



Electronic Media Studies: From Video Art to Artificial Invention

Author(s): Craig Saper

Source: *SubStance*, Vol. 20, No. 3, Issue 66: Special Issue: Deleuze & Guattari, (1991), pp. 114-134

Published by: University of Wisconsin Press

Stable URL: <http://www.jstor.org/stable/3685183>

Accessed: 19/08/2008 11:47

---

Your use of the JSTOR archive indicates your acceptance of JSTOR's Terms and Conditions of Use, available at <http://www.jstor.org/page/info/about/policies/terms.jsp>. JSTOR's Terms and Conditions of Use provides, in part, that unless you have obtained prior permission, you may not download an entire issue of a journal or multiple copies of articles, and you may use content in the JSTOR archive only for your personal, non-commercial use.

Please contact the publisher regarding any further use of this work. Publisher contact information may be obtained at <http://www.jstor.org/action/showPublisher?publisherCode=uwisc>.

Each copy of any part of a JSTOR transmission must contain the same copyright notice that appears on the screen or printed page of such transmission.

---

JSTOR is a not-for-profit organization founded in 1995 to build trusted digital archives for scholarship. We work with the scholarly community to preserve their work and the materials they rely upon, and to build a common research platform that promotes the discovery and use of these resources. For more information about JSTOR, please contact [support@jstor.org](mailto:support@jstor.org).

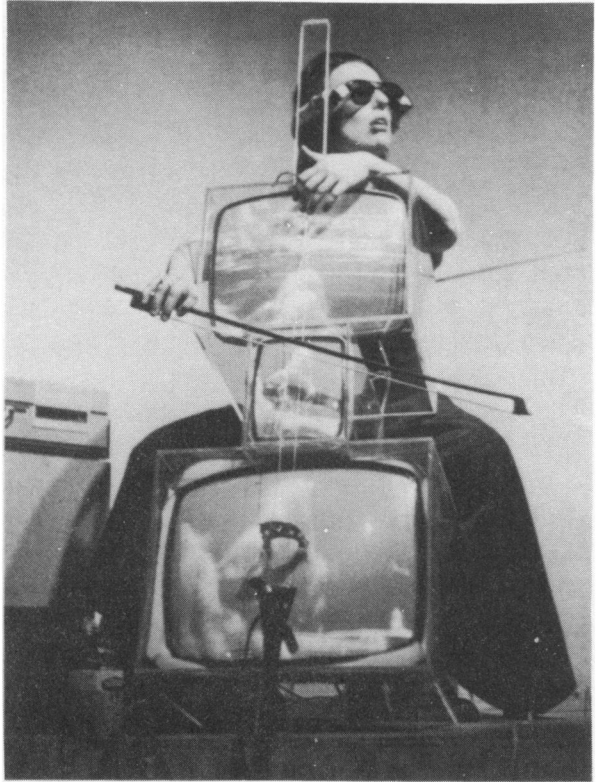
# Electronic Media Studies: From Video Art to Artificial Invention

Craig Saper

AS A PARODY OF MAGISTERIAL HORNS, a *bing*, *beep*, or *boing* announces more than an electro-writing pad or a glorified calculator: every time a personal computer turns on, it lights up a primitive prototype of artificial intelligence. Cartoon-like icons pop onto a field of candy-colored luminescence, and an arrow floats on the screen, manipulated by a wired “mouse.” Like writing while looking at the page in a mirror, it conjures up fantasies of cyborg gloves and goggles: senses of sight and touch separated, then electronically synthesized. Dragging through Menus of promises to “Open,” “Duplicate,” or even “Shutdown,” the computer user follows the contours of a thought built on computational commands. The system mirrors something called cognition—the abstract rules of supposedly pure unadulterated thought. Or, more precisely, the screen mirrors cognitivism’s pop-comical description of human minds as algorithmic computational code machines. This cartoon-like cognizing-subject suggests an assemblage of possibilities. These assemblages lead to the following analogy: what cognitivism is to artificial intelligence, *rhizomatism* is to artificial invention. While cognitive psychology promises to trace out the contours of intelligence, rhizomatism offers a map: cognitivism takes off as a line of flight, careening from code machines and cogs through bicycle chains to scores of songlines and musical comedies, turning Naim June Paik’s electronic invention, the *Tele-Cello*, into a model for artificial invention. While cognitivism’s algorithms function as rules for expert systems, Deleuze and Guatarri’s *A Thousand Plateaus* functions as an expert rhizomatism, helping to insert video art experiments into computer programming.

How can we turn Paik’s *Tele-Cello* into a model for artificial invention? In the context of media theory, we can appreciate its relevance. Media theories in the 1970s and early 1980s tried to account for the ways in which the “cinematic apparatus” positioned subjects as consumers/spectators; the social “apparatus” effaced the labor involved in constructing meanings.

Fig. 1. Naim June Paik's Tele-Cello, played by cellist Charlotte Moorman. The musical vibrations are echoed visually on the screens, in pre-recorded or live images, transformed by a Paik/Abe synthesiser. Reproduced courtesy of Hachette, from *L'Aventure de l'art au XX<sup>e</sup> Siècle*, ed. J.L. Ferrier, 1988.



In those theories, the cinematic apparatus allowed for a kind of liberating delirium, but only in the confines of a patriarchal-humanist social order.

The spectator's vision ("gaze") was carefully guided, and social control "sutured" subjects into a hegemonic ideology. In the terms of *A Thousand Plateaus*, Patricia Mellencamp explains that "commercial narrative films are on the side of the *arborescent*—a series of 'subjective affects form pre-established connections' labeled continuity style" (201). Perhaps because of this critical awareness among media theorists, they should hesitate to adopt computer technology into their pedagogical practice. Indeed, Gregory Ulmer suggests this connection between film theory and electronics by arguing that the "occultation of the production process [in Hollywood narrative films] in favor of a consumption of the product as if it were 'natural,' is *at work again in computing*" (1991, card number 1; emphasis added).<sup>1</sup> If educational technologists have attempted to design software to "suture" the user into a seamless world of information, then avant-garde experiments may offer an alternative model. Many avant-garde films and videos frustrate the desire for pre-established connections.

Unlike Hollywood films, these experimental works do not occult the production process with continuity conventions. Paik's work goes far to "derail continuity . . . and 'baffle and loosen' the hold of the gaze"(Mellen-camp 123). Other models might show potential as vehicles for rhizomatism, but when we turn Paik's experiments into an alternative to the conduit model of communication, we open many routes for further investigation.

Except for avant-garde experiments, much of the analysis surrounding electronic media tended, (unlike film analysis) to merely describe the technical functions of hardware or software. Stewart Brand's *The Media Lab*, typical of a number of books on electronics, suggests that technological changes will facilitate "home manipulation of commercial information." He considers his book as a "primer for a new life-style" of "individual eccentricity." Because of his association with the "electric kool-aid acid" testers, one would expect some daring recipes. But in spite of his provocative comments, he fails to offer any theory of how to use electronics, except in the simplest functional terms (21 and 251-2).<sup>2</sup> Brand's name for his book, *The Media Lab*, and his past endeavors with the "merry pranksters" hint at an alternative to technical descriptions; instead of "selling" finished products, he might actually run electronic-kool-aid acid tests in the spirit of Huysmann's "smell organ." While film theory sought to expose the "system of signification" in the apparatus, the theory explored here "runs a test" with the occulted "system of signification" in computer programming. In that sense, *A Thousand Plateaus* does more than offer a rigorous, dramatic speculation about the future of electronic culture—its creative potential and its despotic possibilities; it supplies a recipe for a "plateau" premised on electronic media experiments.

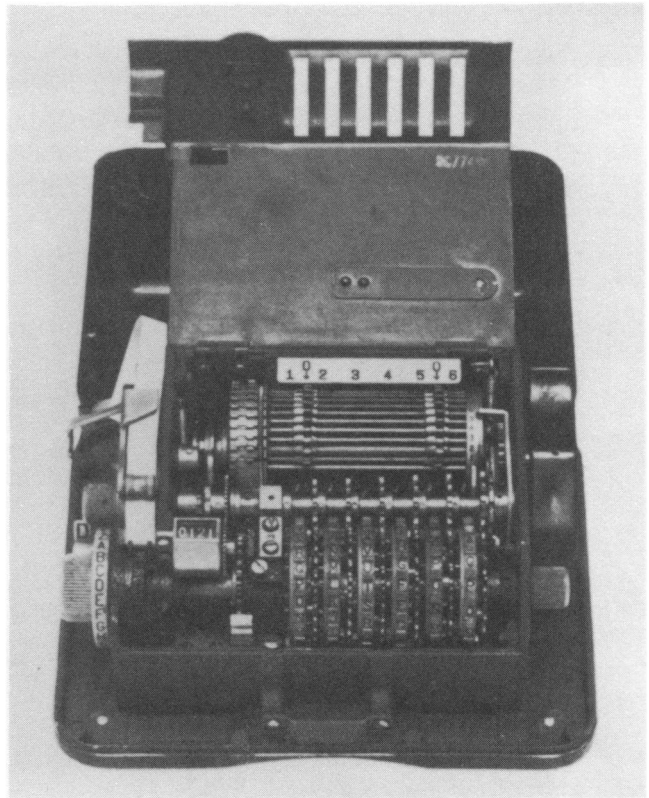
### **Cognitivism's *Becoming-Electric* : The Cipher-Machine Approach**

The experiment involves "running tests" or "mapping assemblages" rather than merely debunking cognitivism. It is not enough to turn Paik into a model. We need a way of moving through that model. The "Turing Machine" offers precisely the vehicle for exploring cognitivism's rhizomatic potential as it is *becoming-electronic*. Alvin Turing, in his efforts to break the Nazi's ENIGMA code machine, conceptualized a computer system to simulate the substitutions and combinations of any and all cipher machines. His article, "On Computable Numbers" written in 1936, describes the theory necessary for a logic machine to function, and it

opened the way for the production of the modern computer. For the purposes of this essay, Turing's logic machine depends on a cipher-cognition of substitutions and combinations.

After cryptologists became more sophisticated, efforts focused on designing "public codes," in which anyone can encode, but not decode, a message. The system works by transforming the letters of the message into numbers by any convenient scheme, and then adding to these numbers a series of absolutely random digits (the key) that never repeats. No matter how many messages accumulate, the sum of the substitutions constitutes a cipher that, unlike all others, does not yield to decoding. A "prime number" which never repeats the same digits in sequence serves to create a key for public codes. The system, based on the early attempts to find prime numbers, also led to prototypes of computers. One early and well-known prime number machine, built by Lehmer, became known as the "Bicycle-chain Sieve;" it used a sawhorse, bicycle chains, and common hardware.

Fig. 2. The M209 (Hagelin) Cipher-Code Machine. Reproduced courtesy of John Wiley & Sons, from *Cryptography: A Primer*, by Alan Konheim, 1981.



How do these peculiar combination machines influence research models? Occasionally, discussions include speculations about how ciphers may have changed patterns of thinking. Most notably, Frances Yates explains the connection between *The Art of Memory* and cipher disks, and in *Turing Man: Western Culture in the Computer Age*, Jay Bolter describes the potential of electronic writing. Yates explains that interpretation depends on a notion of successive substitutions, and the possibility of decoding cipher messages. Critics have explored the socio-political problems related to the Turing Machine or to cognitivism as a model for artificial intelligence (and, by extension, as an increasingly prevalent model of human thinking). A number of articles have analyzed the implications of assuming that people function (like computers) as *information processors*. John Bowers begins his genealogy of the “computational metaphor” by quoting Deleuze and Guattari on the *rhizomatic* versus the *arborescent* model of thinking. Similar to the theories of the “cinematic apparatus” discussed at the beginning of this essay, Bowers’s focus is on how the “regimes of visibility” connect to “claims that knowledge can exist in some pure, disinterested realm, abstracted away from particular social applications and the political questions this raises” (131). He argues that the Turing Test has allowed this disembodied notion of intelligence not only to assume a legitimacy, but also to link mind and machine. (By extension, we can understand that teaching depends on particular metaphors of thinking.)

Douglas Noble focuses on educational applications of computer-modeled definitions of thinking; he studies the “teaching of thinking” based on a particular model of computer programming. Before outlining the problems inherent in this application, Noble explains how the cognitive model arose historically and functionally from a military model; the militarization of the mind through cognitive models not only disembodies and decontextualizes knowledge, but also reduces education to

... task-specific training, with its emphasis on performance outcomes and “time-on-task” efficiency. And [it includes] a desiccated redefinition of key educational concepts—intelligence, learning, thinking—into “information processing procedures” which are highly “mindful” yet unreflective and predetermined. (32)

In the effort to develop a technology which emulates human intellectual abilities, cognitive scientists tend to efface the social machinations involved in thinking. In building that model of abstracted pre-social intelligence, they posit a realm called *cognition*. The activities or behaviors cognitive scientists seek to emulate with computer technology are stripped

of their "social character" in order to posit the existence of inner, pre- or non-social processes (Woolgar 311-316).

Even in their efforts to criticize cognitivism, the sociological explanations use the same underlying algorithmic method. In contemporary media studies, this same type of interpretive practice helps us decode film texts and cultural phenomena: reading one code or sign for another. In that sense, cipher-cognition suggests an abstract machine which guides modern interpretive practices as well as cognitivism. The cognitive approach to artificial intelligence uses a "model of thinking built from a relatively limited number of principles" (Collins 331); that reliance on algorithms to explain the computations involved in cognition (*i.e.*, thinking, problem-solving, knowing, deciding, seeing, learning, understanding, etc.) leaves the model open to attacks on its assumptions of codifying intelligence. Yet, the anti-cognitive critics often depend on similar assumptions and codified representations; there is a "danger of merely substituting a social for cognitive mechanism" (Woolgar 325). Indeed, the criticisms of cognitivism may have more to teach us about the socially based "cultural studies" now prevalent in the humanities. As sociologist H.M. Collins explains,

Methods of research, such as using questionnaires and other techniques for gathering "information" about societies, rest, one might argue, on the assumption that interesting and useful knowledge can be transmitted to members of society and the researcher alike in discrete bits capable of being written down, classified, and counted. This might be called the algorithmic model of sociological research. . . . discrete bits of information and logical instructions. (330)

Deleuze and Guattari's criticisms of "tracing" are aimed at the combination of psychoanalysis and Marxism which decodes messages according to algorithmic formulas. In those decodings, the critic traces each turn the text (or author) makes, ciphering the illusory cultural myth back to the underlying socio-political message. The "symptom" appears in the form of a ciphered message; the text or author, much like the analysand, cannot confront some repressed (cultural, political) desire, so the message undergoes a transformation. Symptomatic criticism functions as a symmetrical cipher machine, imagining exactly the turns and substitutions made by the cipher-cogs of the censoring mind. As Robert Ray points out, this model has become so widespread that the "policing" of texts for ideological distortions has become routine, and the decoded secrets appear predictable rather than surprising. The cipher-cogs emblemize the particular process of decoding found in media criticisms. The surveillance of texts makes

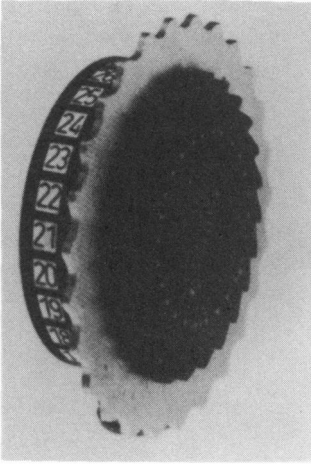


Fig. 3. A rotor from a cipher-code machine. Reproduced courtesy of John Wiley & Sons, from *Cryptography: A Primer*, by Alan Konheim, 1981.

research (as decoding) into statistical proof; one group of film scholars randomly selected 100 Hollywood movies to determine the real nature of the "Classical Hollywood Cinema." Another group of media critics regularly estimate how many murders an average American child will watch on television before various ages. Media "watchdog" groups now tell us what (large) percentage of the "talking heads" appearing on supposedly objective news programs are white males. The list goes on; *statistics* has become the latest mode of algorithmic decoding.

A few critics have begun to explore an alternative to the decoding method of interpretation. Donna Haraway's ironic play on "new age" clichés about all the animals and people living as one big family also hints at something other than intelligence and identity determined by cognitive or social algorithms. She explains that the mechanized virtual reality or *cyborg world* does suggest a "grid of control of the planet" with a "final abstraction embodied in a Star War apocalypse" fought "in a masculinist orgy of war" (72). But, she goes on to argue that the cyborg world might lead to a "joint kinship with animals and machines, [that is] not afraid of permanently partial identities and contradictory standpoints" (72). She offers a line of flight for the substitution and combination cipher machine; an alternative to decoding.

Where can we find explicit models of substitution and combination as part of a cipher- or writing-machine? In discussing models of electronic writing that make substitution and combination into a way of thinking, Bolter notes one experiment which "everyone seems to have heard of," but few "know its title or author." The experiment by Marc Saporta, *Composi-*



tion No. 1 (1963), written on a series of cards slightly larger than playing cards, begins with the following introduction: "The reader is requested to shuffle these pages like a deck of cards, to cut, if he likes, with his left hand, as at a fortuneteller's . . ." Bolter finds in this experiment, as in work by Barthes, Derrida, the concrete poets, and others, a "bridge to the literature of the electronic medium" (1991, 40-42). These experiments offer a model based not on "signifying" (on ciphered texts and enlightening or revealing decodings), nor on ordering or tracing, but on a mapping of cipher-cognition, to make variations. One might use the bicycle-chain sieve for movement, passage, and experiment. Michael Polanyi argues that in order to ride a bike, the rider need know nothing about centers of gravity nor gyroscopic forces; bicycle riding depends on tacit knowledge. We learn to ride by following examples and doing, not by knowing the rules.

### "Faciality" and Face Equations

For Deleuze and Guattari, where meaning and subjectivity intersect, one finds "faciality." Much in the same way that concentric disks link up to signify or encode meaning, the "humans-machines" system "misrecognizes" (*méconnaissance*) itself as an interface. The "interface" functions as an "electro-mirror" stage of screens, faces, screened faces, and facialized screens. In explaining "faciality," Deleuze and Guattari mention that the face equation always comes in pairs: breast-mouth, landscape-face, hand-use objects, or (in this case) screen-face; it always marks an intersection of meaning and subjectivity. The abstract machine implied in facialized objects makes communication possible (subjectivity/signification) through the code of the face.

In terms of information theory, interfaciality occurs as biunivocal concentric rings: cipher disk, electronic rotor, and interface. Yet, Deleuze and Guattari do not stop with these variations. As part of their plateau on "faciality" they speculate on "the abstract machine that produces faces according to the changeable combinations of its cogwheels" (168), and on the possibility of "no more *concentrically organized strata*" (190).

A crucial aspect of their argument, easily missed in a footnote, concerns the shift from *repression* to *subjection*. Deleuze and Guattari follow the distinction that Ergonomics makes between "human-machine" systems (work posts) and "humans-machines" systems (communicational aggregates composed of human and nonhuman elements). They explain:

. . . this is not only a difference of degree; the second point of view is not a generalization of the first . . . The issue is no longer to adapt, even under violence, but to localize: Where is your place? Even handicaps can be made useful, instead of being corrected or compensated for. A deaf-mute can be an essential part of a "humans-machines" communicational system. (Note 56, p. 570)

In short, "one is not enslaved by the technical machine but rather subjected to it" (457). I would argue that Deleuze and Guattari have written a theory about electronic learning which addresses the ideological concerns of media theory; their model of writing resembles a CD-ROM disk or hypermedia program. Others have noted how Deleuze and Guattari comment on electronic culture, especially in their work on "mapping" and the "rhizomatic" organization of knowledge. Mark Poster argues that for Deleuze and Guattari "individuals are constituted through their place in the circuit of information flows. Staying tuned in is the chief political act" (136).

### **Rhizomatic Thinking and New Models of Memory**

The description of rhizomatic thinking has inspired at least one attempt at mapping electronic culture via "creative exploration" rather than a descriptive tracing. In "Handbook for a Theory Hobby," Gregory Ulmer has done an experiment that uses a rhizomatic organization—proliferations, crossings, overlaps, and deterritorializations, without underlying structures or deeply rooted connections. These "assemblages" follow accidental changes—not changes in any single unit, but a change in structural relations which alters the direction of the whole assemblage. The experiment begins with visual instructions for leaf rubbing. The series of illustrations, copied from *Peanut Butter* magazine, pictures a frog explaining the process step by step. Ulmer's experiment then turns to an etymological discussion of the words "leaf" and "feal." Then it discusses briefly the material basis for paper (*i.e.*, trees), and recounts a saying: "Three books are as good as a fire." The text goes on through ten "steps" plus a couple of "activities of related interest." The tenth step illustrates a "paradigm shift project" and a tree-model "mourning." It begins with a page from *Knowing Your Trees* by G. H. Collingwood and Warren D. Brush, in which the American Elm is described and pictured. Ulmer's conclusion in the tenth step is instructive and worth quoting in full:

*U. Ulmus* . . . *U. carpinifolia* (smooth-leaved elm), *U. parvifolia* (Chinese elm), *U. pumila* (Siberian elm). "The stately elms that graced the village streets of 19th Century America are almost gone now, victims of Dutch elm disease or an infection called phloem necrosis, and it is foolhardy to plant elms today—with a few exceptions" (Crockett, *Trees*). Compare the endangered status of the elm with the similar status of the lemurs in Madagascar. Lemurs are endangered due to the destruction of their habitat, the great forests of Madagascar. Is the lemur important? Reflect on the fact of evolution, that, according to Deleuze and Guattari, mankind came down from the trees, but kept the tree in mind as a model for logic. Relate the need for a new model of memory to the deforestation of the planet caused by the pollution produced by fossil fuels. Speculate. (418)

Besides the "signature effect" employed here through the comparison of the *Ulmus* tree and the lemur (both of which make the author's name into a common noun), the text asks the reader to speculate on a "new model of memory." My argument here (in some ways beginning where Ulmer's *leaves* off) is that Deleuze and Guattari construct a model of memory which confronts a logic machine other than "tree logic;" they "map" an "assemblage" off of an abstract machine. The map has to do with performance, whereas the tracing always involves an alleged "competence" (12-13).

Gilles Deleuze and Félix Guattari have produced a set of instructions for the application of electronics to media studies, and their *A Thousand Plateaus* can function as a *model* for electronic writing, *i.e.*, a *de-facing* of the "Classical Computer Programming." But what can we do with the de-facing that Deleuze and Guattari propose?

Much of what follows both explains and *demonstrates* a programming/reading of *A Thousand Plateaus*. As such, this section serves as instructions to make yourself a *memory without cognition* (MwC). Of course, that rather ambitious goal can only find partial fulfillment here, and will require future research into what is called "thinking". The following section organizes much of its information like a hypermedia "environment," rather than as a traditional essay. This simulation must, nevertheless, only hint at the electronic version; for one thing, this printed version presents a "guided tour" rather than a collection of rhizomatically linked "windows."

### Using *A Thousand Plateaus* as a Computer Program

How do you make yourself a memory without cognition? If, as Deleuze and Guattari suggest, we are moving away from predictable critical analyses based on hermeneutics toward an inventive mode of

knowledge production, then the move to a plateau for electronic media studies implies a doubly radical shift. The goals of organizing research are no longer primarily concerned with descriptive ends (i.e., not merely “tracing” information). From a “point system” of memory based on predictability, media studies shift to a “block-system” of “anti-memory” based on *becoming*. Speed, movement, and rhythm rather than *place* or *horizon* become crucial to a way of storing, retrieving, and linking information, which maps potential assemblages rather than merely tracing facts—a pragmatics.

R>[Select:] *Pragmatics and Becoming*:

... pragmatics has no other meaning: Make a rhizome. But you don't know what you can make a rhizome with, you don't know what subterranean stem is effectively going to make a rhizome, or enter a becoming, people your desert. So experiment. (ATP 251)

R> [Select:] *Rhizome*.

Read texts and culture like one plays notes for (electronic) music: follow a line (of flight). (Saper, “Music” 155-170)

7odi NOTE XIV piano piece for David Tudor 4

disegno del 1969  
adagione pianistica: 27.3.1959

SYLVANO BUSSOTTI

Fig. 4. Courtesy G. Ricordi Co., Milan

R> [Click on information booth icon.] As an Aboriginal painting of songlines appears, a voice-over reads from Bruce Chaitwin's *The Song Lines*:

... the contour of the song describes the nature of the land over which the song passes. Aboriginals do not imagine territory as a block of land hemmed in by frontiers: but rather as an interlocking network of “lines” or

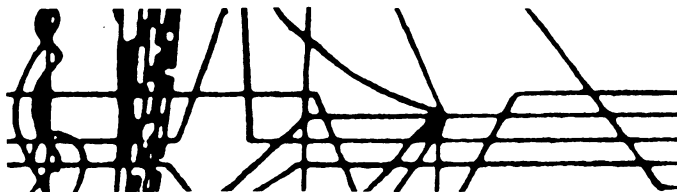


Fig. 5. Aboriginal Songline painting. Reproduced courtesy of George Braziller from *Dreamings: the Art of Aboriginal Australia*, ed. Peter Sutton, 1988, p. 60.

“ways through” . . . The Songlines are like *The Art of Memory* in reverse. In Frances Yates’s wonderful book, one learned how classical orators, from Cicero and earlier, would construct memory palaces; fastening sections of their speech on to imaginary architectural features and then, after working their way round every architecture and pillar, could memorise colossal lengths of speech. . . . Aboriginals could not believe the country existed until they could sing it—just as, in the Dreamtime, the country had not existed until the Ancestors sang it. By singing the world into existence the Ancestors had been poets in the original sense of poesis. (108, 56, 281, 14)

**R>[Flip back to score of “piano piece for David Tudor.”] [Zoom in on detail.]**

Everything is different on the plane of consistency or immanence, which is necessarily perceived in its own right in the course of its construction: experimentation replaces interpretation; now molecular, nonfigurative, and nonsymbolic, the unconscious as such is given in microperceptions; desire directly invests the field of perception, where the imperceptible appears as the perceived object of desire itself, “the nonfigurative of desire” (ATP, 284).



**R >[Select:] Plane of Consistency:**

The line, or the block, does not link the wasp to the orchid, any more than it conjugates or mixes them: it passes between them, carrying them away in a shared proximity in which the discernibility of points disappears. The line-

system (or block-system) of becoming is opposed to the point-system of memory. Becoming is the movement by which the line frees itself from the point, and renders points indiscernible: the rhizome, the opposite of arborescence. Becoming is an anti-memory. . . . The plane is not a principle of organization but a means of transportation. (ATP 294, 268).

R> [Select:] *Becoming*. [Select information booth icon:]

*Neuroinformatics* (neural computers as geometrical mapping machines). The nonlinear dynamics of neural networks is thought to exhibit non-periodic behavior approaching the attractors of noise and chaos. Thus, a mechanization of the brain in the sense of classical determinism must be excluded (Saper, "Electronic," 125). Massively interconnected networks:

Becoming is involutory, involution is creative. To regress is to move in the direction of something less differentiated. But to involve is to form a block that runs its own line "between" the terms in play and beneath assignable relations. (ATP 238-9).

R>[Select HELP icon:]

The computer's ability to combine symbolic and iconic information on compact discs and interactive video, and its ability to retrieve huge quantities of information at a speed hitherto impossible offer our age something as monumentally important as the printing press; it offers the potential for a change in how we organize and communicate knowledge. This potential does not depend on an attempt to record and make accessible all that is known. Rather, the potential changes depend on questioning the taxonomic basis of the learning process. Thus, an interconnected network can serve as a model for the organization of knowledge (Saper, "Electronic," 125).

R> [Select:] *Experimentation replaces interpretation*:

One does not conform to a model, one straddles the right horse. (ATP 286)

(*A Thousand Plateaus* criticizes the *taxonomic* "tree model" of thinking which includes interpretation and hermeneutics as the mechanisms of discovery, change, and progress. It goes beyond this critique by offering and demonstrating the rhizome model.)

One elaborates a punctual system or a didactic representation, but with the aim of making it snap, of sending a tremor through it. (ATP 295)

R> [Drag a line among lassoed terms:] *straddles*, *sending a tremor through it*, and *rhizome* [Select.]

A succession of catatonic freezes and extreme velocities, fainting spells and shooting arrows. Sleep on your steed, then take off at a gallop. Jump from one assemblage to another, with the aid of a faint, by crossing a void. (ATP 268)

R> [Touch screen on one of the television sets from Tele-Cello:] Voice:

"All I can tell you is that we are fluid, luminous beings made of fibers"  
(Casteneda 159, as quoted in ATP R> [Touch another television:]

R> [Scroll back to:] Read texts and culture like one plays notes for  
(electronic) music: follow a line (of flight). [Select information booth icon:]

The cultural book is necessarily a tracing: already a tracing of itself, a tracing of the previous book by the same author, a tracing of other books however different they may be, an endless tracing of established concepts and words, a tracing of the world present, past, and future. Even the anticultural book may still be burdened by too heavy a cultural load: but it will use it actively, for forgetting instead of remembering, for underdevelopment instead of progress toward development, in nomadism instead of sedentarity, to make a map instead of a tracing. (ATP 24)

R>[Highlight:] . . . a cultural load: but it will use it actively. [Select scenario icon:] (In this scenario we see Louis Wolfson embark upon a strange undertaking: he translates as quickly as possible each phrase in his maternal language into foreign words with similar sound and meaning. *Anorexic*: he rushes to the refrigerator, tears open the packages and snatches their contents, stuffing himself as quickly as possible. As the scene unfolds, a whispering voice-over narrates):

It would be false to believe that he needs to borrow "disguised" words from foreign languages. Rather, he snatches from his own language verbal particles that can no longer belong to the form of that language, just as he snatches from food alimentary particles that no longer act as formed nutritional substances; the two kinds of particles enter into proximity. (ATP 273)

R> [Select:] *proximity*:

Becoming is to emit particles that take on certain relations of movement and rest because they enter a particular zone of proximity. Or, it is to emit particles that enter that zone because they take on those relations. (ATP 273)

R> [Select:] *Relations of movement*. [Select information booth icon:]

John Cage appears and speaks:

Given a minimum of two tape recorders and a disk recorder, the following processes are possible: 1) a single recording of any sound may be made; 2) a recording may be made, in the course of which, by means of filters and circuits, any or all of the physical characteristics of a given recorded sound may be altered; 3) electronic mixing (combining on a third machine sounds issuing from two others) permits the presentation of any number of sounds in combination; 4) ordinary splicing permits the juxtaposition of any sounds, and when it includes unconventional cuts, it, like rerecording,

brings about alterations of any or all of the original physical characteristics.  
(Cage 47)

**R>[scroll back to:] *Piano Piece for David Tudor*. [Select information booth icon:]**

The words "David Tudor" in Sylvano Bussotti's *5 Pieces for David Tudor* are in no sense a dedication, but rather an instrumental indication, part of the notation. (Nyman 76)

**R> [Select information booth icon:]**

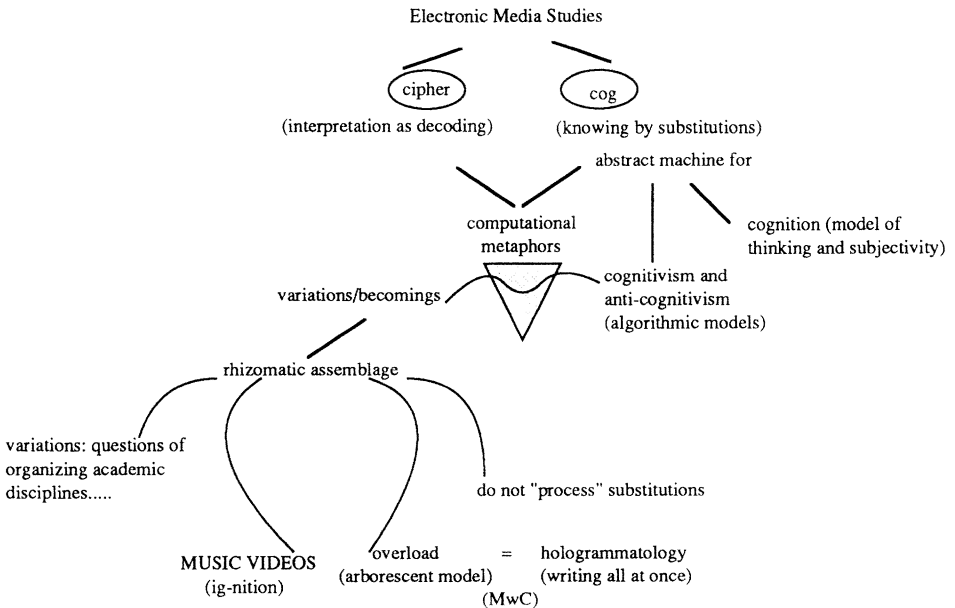
Marshall McLuhan appears and speaks:

I am curious to know what would happen if art were suddenly seen for what it is, namely, exact information of how to rearrange one's psyche in order to anticipate the next blow from our own extended faculties. Would we, then, cease to look at works of art as an explorer might regard the gold and gems used as the ornaments of simple nonliterates? (McLuhan 267)

**R>[HELP icon:]**

One more suggestion of a function of electronic publishing: to experiment with other metaphors for the research process in the electronic apparatus, as alternatives to the metaphor of colonial imperialism. (Ulmer, PMC, #19)

**R> [TRACE]:**





**R [Select:] *Music Videos.*** (In this scene, Jean-Luc Godard, Trinh T. Minh-ha, and Bertolt Brecht discuss music and media):

It's the idea of the musical comedy. . . the idea that the characters are singing. (Godard 182)

When an actor sings he undergoes a change of function. Nothing is more revolting than when the actor pretends not to notice that he has left the level of plain speech and started to sing. (Brecht 356)

This is what I would like to bring out in the film: language as musical communication and information. Even in situations where we understand a language perfectly, we often listen to a voice, not for what it explicitly says but for what it does not say. In the film, I was concerned with both the melodies and the grain of the spoken voice—the combination of tones and rhythms, the relation between body and sound uttered or heard. Thus, people's conversations, an old woman's voice as well as the English voice-over (my voice) are cut up and repeated in such a way as to put into relief the combinations and relations . . . such a cutting of their conversations would be considered disrespectful by many documentarians who subscribe to a doxa which increasingly venerates the oral testimony of people in "factual" films. But for me, it is one way of bringing out the music in the language and challenging the tendency to consume language exclusively as meaning. . . . In film, music is one of the communicating links; it brings the audience and the screen closer. But its role, in most cases, is functional or cosmetic. It is used, for example, to reinforce an action or emotion, to intensify the inner thoughts of characters. Such an approach to music does not appeal to me. I use it in a way to provide continuity, in apparent contrast to the shattered rhythm of the images, but music can also act to disrupt continuity. (Trinh 90-91)



[An information box appears on the screen: "For comparison see window on 'HyperTalk: HyperCard's scripting language.'"]

(As they talk facing each other, you click the screen; the camera pulls back until we see they are images on Paik's *Tele-Cello*, played by Charlotte Moorman.)

R>[Touch all three TV sets:]

Becoming is to extract particles between which one establishes the relations of movement and rest, speed and slowness that are closest to what one is becoming, and through which one becomes. This is the sense in which becoming is the process of desire. This principle of proximity or approximation is entirely particular and reintroduces no analogy whatsoever. (ATP 272)

R [Select:] *Process of desire:*

Schizoanalysis:

For both statements and desires, the issue is never to reduce the unconscious or to interpret it or to make it signify according to a tree model. The issue is to produce the unconscious, and with it new statements, different desires: the rhizome is precisely this production of the unconscious. (ATP 18)

R>[Select:] *Make it signify:*

Writing has nothing to do with signifying. It has to do with surveying, mapping, even realms that are yet to come. (ATP 4-5)

R>[Select:] *Mapping:*

It is perhaps characteristic of secret languages, slangs, jargons, professional languages, nursery rhymes, merchant's cries to stand out less for their lexical inventions or rhetorical figures than for the way in which they effect continuous variations of the common elements of language. They are chromatic languages, or close to a musical notation. A secret language does not merely have a hidden cipher or code still operating by constants and forming a subsystem; it places the public language's system of variables in a state of variation. (ATP 97)

R> [Select *mapping* again.] (In this scene we see Lenin playing with Scrabble pieces, spelling out slogans.) Lenin speaks, quoting Deleuze and Guatarri:

There are pass-words beneath order-words. Words that pass, words that are components of passage, whereas order-words mark stoppages or organized, stratified compositions. A single thing or word undoubtedly has this twofold nature: it is necessary to extract one from the other—to transform the compositions of order into components of passage. (ATP, 110).

Lenin continues:

Transformational research of this kind is concerned with the variation of the order-words and noncorporeal attributes linked to social bodies and effectuating immanent acts. (ATP 82-83)

(He lifts up what appears to be a rule book for Scrabble; it is Lenin's own "On Slogans.") He continues quoting from Deleuze and Guatarri:

This text constituted an incorporeal transformation that extracted from the masses a proletarian class as an assemblage of enunciation before the conditions were present for the proletariat to exist as a body. (ATP 83)

R>[Select:] *Passage:*

We must take quite literally the idea that man is a face drawn in the sand between two tides: he is a composition appearing only between two others, a classical past that never knew him, and a future that will no longer know him. There is no occasion either for rejoicing or for weeping. Is it not commonplace nowadays to say that the forces of man have already entered into relation with the forces of information technology and their third-generation machines which together create something other than man, indivisible "man-machine" systems? Is this a union with silicon instead of carbon? (Deleuze, *Foucault* 75)

R>[Select:] *Face:*

And so she had no face. She had only a smooth, delicately modeled ovoid for her head . . . she had no features . . . a bare golden skull . . . all expression, of course, was gone. (Moore 70-71)

R>[Select:] *She had no face:*

Tree: A data structure consisting of links and nodes. The tree begins with a single parent node and grows downward. . . . A tree is a common way of organizing knowledge in the computer world.

R>[Select:] *Node:*

Leaf: A terminal node of a data structure called a tree: a node from which no further links arise.

R>[Select:] *Leaf:*

Like the generations of leaves, so are the generations of men . . . (*The Illiad*)

[Breakdown in memory—lost:]

A rhizome has no beginning or end; it is always in the middle, between things, interbeing, *intermezzo*. The tree is filiation, but the rhizome is alliance, uniquely alliance. The tree imposes the verb "to be," but the fabric of the rhizome is the conjunction, "and . . . and . . . and" . . . Another way of

traveling and moving: proceeding from the middle, through the middle, coming and going instead of starting and finishing. (ATP 25)

*Bing, Beep, Boing: announcing Rhizomatism & Artificial Invention: A Pop-Musical Comedy on the Computational Algorithms of Cognition.*

R> [Multiply.]

*University of Pennsylvania*

#### ACKNOWLEDGEMENTS

We thank the following publishers for permission to reproduce the illustrations in this article:

Hachette for Figure 1, from *L'Aventure de l'art au XX<sup>e</sup> Siècle*, ed. Jean-Louis Ferrier, 1988.

John Wiley & Sons, for Figures 2 and 3, from *Cryptography: A Primer*, by Alan Konheim, 1981.

G. Ricordi and Co., Milano, for Figure 4, "Piano Piece for David Tudor," by Silvano Bussoti.

George Braziller, for Figure 5, from *Dreamings: The Art of Aboriginal Australia*, ed. Peter Sutton, 1988.

#### ABBREVIATIONS USED

ATP *A Thousand Plateaus*. Page numbers refer to the American edition.

#### NOTES

1. See also Yankelovich, N. *et al.* "Intermedia: the Concept and Construction of a Seamless Information Environment," *IEEE Computer* 21(1990): 81-96.

2. See Landlow, George, "Popular Fallacies about Hypertext," in *Designing Hypermedia for Learning*, ed. David Janassen and Heinz Mandl. (New York: Springer-Verlag, 1989)

## WORKS CITED

- Bolter, Jay David. *The Writing Space: The Computer, Hypertext, and the History of Writing*. Hillsdale, NJ: Lawrence Erlbaum, 1991.
- \_\_\_\_\_. *Turing's Man: Western Culture in the Computer Age*. Chapel Hill: The University of North Carolina Press, 1984.
- Brecht, Bertolt. "The Literarization of the Theater." *The Discontinuous Universe: Selected Writings in Contemporary Consciousness*. Ed. Sallie Sears and Georgiana Lord. New York: Basic Books, 1972.
- Bowers, John. "All Hail The Great Abstraction: Star Wars and the Politics of Cognitive Psychology," in *Deconstructing Social Psychology*, Ian Parker and John Shotter, eds. New York: Routledge, 1990. pp. 127-140.
- Brand, Stewart. *The Media Lab: Inventing the Future at M.I.T.* N.Y.: Viking Penguin, 1987.
- Cage, John. "Experimental Music," in *The Discontinuous Universe*, Sallie Sears and Georgiana W. Lord, eds. New York: Basic Books, 1972.
- Castaneda, Carlos. *Tales of Power*. New York: Simon and Schuster, 1974.
- Chaitwin, Bruce. *The Songlines*. New York: Penguin, 1987.
- Collins, H.M. "Expert Systems and the Science of Knowledge," in *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*, Wiebe Bijker, Thomas Hughes, Trevor Pinch, eds. Cambridge, Mass: The MIT Press, 1989. pp. 329-348.
- Deleuze, Gilles. *Foucault*, trans. Sean Hand. Minneapolis: University of Minnesota, 1988.
- Deleuze, Gilles and Félix Guattari. *A Thousand Plateaus*. Minneapolis: University of Minnesota Press, 1987.
- \_\_\_\_\_. *On The Line*. New York: Semiotext(e), 1983.
- Godard, Jean-Luc. "Interview with Jean-Luc Godard in Cahiers du Cinéma" (1962) in *Godard on Godard*, ed. Jean Narboni and Tom Milne.
- Haraway, Donna. "A Manifesto for Cyborgs: Science, Technology, and Socialist Feminism in the 1980s," *Socialist Review* 80: 65-107.
- McLuhan, Marshall. "Challenge and Collapse: The Nemesis of Creativity." *The Discontinuous Universe: Selected Writings in Contemporary Consciousness*. Ed. Sallie Sears and Georgiana Lord. New York: Basic Books, 1972.
- Mellencamp, Patricia. *Indiscretions: Avant-Garde Film, Video, and Feminism*. Bloomington: Indiana University Press, 1990.
- Moore, C.L. "No Woman Born" in *Human-Machines*, Thomas Scortia and George Zebrowski, eds. New York: Random House, 1975.
- Noble, Douglas D. "Mental Material: The Militarization of Learning and Intelligence in US Education," in *Cyborg Worlds: The Military Information Society*, Les Levidow and Kevin Robins, eds. London: Free Association Books, 1989. pp. 13-42.

- Nyman, Michael. *Experimental music : Cage and beyond*. New York : Schirmer Books, 1974.
- Polanyi, Michael, *The Tacit Dimension*. Garden City, N.Y., Anchor Books, 1967.
- Poster, Mark. *The Mode of Information*. Chicago: University of Chicago Press, 1990.
- Ray, Robert. "The Signature Effect Meets Andy Hardy." *Derrida and the Visual Arts*. Ed. Peter Brunette and David Wills. (forthcoming)
- Saper, Craig. "Electronic Media Studies: From Video Art to Artificial Invention." *SubStance* XX (3) 1991, 113-133 (this issue).
- . "The Music of Visual Poetry and Architecture," *Yearbook of Interdisciplinary Studies in the Fine Arts* 1 (1989): 155-170.
- Trinh, T. Minh-ha. "Interview of Trinh T. Minh-ha with Constance Penley and Andrew Ross," *Camera Obscura*, 13-14 (Spring-Summer 1985) 87-104.
- Turing, Alvin. "On Computable Numbers, with an Application to the Entscheidungsproblem." *Proceedings of the London Mathematical Society, Second Series*, Vol 42 (1937).
- Ulmer, Gregory. "Grammatology Hypermedia," *Post Modern Culture*, 1, 2 (1991): no page numbers in electronic form.
- . "Handbook for a Theory Hobby," *Visible Language* 22, 4 (1988): 418-440.
- Woolgar, Steve. "Reconstructing Man and Machine: A Note on Sociological Critiques of Cognitivism," in *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*, Wiebe Bijker, Thomas Hughes, Tevor Pinch, eds. Cambridge, Mass: The MIT Press, 1989. pp. 311-328.
- Yates, Frances Amelia. *The Art of Memory*. Chicago: University of Chicago Press, 1966.