is that it's all the same stuff, not different stuff, so the stuff in your head doesn't do interesting stuff anymore. And the stuff people do to say stuff to each other doesn't have any of the meaning stuff that gives stuff its stuff in the first place. So, as the taxidermist says, “Stuff it.” [Kevin Murray (kmurray@mira.net), Theory Stuff, Tue, 8 Sep 1998 21:04:36 +1000.]

which themselves indicate or display not merely their electronic data and boundaries but even the production process. Technical drawing is no longer a drifting abstraction, as once in printed books, dreferring to devices whose possibility or impossibility (in the case of the perpetual motion machine) must first be proven in the process of building. It now indistinguishably coincides with a machine that itself is a technical drawing, in microscopic layers of silicon and silicon dioxide. However, third and lastly, the hardware of today thereby brings together two previously separated knowledge systems: media technology and the library.

On the one hand, computer hardware functions like a library, making possible the storage and retrieval of data under definable addresses. On the other hand, it makes possible the same mathematical operations with these data that have been part of technical analog media since the nineteenth century, operations that, however, have fundamentally vanished from traditional libraries. From this combination, the management of knowledge results in a double gain of efficiency. To the same extent that the analog media appear one after another in the Universal Discrete Machine, their former chaos also falls under an ordering of universal addressing that first truly enables the knowing of images or sounds. Or, the other way round, to the degree that it appears in binary code, writing gains the enormous power to do what it says. It is no accident that what we call in ordinary speech a statement is called, in programming language, a command. Whatever technical drawing simply puts before the eyes, effectively takes place.

3

It is possible that from this short sketch, which does not even come close to doing justice to the complexity of today's hardware, the vast migration that knowledge has experienced and will yet continue to experience does indeed emerge. Michael Giesecke, in his study on book printing of the early modern era, was able to use the triumphal procession of electronic information technology as a methodological model in order to be able to estimate Gutenberg's leap of innovation quantitatively. On the other hand, such a process does not work in reverse. No past leap of innovation can provide the measure for that which is currently occurring. If so-called intellectual work on the one side and its objects of study on the other are as a whole transferred to machines, the self-definition of European modernity, understanding thought as an attribute of subjectivity, is at vulnerable. This is not the time or place to discuss in detail the results of this occurence for a society that blithely banishes machines and programs out of its consciousness and must be immediately retrained. Because it is about implemented knowledge, and not implemented strategy, the results of that migration for universities as institutionalized places of knowledge remain urgent.

At first viewing, there are reasons that the university can be satisfied. First of all, the principle circuit diagram of the Universal Discrete Maschine appeared in an unprepossessing dissertation that counted human beings and machines, regardless of any differences, as paper machines. Secondly, the implementation of this simple and useless paper machine, first put into operation using tubes, later with transistors, also took place at that elite U.S. university which structured the World War II as a sorcerer's war. Third, the circumstances of this birth have already made it sure that the Pentagon, in order to be equipped for the case of an atomic attack, did not only diversify its command centers over numerous states, but also had to link with them the elite colleges from which the hard- and software employed first originated. As Bernard Siegert has pointed out to me, long before the internet was promoted as the utopia of radical democrats and the delight of features editors, it was already a university postal system in precisely the historical sense of the early modern coupling of state and university postal systems, such as in the France of Henry III. The difference being that in the internet, in defiance of all those utopias, scholars do not exchange their findings or documents, but computers transmit their bits and bytes. (Which is not even to speak of the radical democratic forums of discussion.) Every knowledge system has its corresponding medium of transmission, which is why the electronic networks are best understood as first the emanation of the silicon hardware itself, as the planetary expansion and spread of—of all things—the epitome of miniaturized technology. In this respect, universities had better chances under high-tech conditions precisely because their origins are older, more mobile, and more integrated than those of teritorial or national states. It is precisely their proximity to computer technology, however, that makes it difficult for universities to be equipped. Wholly apart from the economic shifts that, in the meantime, have made the design of new hardware generations into a billion dollar business for a few companies, established academic knowledge, along with its implementation, also has theoretical deficiencies. In the pattern of the four faculties that still survives its many reformers, there was from the very beginning no place for media technicians as they explicitely arose out of the modern alphabet and number systems. For this reason, technical knowledge, after a long path through royal societies, royal academies and military engineering schools, all of which circumvented the universities, finally reached the technical colleges, the prototypes of which at the time of the French Revolution were not accidentally called schools for powder and saltpeter. This odor of sulphur frightened the old universities so much that they wanted to refuse the technical colleges the right of promotion to doctoral degrees. And it was first the life's work of the great mathematician Felix Klein, who compensated for his extinguished genius with organizational talent, that in the German Reich prevented science and technology, universities and schools of engineering, from taking fully separate ways. In the garden of the Mathematical Institute at Goettingen, as the first physics laboratory in the history of German universities, a couple of cheap sheds appeared, out of which emerged all of quantum mechanics and the atomic bombs. David Hilbert, Klein's successor to the professorship, was thus doubly refuted. His theory that no hostility exists between mathemeticians and engineers simply because there is no relationship between them at all was overshadowed by world developments, and his hypothesis that all mathematical A. can be decided was pushed aside by Alan Turing's computer prototype (Andrew Hodges, *Alan Turing: The Enigma*, NY, 1983).

Since then, all knowledge, even the mathemetician's most abstract, is technically implemented. If "the nineteenth century," to use Nietzsche's wicked phrasing, was a “victory of the scientific method over science” then our century will be the one that saw the victory of scientific technology over science (“*Nachgelassene Fragmente Anfang 1888 bis Januar 1889*,” *Works*, vol. 8.3, 236). In exactly this way, over a century ago, the physicist Peter Mittelstaedt described it as state of the art, though not without experiencing the passionate animosity of his colleagues. Even in the nineteenth century, according to Mittelstaedt, every experimental scientist worked like a transcendental apperception, in the Kantian sense, incarnate. The data of the sensory impression (to stay with Kant’s phraseology), flowed to the senses, whereupon the understanding and the faculty of judgment could synthesize this flow of data into a generally valid natural law. In contrast, today’s experimental physics claims that stochastic processes which occur far beneath any threshhold of perception are received, first of all, by sensors that digitalize them and transmit them to high-performance computers. What the physicist achieves, finally, with his this human-machine interface, is scarcely “nature” anymore, but, as Heidegger put it in, “The Question of Technology,” a “system of information,” the “ordering” and mathematical modeling of which has itself been taken over by computer technology. The result of this is Mittelstaedt’s compelling conclusion that transcendental apperception, also referred to as knowledge, has simply abdicated.

With this abdication, in part because with solid-state physics it made possible the hardware of today, physics really takes on merely the role of a forerunner. If the spirit of the philosophers itself, in Hegel’s great words in the opening of *The Phenomenology of the Spirit*, is “only as deep as it dares to spread and to lose itself in its interpretation,” though this explicit interpretation would be unthinkable without a storage medium, the formerly so-called humanities (*Geisteswissenschaften*) are no less affected. The fact that they show a readiness to drop their old name and in its place to take on the name of cultural sciences (*Kulturwissenschaften*) appears to encompass a renunciation of transcendental apperception, namely the equally hermeneutic and recursive “knowing of that which is known” (P. A. Boeckh, *Enzyklopädie und Methodologie der philologischen Wissenschaften*, 2d ed., Leipzig, 1886). Cultural science, in case this term doesn’t remain a fashionable word, can surely only mean that the facts which make up integral cultures, the investigation of which is therefore fixed, are in and of themselves technologies; they are, furthermore—in the harsh words of Marcel Mauss—cultural technologies. When texts, images, and sounds are no longer considered the impulses of brilliant individuals but are seen as the output of historically specified writing, reading, and computing technologies, much will already have been gained. Only when the cultural sciences, over and above this, begin to use contemporary logarithms to coordinate all the writing, reading and computing that history has seen will it have proved the truth of its renaming. The legacy of these times is certainly not only to be found in archives and data records, which are inherited by every age, but also in those which it passes down to coming generations. If the knowledge that is handed down, then, does not become recoded and made compatible with the universal medium of the computer, it will be threatened by a foreseeable oblivion. It is quite possible that Goethe, that totem animal of all the German literary sciences, has long since ceased to be

at home in Weimar archives, but has taken residence at the U.S. university that has most exhaustibly scanned-in his writings—an institute that, not in vain, was founded by Mormons, and so for the eternity of the resurrected.
The *apocatastasis panton* need not hurry, as silicon-based calculation and transmission still lack the sufficient storage. Even now, physical parameters are not capable of authenticating the event of the recording per se. That which is valid for archives and storage facilities is, for that reason, all the more valid for the knowledge technologies and categories. In Gutenberg's time there were French monasteries in which handwriting was so deeply rooted that they searched through all three hundred copies of their first printed missal book for copying mistakes. In Fichte's time, and much to his derision, there were professors whose lectures would "re-compose the world's store of book knowledge" although it was clearly to be found "already printed before the eyes of everyone" (J. G. Fichte, "*Deducierter Plan einer zu Berlin zu errichtenden höheren Lehranstalt*," in *Sämmtliche Werke*, vol. 8, Berlin, 1845, 98). Knowledge practices that even today adhere to book knowledge in computer illiteracy and misuse a technology that sits on every writing desk as merely a better kind of typewriter are no less anachronistic. Indeed, even the lectures in video conferences and internet seminars, currently being attempted in many places, presumably bring necessary but still insufficient changes. Only when the categories that are implemented in computers, meaning the algorithms and data structures, are elevated to utilization as guides for—precisely—culture-scientific research will their relationship to the hard sciences be anything more than the shock absorber or compensation for the evil results of technology that has been favored since the time of Odo Marquardt.
The unique opportunity to bridge the chasm between both cultures stems from technology itself. For the first time since the differentiation of libraries and laboratories, the natural sciences again work, insofar as they have become technical sciences, in one and the same medium as the cultural sciences. Soon, the network of machines will have filed texts and formulas, past and future projects, catalogues and hardware libraries in a uniform format under uniform addresses. If it succeeds from that point in articulating the cultural and natural sciences to one another, the university will have a future.

4

This articulation, perhaps, can be expressed with the formula that the cultural sciences will no longer be able to exclude calculation in the name of their timeless truth, and the natural sciences will no longer be able to exclude memory in the name of their timeless logic or efficiency. They must learn from one another in ways that are precisely reversed: the one to make use of calculation, the other of the memory. Only if that which is to be passed down historically is so formalized that it even remains capable of being handed down under high-tech conditions does it produce an archive of possibilities that may be able to claim, in its great variety, no lesser a protection of species than that of plants or animals. The other way round, the technological implementations in which formerly so-called nature crystallizes begin to be more than ever in danger of forgetting, along with their origins, their reason for being. Even now there are vast quantities of data which are sim-

```
#1, "N DAY,^^66"
            * Day_66 -o pal pal.c
            */

            #include
            *<X.h:
            * http://www.jodi.org/day66

            int main(int argc, char **argv)
            {
            unsigned char buf[1024], *p1, *p2;
            int mode=0, valid;
            FILE *infd;

            if (argc > 1) {
            if ((infd = fopen(argv[1], "r")) == NULL) {
            fprintf(stderr,
            "\n%s: Can't load file %s\n", argv[0], argv[1]);
            exit(-1);
            }
            ++mode;

'toolbar=no,location=no,directories=no,status=no,menubar=no,w

            <nettime> Day_66.EXE

            jodi@jodi.org
            Fri, 22 Aug 1997 11:28:28 -0700 (PDT)
```

ply unreadable because the computers that once wrote them can no longer be made to run. Without memory—and this means without a history that also explicitly places machines under the protection of species—the legacy of this time in history, then, cannot be passed on to the coming generations. Only when the natural sciences stop dismissing their history in terms of being a forerunner will that same history begin to appear as a scattering of alternatives. The fact that even Stanford University is preparing to collect the half-forgotten private archives of all the Silicon Valley companies could very soon have a rescuing effect—if not for human lives, then certainly for programs upon which human lives (not only in the airbus) increasingly depend.

The historicity of technologies does not encompass, but rather excludes, sticking to the saddest legacy of all so-called intellectual history. Knowledge can exist without the copyright. When Goethe, in January of 1825, strongly suggested the "favorable conclusion" to a "high" German "national assembly" that he be able "to draw mercantile advantage" "from his intellectual production" "for himself and those of his dependents," the development of a privatization that in the meantime has spread to even formulas and equations was initiated ("*Brief an die Deutsche Bundes-Versammlung*," November 1, 1825, in *Briefe und Tagebücher*, Leipzig, vol. 2, 422). Gene technological and related computer supported procedures are patented, while the currently fastest primary number algorithm—in contrast with four centuries of free mathematics—remains an operational secret of the Pentagon (D. Herrmann, *Algorithmen-Arbeitsbuch*, Bonn, 1992, 4). Turing's proof that everything which humans can compute can also be taken over by machines has up to now had so little effect in an economy of knowledge that, not only at the disadvantage of its transmission capacity, systematically disables more than only the universities. Clearly, our inherited ideas are a long ways from reaching the level of today's hardware, the manufacturing equipment of which costs billions, and the manufacturing price of which, in contrast, crashes downward. It can be expected of hardware, and only of hardware, that it will one day drive out the apparition of the copyright.

That, however, is bitterly necessary. All of the myths that are constantly conjured up, which like the copyright or creativity define knowledge as the immaterial act of a subject, as the software of a wetware, do nothing more than hinder only its implementation. It may be the case that, in past times when the infrastructure of knowledge lay in books, they even had a function. Jean Paul's brilliant but dirt-poor Wuz, in any case, who could not afford to pay for any books, could himself write his library. Today such lists would be condemned to failure. Computer technology offers not merely an infrastructure for knowledge, which could be replaced by other, more costly or time-consuming procedures. Rather, computer technology provides a hardware whose efficiency itself earns the name software compatibility. It is, then, in contrast to all the current theories that have only pictured technology as a prosthesis or tool, an inevitability.

This may not please nation states and scientists. The doctrine, particularly favored in Germany doctrine, that the communicative reason, formerly also called the peace of God, is higher than the instrumental, in the end costs much less. It is probably for this reason that the siren songs of a discourse theory that has no terms at all of time and archive meet such open ears in high offices (N. Luhmann, “*Systemtheoretische Argumentationen*,” in J. Habermas and N. Luhmann, *Theorie der Gesellschaft oder Sozialtechnologie*, Frankfurt, 1971, 336ff.). As places of communicative reason, universities did not have the slightest need for hardware. They got along with just that garden on the north edge of Athens, where Plato once dropped the seed of all higher things in the soil of his young boys. The short history of European universities should have shown, on the other hand, that knowledge is not to be had without technology, and that technology is not to be reduced to instruments. Moreover, the anonymity of knowledge, for which Alan Turing gave his life, makes it ever more impossible to decide whether major states will continue as before to be responsible for knowledge institutions such as universities. One thing is certain, however: it will be decided, regarding the legacy of this time, who set up which hardware when.

[For David Hauptmann, sysop of my professorship, laid off by the Berlin Senate.]

SUBJECT: DIGITAL SALVATION

FROM: JÖRG KOCH <KOCH@WELL.COM>
DATE: THU, 6 AUG 1998 12:49:49 +0100

“At the end of the day it’s all about trying to keep the console alive instead of letting people forget about it and have it fade into obscurity.” —Andrew “Raven” Coleman, 21, London

For a while now, old, long-outdated video game consoles of the eighties such as the Atari 2600 or the Vectrex have been enjoying something of a renaissance. They’ve found their way into the canon of good taste; a multitude of records and T-shirts are testimony to that. PC emulators for old school games are being introduced everywhere with verve, as if every reviewer has to prove his or her proper socialization with the holy trinity of Pong, Space Invaders, and Donkey Kong. But the nostalgic and sentimental enthusiasm for the cute little games of yore is being played out on another level as well. Strategies are also being developed for saving the endangered artifacts of digital culture.
A particularly charming console, Milton Bradley’s (MB) Vectrex, has become the darling of retro gamers. Vectrex was the system every kid wished for but never got because it was too expensive. It appeared on the market in 1982, a single console with a built-in monitor. The main attraction of this mini-arcade was that the screen featured not pixels (as a television does), but vectors. Razor sharp lines, unfettered by raster points, can be scaled at lightening speed, and this is what jettisoned Vectrex into the pantheon of arcades games, right up there with Tempest, Space Wars, and Asteroids. To keep

costs down, MB decided on a black-and-white screen, but nevertheless wanted to bring a little color into the game as well. So every game came with colored filters one could stick in front of the screen, giving the game a unique aesthetic. In short, Vectrex was abstract modernist funk.

A quarter of a century later, Vectrex is still around and is, in fact, more alive than ever. Tom Sloper, who programmed the killer games Spike and Bedlam for the Vectrex and has since designed around eighty games on just about every imaginable platform for Activision, beams, “My old Vectrex-era cohorts and I are astounded that there is now a thriving community of Vectrex fans, that there are people creating new Vectrex software and cartridges.”

No small feat. The computer and entertainment industries thrive on amnesia, full speed ahead to the future, with no looking back. Every sixteen months, the power of processors doubles, and the storage capacity for digital media is all but unlimited. One would think that these would be terrific times for the preservation of the output of our civilization.

Hardly. The rancid cartridges and obscure consoles crammed together at flea markets could serve as a metaphor for a looming informational disaster. In the shift from atoms to bits, any digitally stored information for which we no longer have instruments with which to read it will become indecipherable. But for how long can these rows of zeros and ones actually be stored? At the beginning of the year, an industry-sponsored study by the National Media Institute in St. Paul was released that examined the life expectancies of digital media. The study put an end to the myth of eternal storage. At room temperatures, magnetic tapes can be expected to last for just twenty years, while CD-ROMs vary in their durability between ten and fifty years.

But even if magnetic tapes are still intact, the instruments necessary for them to be of any use have often already been tossed onto the silicon heap of history. “Imagine an encyclopedia program that only runs on Windows 2.0,” says Tom Sloper, describing a typical situation. “Somebody would have to have a machine with Windows 2.0, with an appropriate CPU and the appropriate audio and video cards and drivers, in order to run the software.”

Strategies for salvaging obsolete hardware and software are beginning to evolve. The most refurbished of models will turn up after all in the video game community, whose members might merely be trying to revive their childhood memories, but who are also at the same time developing a blueprint for dealing with obsolescence in general. It’s these people who lovingly scan in old manuals or upload onto the net the source code of games or the smallest detail of the cartridge design of their favorite platform.

They’re creating an infrastructure that makes it possible for, say, the 21-year-old Londoner, Andrew Coleman, to program a new Vectrex game called “Spike goes Skiing” (Spike was the Mario of the Vectrex universe). “I think it’s great what people are doing to try and help preserve the whole ‘culture,’” says Coleman. “The archives that are out there on the Internet hold just about every game written for every classic system, including arcade machines.”

And what about hardware? If the Vectrex hasn’t gone the way of the E.T. poster on the wall in the romper room, the machine is worth a very tidy sum indeed. “Let’s face it, the average life expectancy of a microchip is about 50 years. After that enough of the silicon will have oxidized to render it unus-

able," says Coleman, and goes on to predict that, "In 40 years time there will probably be only a handful of working Vectrex machines and games in the whole world. I think that the emulation scene is the only hope really for keeping these games playable. At the moment, there are emulators for the PC that will let you play just about any old game on a standard computer. The emulators and game files can easily be backed up and transferred onto new media over the years so there's no reason that these games should be lost." Coleman concludes, "There are literally thousands of games out there that took a great deal of work to produce in the first place. I don't want to see all that work lost."
U.S. computer scientist Jeff Rothenberg of the RAND think tank has been addressing the problem of loss of digital data to obsolescence. As early as 1992, he proposed the use of emulation "as a way of retaining the original meaning, behavior, and feel of obsolete digital documents." And sees his efforts validated in the DIY video game emulators. "I see the use of emulation in the video game community as a 'natural experiment' that suggests—though it doesn't prove—the viability of this approach. Nevertheless, the success of the video game community provides significant evidence for the ultimate viability of the emulation approach to preservation."
Learning from old-school video games, then, can also mean learning how to preserve a culture. "I think the Vectrex community shows us that with some dedication and cooperation among people with similar interests," Vectrex veteran Tom Sloper adds Yoda-like, "old software and hardware need not die."

SUBJECT: LINKS AND SYNCHRONISMS ON THE FLESH FRONTIER

FROM: CRITICAL ART ENSEMBLE (BY WAY OF STEVEN KURTZ <72722.3157@COMPUSERVE.COM>)
DATE: SAT, 29 AUG 1998 16:46:21 -0400

Two technological revolutions are currently taking place. The first and most hyped is the revolution in information and communications technologies (ICT). The second is the revolution in biotechnology. While the former seems to be rapidly enveloping the lives of more and more people, the latter appears to be progressing at a lower velocity in a specialized area outside of peoples' everyday lives. In one sense, this general perception is true; ICT is more developed and more pervasive. However, CAE would like to suggest that the developments in biotech are gaining velocity at a higher rate than those in ICT, and that biotechnology is having far greater impact on everyday life than it appears. The reason that ICT seems to be of such greater significance is less because of its material effect and more on account of its enveloping utopian spectacle. Everyone has heard the promises about new virtual markets, electronic communities, total convenience, maximum enter-

Did you ever watch yourself sitting in front of your computer wondering what was gonna happen when you turned it on? Wondering whether it was still gonna work as nicely once you ended the state of promised information and actually started the damn machine? Ever since the data returned from the *Voyager* mission started decaying, we knew that the future was not gonna be as glorious as promised no more. It was not gonna be possible to just download our brains and live in cyberspace all happily ever after. NASA's method tof refreezing the data on acid-free paper printouts won't change our feeling that the wonder years are over and we are facing the reality of Bit Rot. Or, as the Germans call it, *Datenverwesung*. Time's Up is dedicating all its research capabilities and efforts in order to change this horrible prospect. We see one solution only to stop data from decaying: the MicroBit program. Time's Up researchers around the globe are working on the recognition of information before it is complete. Once we solve the problem of how to recombine two halfbits into one complete piece of information, we feel it will betime for us to move on and explore the world of de-information even further. We see an emergence of the quarter-bit hard drive and the tenth-bit swappable interface. In a first step, we will start a program to at least freeze the BitRot before it starts evaporating current Data. We call on to everyone who is afraid of losing valuable information to turn it over to Time's Up, where we will turn it into information that it could have been. In order to further investigate the MicroBit solution and to preserve your data we will give you your option of deciding what it was that your data really wanted to be, or you can let the highly qualified technicians and research scientists at Time's Up determine the essential nature of your data's potential using the latest in bitrot recovery algorithms. Given that data is returning as we speak to some kind of Freudian primal ooze-state, we attempt to apply techniques of regression to discover other possible parallel existences of your data. Developments are underway, but to incorporate all possible methodologies of bitrot reappropriation, we need your data and we need it now. Bit rot is not waiting for you, we shouldn't be either. Call now. [Time's Up <obsolete@timesup.org>, BitRot Program!, Thu, 11 Jun 1998 10:22:44 +0200]

tainment value, global linkage, and electronic liberty, just to name a few. Indeed, this hype has brought a lot of consumers to ICT; however, this explicit spectacularized relationship with the technology has also brought about much skepticism born of painful experience. Those who work with ICT on a daily basis are becoming increasingly aware of office health problems, work intensification, the production of invasive consumption and work spaces, electronic isolation, the collapse of public space, and so on. The problems being generated by ICT are as apparent as its alleged advantages, much as one can enjoy the transport advantages of an auto while at the same time suffering from the disadvantages of smogged-out urban sprawls.

On the other hand, biotechnology has proceeded along a much different route. If ICT is representative of spectacular product deployment, biotechnology has been much more secretive about its progress and deployment. Its spectacle is limited to sporadic news reports on breakthroughs in some of the flagship projects, such as the unexpected rapidity of progress in the Human Genome Project, with the birth of Dolly the cloned sheep (and now her daughter, Polly, a recombinant lamb containing human DNA), or the birth of a donor-program baby to a sixty-three-year-old mother. Each of these events is contextualized within the legitimizing mantles of science and medicine to keep the public calm; however, the biotech developers and researchers must walk a very fine line, because developments that go public can easily cause as much panic as they do elation (just as the aforementioned examples did). Consequently, the biotech revolution is a silent revolution; even its most mundane activities remain outside popular discourse and perception. For example, almost all people have eaten some kind of transgenic food (most likely without knowing it). Transgenic food production, while advantageous for producing industrial quantities and qualities of food, is not a big selling point that marketers want to promote, because there is a deeply entrenched, historically founded popular suspicion (emerging from both secular and religious beliefs) of anything that could be construed as bioengineering. Unfortunately, this very sort of research and development is progressing without contestation, and (to make matters more surprising) there are strong links between developments in biotech and ICT.

MACHINE CODE

From the opening salvos of the Enlightenment to the envelopment of the world in capital, the machinic model of systems has always held an important place in illustrating Western values. Machinic systems exemplify the manifest values that emerge from capitalist economy. When a state-of-the-art machine runs well, it produces at maximum efficiency, never strays from its task, and its engineering is completely intelligible. Is it any wonder that some people in the socioeconomic context of pancapitalism desire to be machines, and cannot understand any phenomenon (the cosmos, society, the body, and so on) as being other than a machine?

Machinic task orientation and the coordination and synchronization of machinic units into functioning systems require a means of "communication," and that system has come to be understood as coding. Among the legacies of late capital, with its fetish for instrumentality, is its obsession with the code. The common belief seems to be that if codes can be invented, streamlined, or cracked, ipso facto, humanity will be all the better for it. Consequently, an army of code-builders and crackers have set to work to understand and/or control the world through the use of this model. Software programmers are perhaps the best known of these researchers, but the model extends to all things, not just machines proper, and so the code analysts, generators, and crackers have found their way into all areas of research. In culture there are those who work tirelessly to understand, develop, or break the codes of the social text in its many variations. Then there are the those who examine organic code. It has not been broken yet, but researchers have made progress. The DNA code has been isolated, and is now being analyzed and mapped (the Human Genome Project). While such knowledge is quite compelling in itself, one must wonder how that knowledge will be contextualized and applied after it leaves the sanctuary of the lab. If the reductive instrumental value system that accompanies the machinic model is applied to genetic codes (and one must assume it will be), the conflation of the organic and the machinic will be become more than just an ideological model; it will be a material construction. Like the computer, organic systems will be engineered to reflect the utilitarian values of pancapitalism.

Using the model of the code as a link, one sees that the two ideologies key to the development of late capital are imploding. One is the machinic system just described, and the other is the ideology of social "evolution." This radically authoritarian ideology has found expression in mid-nineteenth-century social Darwinism, in early twentieth-century eugenics, in Kevin Kelly's neo-Spencerian global free markets, and in Richard Dawkins's memetic information culture. Now functioning in a magical moment of Orwellian doublethink, these two ideological pressures are directing research along a political trajectory toward a totalizing utilitarianism that will give rise to a fully disenchanted cyborg society of the "fittest."

ORGANIC PLATFORMS

When imagining the cyborg society of the near future, considering the rapidity of ICT development within the context of pancapitalism is only half the task. The question "Who is going to use the technology?" becomes increasingly significant. ICT has pushed the velocity of market vectors to such an extreme that humans immersed in technoculture can no longer sustain organic equilibrium. Given the pathological conditions of the electronic workspace, the body often fails to meet the demands of its technological interface or the ideological imperatives of socioeconomic space. Feelings of stress, tension, and alienation can compel the organic platform to act out nonrational behavior patterns that are perceived by power vectors to be useless, counterproductive, and even dangerous to the technological superstructure. In addition, the body can only interact with ICT for a limited period of time before exhaustion, and work is constantly disrupted by libidinal impulses. Many strategies have been used by pancapitalist institutions in an attempt to keep the body producing and consuming at maximum intensity, but most fail. One strategy of control is the use of legitimized drugs. Sedatives, antidepressants, and mood stabilizers are used to bring the body back to a normalized state of being and to prevent disruption of collective activity. (For example, 600,000 new prescriptions were written in the U.S. for Prozac in 1993, and this number has continued to advance throughout the decade, ending in a grand total of 22.8 million in 1998). Unfortunately, social control drugs often rapidly lose their effectiveness, and can damage the platform before it completes its expected productive lifespan.

In order to bring the body up to code and prepare it for the rapidly changing pathological social conditions of technoculture, a pancapitalist institutional subapparatus with knowledge specializations in genetics, cell biology, neurology, biochemistry, pharmacology, embryology, and so on have begun an aggressive body invasion. Their intention is to map and rationalize the body in a manner that will allow the extention of authoritarian policies of fiscal and social control into organic space. We know this network as the *flesh machine*. Its primary mandate is eventually to design and engineer organic constellations with predispositions toward certain task-oriented activities, and to create bodies better suited to extreme technological interaction. The need to redesign the body to meet dromological imperatives (whether in warfare, business, or communications) has been prompted by the ICT revolution. ICT developers must now wait for the engineering gap between ICT and its organic complement to close; because of this, ICT development is slowing down (the web was the last high-velocity moment in the popular ICT revolution) compared to the rate at which investment and research in biotechnological processes and products for humans is growing. CAE believes that while we will continue to see ICT upgrades (such as in bandwidth) and further technological development in domestic space, radically significant change in the communication and information technology of everyday life will not take place until the gap between the technology and its organic platform is closed.

CAPITAL'S ENGINE

Given the entrenched skepticism about bioengineering, what would make an individual embrace reproductive technologies (the most extreme form of biotech)? For the same reasons people rushed to embrace new ICT. In the predatory, antiwelfare market of pancapitalism, a belief has been constructed and promoted that one must seek any advantage to survive its pathological socioeconomic environment. The extremes that function in the best interest of pancapitalist power vectors instantly transform into the common in a society that only profits from perpetual increases in economic velocity.

At the same time, the institutional foundation that produces the desire for bioengineering has blossomed in late capital. The eugenic visionary Frederick Osborn recognized that more hospitable conditions for eugenic policy were emerging in capitalist nations as early as the thirties. Osborn argued that the people would never accept eugenics if it were forced on them by militarized directives; rather, eugenic practices would have to structurally emerge from capitalist economy. The primary social components that would make eugenic behavior voluntary are the dominance of the nuclear family within a rationalized economy of surplus. Under these conditions, Osborn predicted, familial reproduction would become a matter of quality rather than a matter of quantity (as with the extended family). Quality of offspring would be defined by the child's potential for economic success. To assure success, breeders (particularly of the middle class) would be willing to purchase any legitimized medical goods and services to increase the probability of "high-quality" offspring. The economy would recognize this market, and provide goods and services for it. These conditions have come to pass, and the development of these goods and services is well underway. Of course, they only appear when one searches for them.

Without question, there is a strong intersection between the technology of the *sight machine* (ICT) and the technology of the *flesh machine*, much as the organic and the synthetic are necessary complements. Development in one machine system has a profound influence on development in the other. They merge under the value system of instrumentality. So in spite of the cyber-hype claims that the body is obsolete, and about to give way to post-human virtualization, it seems the body is here to stay. Why should capital refuse this opportunity—the greatest market bonanza since colonization, and the best method of self-policing since Catholic guilt? Unfortunately, the body of the future will not be the liquid, free-forming body that yields to individual desire; rather, it will be a solid entity whose behaviors are fortified by task-oriented technological armor interfacing with ideologically engineered flesh.

[An elaboration of this argument is in *Flesh Machine* (NY: Autonomedia/ Semiotext[e], 1997), or the abbreviated version, "The Coming of Age of the Flesh Machine," in T. Druckrey, ed., *Electronic Culture*, NY: perture, 1997.]

SUBJECT: CONFESSIONS OF A BACKSEAT DRIVER CA. 1998

FROM: PAULINE VAN MOURIK BROEKMAN <PAULINE@METAMUTE.COM>

DATE: WED, 14 OCT 1998 11:52:27 +0100

On Great Windmill Street, just around the corner from the bubble behemoth of SegaWorld, a humbler Mecca has been putting down its wire roots. This one is named Wonderpark and is the brainchild of competitors Namco. Interestingly enough, Wonderpark is a different kettle of fish altogether from its neighbor. Where going to Segaworld is, all in all, a pretty antisocial experience (destined to ensure it most-favored status with families everywhere), Wonderpark feels like a teenage promenade gone mad. Coke- and change-machines oiling the general interaction, this is hormone intensity of a totally different order: gangs of girls play on the Shrinky Dink photobooths, gangs of boys on the fighting games and, just to piss Barbie off, roles are regularly reversed—girls slugging it out to the death. No one could harbor the illusion that Wonderpark isn't part of the same engineered reality, though. Your walk-through is totally choreographed: easy escalators in and shadowy stairs out, banks of driving-simulation machines flanking the big attractions like a defensive military regiment (lest you escape without playing and paying) and wall-to-wall CCTV and security guards, keeping the kids in sight, and in line, at all times. But, somewhere inside this ring of steel, there are cracks. They are, to state the obvious, provided by the games themselves.

Wonderpark's most popular games by a long stroke are the Tekken derivatives—descendants of Namco's classic early-nineties fighting game where one character of the player's choice battles it out against another (either played "by the machine" or by another player). Whereas three years ago, the character selection consisted of about four men and four women, all appropriately mythical and manga-esque, the contemporary offering spans about fifty subspecies, ostensibly tweaked to accommodate every need and creed (albeit dutifully Orientalized). Where early Tekken fights were conducted on a flat plain in an ethereal nowhere land (the proverbial end of the world), the latest ones are plonked down in a bizarre assortment of "realistic" locations. You could, for example, end up with a beefy, blond, Oriental boxing hero fighting a basketball lookalike of the A-Team's B. A. Barracus on a nameless American city street with onlookers and fast cars thrown in for realism's sake. Behind you would stand a Chinese business man shifting from one foot to another, his shirt dangling out of his trousers and his briefcase disheveled from overuse, while next to him an up-for-it cheerleader would jump up and down ad infinitum, egging you on in a self-imposed trance. Behind you, cars would screech by, wait for traffic lights to turn from red to green and go about their business on an eternal loop-de-loop like everything, and everyone, else.

Speed of response, compulsive logic problems, dynamic complexity and the elusive "gameplay" being the prime drivers of most games (or at least of the successful ones) the importance of their graphic environments—and even characters—can be overestimated. Background scenarios such as the one described above melt away next to the foreground activity. If the fighting itself wasn't getting better, faster, more seamlessly integrated with the hand-eye dynamics of the player, the Tekken derivatives would be standing around, just as lonely as all the other unpopular games in Wonderpark. Place classics like PONG, Tetris or Pac-Man next to some of the more recent, graphics-heavy candidates and the former "basic" ones will win hands-down every time (no pun intended). The current tendency toward "realism" and enhanced graphics that cuts across games genres as diverse as ski-simulations and fighting games (and which, beyond gaming, impacts on every single pixel of the graphical user interface—be that of Macs or PCs) seems inversely proportional to the thought being put into the question of *where*—or under which phenomenological and technological/systemic conditions—good gameplay occurs. The fact that simulation and fighting games are the most popular by far merely points to the fact that the area where this has been most successfully considered is propulsive physical movement. Whether it's blasting your way through a dungeon, successfully negotiating a moving train and jumping onto another one while shooting your opponents straight to hell, or driving at 200 mph through a deserted city, the parameters of virtual and concrete architectures are relatively simply aligned.

The no-holds-barred propulsion forward—and back—merely subject to far less friction than it would in the world of the concrete (and therefore so attractive to tired urbanites the world over).

You don't need to be a disciple of "computer visionaries" such as Brenda Laurel to see something cathartic (her term) is going on in many of the most popular games. Her erstwhile singling-out of games in discussions of computers, representation, and "meaningful" dramatic action would no doubt be repeated were she to survey the contemporary terrain. Whereas the VR industry stumbles around in search of a gratifying (read: lucrative) object, games have raged ahead in their exploration of, for want of a better word, the virtual. Even over as short a span as the past two years, the fast-developing ethos surrounding their effects on the body and the user's relationship to the world can—still—be gleaned from their incredible advertising campaigns. A couple of years ago, the opening of Segaworld saw Sega's blithe identification with the "extreme" mind-altering signifiers of drugs and hormones (the architecture of this Mecca will continue to stand as a testament to this specific point in time); elsewhere, companies like Sony even went so far as to advertise the PlayStation as a full-on intervention in the Occidental rationalist paradigm—the ads ran as a Zen master's, PlayStation-aided, hack of TV: Western media symbol par excellence). Now, in 1998, a strange pragmatism has set in, here as in many other areas of computing. Gone are the claims to paradigm-busting. Gone are the claims to mental dissolution, cortex rewiring, or entire escapes from reality, aided and abetted by the power of the machine. In their place have come hesitant, ironic, acknowledgments of the frictious relationship between the phenomenological interactions of "real life" and those of game space: Nintendo 64's latest ad, tagged with the mantra "Feel Everything" has a player making mistakes in his handling of "real" scenarios, "real"—and often very basic—physical interactions due to his overfamiliarity with another set of phenomenological standards: those generated by the machine.

The paranoid paraphernalia accompanying many games in Wonderpark and Segaworld certainly pays testament to a crisis of sorts. Simulation games especially are creating some interesting by-products. Construct a taxonomy of the modern gaming arcade and the main growth area seems to be awkward, clunky, objects that go *in-between*. Consequently, we now have a burgeoning morphology of padded armrests, safety railings, skipoles, pooltables, bowling alleys, cardboard icicles, model airplanes and outsized footpedals. Their raison d'être is cushioning the physical (or ocular) transition between the analog/object world and that of the digital/screen. At the same time, they function to convince users that times haven't changed: you're still doing the same thing really...your body hasn't changed, your adrenaline levels haven't changed, it's just that bit more dark in here and you need to be wired up to do it. It is hard not to see this push-me-pull-me game of denial, engagement, submission, and rejection as a far more interesting development than that positing a radical ontological break with the world that was popular a few years back. At Wonderpark, the cracks in the ring of steel might be widening, attracting hordes of teenagers every weekend to their paranoid, greedy hosts, but after the teens leave they go home, stepping on the cracks of the pavement instead. Outside, "a hole in the wall" remains the only way you're going to get any cash.