The Cyborg Handbook

Edited by Chris Hables Gray

With the Assistance of Heidi J. Figueroa-Sarriera & Steven Mentor

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Brain-Mind Machines and American Technological Dream Marketing
Towards an Ethnography of Cyborg Envy

Joseph Dumit

The passion for deliverance by Machine dies hard.
—Neil Harris

It is not enough to interpret the body, it will also have to be changed.
—Gunther Anders

IN 28 MINUTES YOU’LL BE MEDITATING LIKE A ZEN MONK!
Astounding Sound technology induces altered mind state, intensifies psychic functioning, and causes peak experiences. Some are calling it the “lazy path” to enlightenment!
I took everything in the 60’s. I did all the retreats in the 70’s. I had my first out-of-body experience in ’85. But none of it prepared me for the transcendental experiences I’ve had using the Ultra Meditation soundtracks.

ALTERS BRAINWAVE PATTERNS
Created by the Mind Research Laboratory, a powerful combination of sound frequencies are delivered into your brain. These sounds synchronize your brainwaves into a “theta” pattern and put you into a psycho-physical state of deep meditation...
The neuro-entrainment matrix holds you in this mind state and allows anyone to quickly feel the benefits of deep meditative awareness. And the cumulative effects of stress reduction and increased mental awareness will allow you to function at your optimum ...

Of course, experienced meditators can achieve these higher states at will without any help, although it takes years of concentrated practice. "When used regularly this soundtrack can give anyone that same ability," says the developer. "To reach a high level meditative state and brain synchrony using a cassette tape and a Walkman has very empowering possibilities. When a person experiences this degree of inner control, their self confidence and sense of well-being will skyrocket. This is truly an awesome mind tool."

The Cyberpunk Cyborg Monk here symbolizes a desire for transparent communion with technology in spite of a rapidly dystopian future. Our middle-class American selves are envisioned as wrapped in technology, imbricated in thousands of micro-links which support us as humans-in-the-world, needing only a decade more progress to complete our transcendence.

Two related but different issues concern this ethnographic exploration. The first concerns the ways in which we are all cyborgs, as Donna Haraway has detailed: the ways in which our ways of living are necessarily bound up with multiple aspects of technoculture. The second issue, crucially different from the notion that we are already cyborgs, is one which is best named, "cyborg-envy". This is a sociopathic condition which was formed around the interwar period and in conjunction with various military research programs and the assistance of a technophilic popular media. It involves an apparatus of producing our selves as brain-function measurements, allowing deficient, normal, and even super levels to be demarcated.

In this condition, alongside stressful fears of the human species being outpaced by the world, appears the dream of individual technological redemption through making better humans. Now, to some extent we are all afflicted by the desire for technological enhancement, understanding our bodies as somewhat deficient cyborgs.

A Cyborg Anthropology?

I am organizing this study around brain-mind machines; based on fieldwork in Houston and California with inventors, users, dealers, ad copywriters, and bookstore owners. Building on Arjun Appadurai's notion of "the social life of things" and Gary Downey's concept of technology as a social actor, the prime subjects of my ethnography are specific devices called light and sound brain-machines. The brain machines I will be referring to in this paper are electronic devices which are worn on the head and, through light sound or electrical stimulus, induce the wearer's head to produce brainwave patterns of a desired sort on an electroencephalograph or EEG machine.

Specifically I am looking at how they organize scientific and parascientific discourses into conferences, newsletters, books, centers, and advertising. I am interested in the way they function as ascension devices: since, given their presence at the 'cutting edge' of both marginal science and high-tech science, they attract stakes in self-control and stress reduction, psychic possibilities, creativity and intelligence enhancement.

The 'field' of this ethnography of images must include, then, not only their biogra-
phies, but what can be called their 'virtual community.' With 'virtual community' I'm borrowing Alleequere Stone's notion of communities which include non-human actors as vital participants. These communities are dispersed in space, and while each participant is not necessarily connected directly to every other one, there is a differently weighted network that plays a role in communication and which itself must be considered an acting participant.\footnote{In the virtual community of brain-mind machines, then, there are popular theories of person and science that are also the basis of scientific theorizing. There are laboratories and granting agencies, there are journals and publishing apparatuses, there are machines, brains and persons. And finally, there are definitions and demarcations of authority which interweave all of these—science vs. (popular) culture, technology vs. society, normal vs. not-normal—demarcations which are shorthand for the ways in which attributions of agencies, functions and types are distributed, disputed and constrained.}

In one "mind gym" called the Universe of You Studio in Corte Madera, California, Synchro-Energizers by Denis Gorges are used for $10 an hour. There are at least twenty in the US, perhaps thirty worldwide of these self-improvement centers devoted to providing brain-mind machines for individual uses of twenty minutes to five hours. These centers often provide flotation tanks as well, based on sensory deprivation rather than sensory overstimulus.

Owners and workers describe their investment in these centers as both providing opportunities for others to experiment in self-improvement, and a way to support their own involvement in these technologies. Personal devices geared toward brain-wave entrainment began appearing in the seventies but the 1986 book Megabrain by Michael Hutchinson (who wrote his first book on Floatation tanks) brought their use to a much larger audience.\footnote{Two aspects are particularly important for this project: first the specific kind of cyborg existence which BMMs engender—how they operate as agents mobilizing certain humans into new ways of life through their position in discourses of technological progress and self-improvement; and second, the way in which the discourses of technological nationalism and personal enhancement localize themselves into a middle-class life-form as cyborg envy, with machines ultimately standing in for a 'human' ideal.}

Expand Your Limits

Expand your limits: Class-bound pitches are the base-line of "Mind tech for a New Age." The ad reads:

\begin{quote}
Just as the '80s brought the realization that our physical well-being is mostly self determined, the '90s will enlighten many to the use of new tools and techniques for altering consciousness in a positive way. At the dawn of a new decade, Synetic Systems offers three new products for awakening and stimulating mental functions ... \\
State of the art in audio/visual entrainment technology. This form of stimulation is the least intrusive and most effective means of inducing brainwave activity available. Users are experimenting in such areas as relaxation, stress reduction, enhanced learning, improving memory and simple enjoyment. Each unit comes complete with manual, and accessories.
\end{quote}
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This is a discourse of explicit, personalized privilege: "We've determined our physical world" and therefore it is time to get on to improve on and even transcend our biopsychic world. The only visual image in this ad is a documentary photograph of the machine itself. The physical existence of a real machine behind the ad provides the imperative: it is here, how can you not try it?

A copywriter explained to me that he felt free to add claims regarding creativity enhancement and psychic powers even if he didn't particularly believe them, because, as he put it, "some people do". This notion of belief in general, backed up by a lack of scientific consensus, travels through these machines.

I want to make the claim that these ads actually embody much of the subculture of brain-machines. Users, in fact, take up the rhetoric of these ads into their own self-description. And the researchers and inventors of these machines are also promoters and marketers. Consequently there is a shared discourse of values, and these ads serve as seeds as well as expressions of the underlying metaphors of self and self-improvement.

**Remote Self Control**

Electronic machines are symbols of controlled automation, and the dream of automating self-improvement is instantiated in these brain machines. One machine is called IM-1 for *Instant Meditation*. Though it may seem oxymoronic or simply moronic to talk about meditation this way, this should be read as a corollary of militarized discourses of the self since World War Two. By militarized I mean an emphasis on the quantitative technological enhancement and scientific management of human capabilities.

Sylvere Lotringer said, regarding war, that violence is the only means that can become an end. Taking this notion seriously, I am exploring the implications of the fact that self-improvement since the inter-war period has been shorn from both its better-citizen aspirations, as well as its Taylorist desire to fit workers most efficiently into a assembly line; instead, it has become an end in itself.

Put another way, with the insertion of high technology into automatic and quantitative notions of self-improvement, a specific mutation occurs in technological advancement, as the realm of automation, miniaturization, speed and accuracy, becomes the means to realize the end of self-improvement. Social relations are completely privatized, existing only as the technoscience net in which individuals work to be able to afford such improvement in their attributes.

Brain-mind machines are loosely based on the following abstract diagram:
Psychophysics experiments at the turn of the century in Britain, Germany and the U.S., attempted to scientifically map the unconscious and quantify states of mind. This plus the development of electroencephalograms as part of the war effort in Britain resulted in possible connections between brain waves and personalities. This knowledge combined with 1950's and 60's fascination with idealized "stressless and blissful" Asian gurus to produce a series of attempts to distinguish measurable differences in brainwaves, and thereby isolate and codify specific desirable states of mind.

These experiments defined certain people as meditation experts and indicated that a higher percentage of alpha waves was one of the key differences between truly meditating people and non-meditating people. Meditation—and by metaphoric extension or ascription, creativity and stresslessness—became defined then by quantitative results on brain-imaging devices, (BID's on the chart), such as EEGs.

Recent brain-mind machines, BMMS were developed on the basis of their ability to cause similar EEG production—alpha range—in non-meditators who were hooked up to them. The problem was one of scientizing the Yogi-mind, transferring or translating their difference into electricity (the universal medium and thence onto paper, into graphs.) Thus measured, it became a western scientific quest to attain the perfect simulation of those graphs. BMMS are such a simulation, they produce alpha waves, then attempt to induce them in other people, the hopeful experts (or experts on hope) on the chart. As such, the machines are closer to the Yogi enlightenment than we are.

Codified in the form of measuring devices, so-called states such as creativity, meditation, etc. become reified; no longer means toward another, social, end, they become the ends for which alpha-wave production is the means. The subjects produced by the BMM come to “know themselves” through the application of an EEG to verify their status as enlightened. No longer is the goal to be of no-mind, or creative, but to be “in alpha”, to be read by an EEG machine as equal to the brain machine. Thus a user, upon verifying that he was indeed in alpha, via the EEG, declared to me: “So that was meditation!”

Thus we can note that what is being marketed is the form of mind-state, not the content. The metonymic chain from master’s ability to hopeful brain state presents both a scientific explanation of the "meditative difference" and a technology to transfer this difference. Previously, in pre-mind-machine days, one either studied with a master, tried to get into the master's vicinity, listened to tapes of a master’s voice, or read the master's words. The aim in most of these cases was not to become a meditation teacher but rather, through meditation, to learn how to lead one's life.

The problem with this previous technology is that it is subject to human frailty—corruption. How is the unenlightened seeker to choose an enlightened teacher? As one informant wryly commented, “It's a mine-field out there, so many people who think they own the world.” BMMS purport to provide an objective method of measuring enlightenment, and of producing enlightenment. They propose to entrain your mind to meditate without middle-men, and indeed, while entertaining you.

**Scientific Orientalism**

This theme of speedy and easy acquisition of coveted attributes is also presented
as, "In 28 minutes you'll be meditating like a Zen Monk." Other ads similarly depend on an inferior relationship to exoticized others:

**NO MORE YOGI ENvy!**

Yogis spend years, even entire lifetimes, training themselves to attain specific states of consciousness. The Nustar is a brain wave training device that can help you reach the realm you're seeking, and still leave you plenty of free time ...

_The Nustar was born from the pioneering work of Michael Hercules, inventor of the Pulstar. In his research Hercules discovered that specific brain wave frequencies are indicative of certain states of consciousness. For example: 1.0 Hz Feeling of well-being: pituitary stimulation to release growth hormone: overall view of interrelationships. 5.5 Hz Moves beyond knowledge to knowing: shows visions of growth needed. 7.5 Hz Inter-awareness of self and purpose: guided meditation: creative thought or art, invention, music, etc.: contact with spirit guides for direction. 10.5 Hz Healing of the body: mind-body connection: firewalking._

Even enlightenment is now passé. EEGs seem to prove that one can meditate, as a Zen master, simply by listening to a specially prepared electronic tape. The technolo-gy will produce in you without hocus pocus and "without dogma," a pure higher-electro-consciousness, or Cybershamanism (a term used by some researchers).

Western technoscience appears to have duplicated the Third World's magical residue—faster, better, cheaper and more comfortably, privately and securely—with all trappings removed, the essence extracted. One now has to concentrate on effects: material symbolic effects—stress reduction, intelligence, creativity, and interest—getting rid of boredom, electronically excising alienation, streamlining the mind for stress-free work.

**Brain Erotics, Bachelor Machines**

Selling machines and sexing machines are interpolated across sexual difference taking the brain as the site of transcendence: a neurophysiologist at UCLA put it this way, "Literally and figuratively, it's the sexiest organ we have ... It's where we live. You can't touch anything more private than the brain. The field is wild and intriguing. We are at a frontier."17

Inner Technologies' Richard Daub, upon including bio-feedback machines in his catalog and receiving no response said: "I thought people would want something interactive ... They don't want interactive devices, they want something that will do it to you."18 Michel Carroughes defined precisely this confluence of pleasure and mechanism as a Bachelor Machine: "The machine is essentially the symbol of autoeroticism. The image of pleasure is greater the more the machine seems a do-it-yourself one."19 Or rather, having it done to yourself.

I also want to note that some ads specifically highlight the potential danger of these machines as part of their seductive power. The Zen Monk ad has a bold box in its center stating:

**WARNING: due to the powerful effects on the brain, these sound-tracks are not suitable for epileptics, or psychiatric patients.**

This proclaimer points to a prehistory of contemporary brain-mind machines. World
War II soldiers stationed in Africa and driving jeeps at certain speeds on jungle roads were subject to epileptic seizures due to the flickering sunlight through the canopy at certain frequencies. Wartime research on flicker responses like these indicated the ability of different frequencies of light as well as tones and direct electrical stimulation to induce both epileptic seizures in some persons and specific EEG responses in others.\textsuperscript{20}

In this "WARNING", deleterious side effects are turned to advantage with the sense that if something is dangerous enough to harm some people, it must also be powerful enough to help others. Deleuze and Guattari have taken up the concept of bachelor machines as "paranoid devices overwritten with miracle-working inscriptions."\textsuperscript{27} The brain-mind machines I am interested in here have one of their origins in physical control of the mind experiments performed in Jose Delgado's 1950's physiology labs.\textsuperscript{22} Two of Delgado's objects, Paddy and Carlos, each had 100 intracerebral electrodes and boxes for instrumentation and control in their skulls. They were still living with no behavioral deficits years after this construction. They are Cyborgs. Indeed one of Delgado's associates, Manfred Clynes, put together the word "Cyborg" out of cybernetic organism, in a vision of men living in space.\textsuperscript{23}

In two more of Delgado's objects, stimoceiver caps were attached to two women for implantation of electrodes in the brain for diagnostic and therapeutic purposes. Radio telemetry was used to send electrical signals to stimulate the brain while allowing for 'free' movement. In Delgado's words:

\begin{quote}
Behavior such as aggression can be evoked or inhibited ... The patient is instrumented simply by plugging the stimoceiver to the head sockets ... Therapeutic programmed stimulation of the brain can be prolonged for any necessary amount of time ... the danger of unwanted and unethical remote control of cerebral activities of man by other men is quite improbable.\textsuperscript{24}
\end{quote}

In these devices, as with the BMMs, the work of establishing the relationships between brains, measurements, and categories appears straightforward. Aggression and non-aggression, creativity and meditation are presented unproblematically, as if there were no disputes over the range and definition of these attributes. These descriptions, together with the measuring devices seem to prove that: (1) that this technology really does show the brain in action, (2) that the brain really is the site of the differences made evident (the outside is an expression of the inside), and (3) that these socially defined differences are significant and definitely biological. These three areas of popular theorizing will be briefly discussed before examining the machines and rhetoric more closely.

The first area involves the authoritative relationship between science and technology and lay society—the popular notion that science and technology are relatively free of historical and cultural presuppositions and that technological production is in itself neutral, even if it might be put to improper use.\textsuperscript{25} Under this notion, there is an increasing rationalization of judgment, in which automated test results are privileged over subjective interpretation, even sometimes over expert adjudication. Computer-generated evidence is preferable. Computers have a potent history as the model of an efficient brain and as the icon of technological progress.\textsuperscript{26} Electrical waves such as those produced by BMMs are thus framed between the objective sciences of measurement and the unbiased calculative power of computers, drawing significance from both.\textsuperscript{27}
The second area involves the craniocentric notion that the brain is the key to the mind; in the sense that if there is a correlation between a brain difference and another symptom, or set of symptoms, this brain difference is taken to be the final cause and explanation. The brain is the master controller of the person, as DNA is the master controller of the organism. The importance of studying popular theorizing about the brain-mind relationship comes from a recognition that neuroscience researchers do not start from a blank slate, but are engaged with these images through root metaphors grounded in popular theorizing. Ludwig Fleck, reflecting on syphilis serum research, put it this way: "Popular science ... furnishes the major portion of every person's knowledge. Even the most specialized expert owes it many concepts, many comparisons, and even his general viewpoint." Useful notions to explore are the divisions of mental faculties (learning vs. creativity vs. remembering) and metaphors of functional organization (are we hierarchically programmed like a computer or are we the product of competition among various brain regions?). I am presently working to identify these metaphors and track their involvement in the design of experiments and equipment, and the interpretation of results.

The third area involves cultural notions of significant human difference and the methods of determining these differences—sane and insane, healthy and diseased, smart and dumb, old and young, happy and bored, male and female, heterosexual and homosexual, normal and pathological. Each of these demarcations is a social valuation determining that such a relational difference is worth remarking on and important to keep clear. They are versions of what Foucault has called social truth: powerful ways in which an attributed aspect of a person or group is raised to the status of discrimination. Each has an historical and regional specificity, yet the promise of a neutral or objective means for determining their existence is hailed continuously as an advance. I am interested in how these social truths are in turn altering what anthropologists have called our category of the person.

The point of identifying these three areas of popular theorizing is to better attend to the ways in which this theorizing is embedded in the science, technology and presentation of them, and to bring out other possibilities for understanding these machines based on alternate notions of brain, mind, technology and society.

**MegaMind TechNoStress**

Another key concept running through our care of ourselves and through these ads is stress. There are always pictures of happy people wearing the equipment. Quoting from the fine print now of the TechNoStress ad:

> Stress. It's more than just an unpleasant feeling. Stress can be a prison, keeping us from the very things we want most in life: creativity, energy, well-being, inner peace... Backed by science: Scientists tell us that every one of our mental states is the result of a specific pattern of electrical and chemical activity in the brain ... it can be effortless.

Viewing ourselves as possessors of quantifiable and incrementally increasable states of mind is a relatively recent phenomenon and can also be dated to the interwar period and the invention of the concept of stress by Hans Seyle. As described by Rustin Hogness, a new science of control was developed, heavily invested in by the military. Understanding Taylorite humans as efficiently fitted
into systems of production but unable to survive the physical demands of modernity on their bodies, stress became the quantitative measure of each man's unfitness to the world.

Progress was good, of course, the faster the better, and if individuals were not up to the pace of progress, it was they who needed to find ways to cope ... Products of a simpler time, we were unable to change rapidly enough ... Our salvation was in what help our experts, in psychiatry and medicine especially, could give us.26

Biological eugenic notions of degeneration of the race of man are here supplanted by a notion of obsolescence of individuals in the face of their machines. We are now in competition with them and losing. But note also how with this concept, stress reduction becomes both a national and individual imperative.

MC²
THE POWER TO BE ALL YOU CAN BE

Achieve Your Dreams
Now you have the power to experience deep relaxation, accelerate your learning abilities and change behavior patterns at the touch of a button.

The MC² computerized audio-visual component system enables you to do just that. In just minutes, the MC² can guide you to a state of relaxation through the use of synchronized light and sound patterns.

When you use the MC² you can select from any one of the 10 convenient presets for relaxation, focusing, learning and motivation.

Explicit ideological connections between brain-mind machines and militarized selves are immediately made. Chris Hables Gray has traced the Department of Defense concentration on producing and technologically enhancing men so they become soldiers capable of handling the stress of the rapidly changing battlefield.27 Stress has become an industry as well as an essential part of our own self-description and the key to productive survival.

"The power to be all that you can be, achieve your dreams": In this civilian version of the Army recruiting slogan, we can note the coincidence of the nationalist ideal of technological superiority and redemption with its individual new age middle-class leisure variety.38

A result of this understanding is the central role which these machines come to play,
inserting themselves as essential to certain ways of life. One user, Lisa, a civil servant living in Houston, began using brain-mind tapes and enjoyed their presence and potential powers so much that in a month she was listening to them for two hours before bed, while sleeping, an hour upon waking, and during lunch. When I questioned the excessiveness of her use of the tapes, she replied that they really soothed her and that she had never felt so satisfied with her life before.

Her self-defined goal was self-realization and she described herself as on the way to it thanks to these tapes. I am interested in the way in which the goal of self-realization has been privatized to a relationship between Lisa and her machine.

Another ad declares: "Altered states mind gym, 60 minute vacation. See stress disappear." A week's vacation in an hour. Free time is here equated with stress reduction and thus in need of speeding up. This denigration even of vacation time is a good example of what Paul Edwards would call a closed-world self. A self subjected solely to the military imperatives of speed, miniaturization, and automation. This kind of extreme bourgeois alienation would make Marx gloat; though perhaps Lewis Mumford said it best:

The historic process may be condensed into a brief formula: manual work into machine work: machine work into paper work: paper work into electronic simulation of work, divorced from any organic functions or human purposes except those that further the power system.

Another machine, the Inner Quest or IQ, has been advertised in OMNI magazine and boasts the pun, "We've improved our IQ for you!" A brain-machine designer I talked to reported that he got into this field when as a clinical psychologist interested in measuring states of mind, he became concerned over possible harmful effects of these brain-wave entrainers. He built his own in order to study its effects and decided that there were positive benefits to be gained. He began using it everyday planning to increase his intelligence so that he could build better machines.

The cyborg-audience appealed to here is one whose being is monetarily self-sufficient but unsatisfied and unrealized. By uncoupling oneself from the technoscience social world and linking instead to a personal private realization device, one can become simply and measurably better. As the ad states: "for yourself, by yourself."

Self-improvement here becomes an end in itself to be known only through the apparatus of inscriptions which one is able to produce. Alpha, delta and theta waves literally become 'proof' of creativity, stresslessness, etc. and thus proof of quantitative progress in a quest for self by those who (to recall one of the first images) already determine their own physical environment.

Reproducing Brains, Reproducing Society

To conclude I'd like to situate the class position the previous ads have staked out by looking at an alternative instantiation of a brain-mind machine.

"MILLIONAIRE'S MIND" TATTOO'S SUCCESS ONTO BRAIN CELLS

Amazing new success booster system energizes your subconscious to attract prosperity and wealth like a magnet. How? By implanting 21 success traits of a self-made millionaire permanently onto your brain cells and into every fiber of your being.
This represents, I think, a working class version of BMMs and is made by the same company which produced the 28 minutes to Zen monkhood tapes. This ad reads:

_Beyond subliminal tapes [to Transliminal!] the Millionaire’s Mind system uses a super powerful new technology called Mind Mapping that actually fuses the 21 success traits of a self-made millionaire onto your brain cells. An extremely complex audio matrix ... maps new memories and beliefs about success and wealth._

Beyond hyperbolic to transbolic talk, this pitch for a $69.95 product names out loud the claim that life can be better through having more control over one’s environment via financial security. Where the previous brain machines retail for between $295 and $5000, this ad assumes a reader who has little money to spend and who in fact wants money, a trait not mentioned in most more “New Age”, self-improvement ads. There is not one mention of stress, either, only anxiety.

Here then, a different kind of cyborg is appealed to. One who has been excluded from high paying career opportunities can now avail himself of science to provide him with traits he does not have. __He can gain the monetary benefits of class while remaining himself.__

I’d also like to take a moment to reflect on the laughter which these machines and their adwriters evoke; a laughter which is as much theirs as ours, though with the uncanny feeling that we think we know better. Because, for many people I have talked to, the desire to try these machines is not in spite of, but because of their humorous nature.

I am interested in the machinery of these ads because they disturb, by calling attention to, parts of my own self-discourse, they name and make desirable a retreat from social awareness into rather comfortable kinds of self-improvement.

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_God is User Friendly_
—Protestant Church Announcement Board

This cover from a 1990 issue of _EAST/WEST_, the journal of NATURAL health and living, draws together visually a number of the discourses I have been describing. Meditation, a signifier of natural body processes, goes high-tech because the results of enlightened living are stressed over the discipline. Note the way in which the machine itself is the source of spiritual as well as electrical power. In an appropriation of the wisdom of the East by Technology of the West, Buddha has been put into a box and becomes available for personal purchase and consumption. This machine symbolically embodies who “we” want to be: once plugged in it produces constant alpha waves so we can have pure no-mind or buddha-mind.

Brain-mind machines are acting here to gather up the discourses of self-improvement, superpowers, technological progress and redemption in order to provide a
site for new practices. Analyzing ads within the context of an anthropology pro-
vides explicit acknowledgment of differential class desires, self-improvement versus
financial security.

By realizing and personalizing brain inscription devices, these machines are able to
transform desires for essential self-depiction and self-control into specific ways of
life with the machines at the center. They thus produce a manifest cyborg person
within a discourse of cyborg envy. That is, they realize a way to achieve the desired
result of a quantitatively better-functioning mind.

By carefully tracking and situating our own complicity in these militarized dis-
courses of self it is hoped that alternate cyborg futures may become imaginable.

Notes

1. There are many recent attempts to theorize technocultural embeddedness. See especially [Haraway,

2. On technophilia and epistemophilias, see especially [Sofoulis, 1988; Sofoulis, 1984; Kittler, 1985; Crary,
1992].

3. See [Kopytoff, 1986; Appadurai, 1986; Downey, 1992; Pfaffenberger, 1992].

4. Ascription is the process whereby one attribution of unnatural or supernatural powers leads to the
attribution of the entire range of them. Aghenanda Bharati provides an excellent description of the work-
ing of this discourse in India. [Bharati, 1976].

5. See [Stone, 1992].

and Dick Teresi provides a history and a detailed account of devices and places, in the form of journalistic
advertisements [Hooper, 1990]. Hutchinson's books are in the same vein. Further materials in this field
include MONDO2000, a magazine which features BMMs as one component in a cyberpunk future, along
with "smart drugs" and virtual reality. Cyberpunk for MONDO2000 is both science fiction and music.

7. Semiotics and following semiotics, science and technology studies, have mounted an intensive investi-
gation of the concept of agency, primarily emphasizing the narrative construction of it. See [Greimas,
1990; Greimas and Cortes, 1982; Latour, 1987; Bastide, 1989]. The phrases regarding BMMs "localizing themselves" and "mobilizing certain humans" are written in this
lively way for a number of reasons. First, as I have mentioned throughout this paper, attributions of
agency, especially with regard to technology, are one of my main objects of study. This is not so simple as
taking the comment "This machine says that you are probably meditating" at face value. Rather, I use
these discursive metaphors excessively to question to notion that language is the deciding factor in
attributing will and agency. To the extent that machines, for instance, determine our actions by what they
tell us about ourselves, they have agency. And we are in dialogue [semiotic communication] with them.

The important point here is not whether one can tell a history of a machine and show that human deci-
sions and agency caused it and are sedimented into it. Rather, the fact that someone accepts the determi-
nation of the machine, and does not look for further explanation, is the recognition of agency. Expertise
has been transferred from human to the device, which is now more expert than the human.

The liveliness of this language is hopefully an antidote to the discourses which reduce humans to auto-
omatic information processors in order to account for the ways in which we can be wired into the world.
One advantage of talking about machine agency, and especially machine discourse, is that both humans
and non-humans are recognized for their subtle humors and general unruliness.

8. Heterodox science survives in the contentious boundaries of orthodox science. This boundary is difficult
to define and impossible to fully police. See. [Hess, 1993; Hess, 1987; Wallis, 1979].

9. See [Virilio & Lotringer, 1983].

10. [Noble, 1989; etc.]

11. [Walter, 1953, Hutchison, 1986].

12. On the recent history of the New Age see [Melton, 1988; Melton, 1991].

13. See especially the essays by Stoehr, Greenway and Fuller in [Wrobel, 1987] on the history of popular
electricity. See [Lawrence, 1972] for work on Alpha waves.

14. The science fiction novel The Karma Machine takes this notion of spiritual computing to its logical
utopian conclusion. People in this paradise run by a computer, eventually merge into one perfect hum [at
60hz?] [Davidson, 1975].
15. Whether or not this kind of mastery of self is consistent with, for instance, yoga and meditation as it is practiced in parts of East Asia, there is certainly no sign in advertisements for brain machines of escaping oneself, giving oneself up or becoming non-self. If any theme is predominant, it is that of taking responsibility for your life, taking charge of it, and maintaining this self-control.

16. Anthropologist Michael Taussig has written powerful accounts of the cohabitation of brutal colonialism and colonists’ deep involvement in the ‘magic’ of the Other. Technology figures prominently as both the means of violence and the medium of the sacred. [Taussig, 1987; Taussig, 1993]. On Orientalism as a discursive formation of scholarly fantasy, see [Said, 1978; Mudimbe, 1988].

17. John Liebeskind, quoted on the back of Megabrain.

18. [Hooper & Teresi, 1990, p. 21].

19. [Carroughes, 1946, p. 17].

20. On this history, see [Walter, 1953]. John Varley’s short sci-fi story, “Press Enter,” also depends on the notion of the flicker response [Varley, 1990].

21. [Deleuze & Guattari, 1987].

22. [Delgado, 1969].

23. [Kline and Clynes, 1960].

24. These experiments were the subject of Marge Piercy’s Woman on the Edge of Time [Piercy, 1976].

25. On the cultural notion of science as a neutral “culture without culture,” see [Traweek, 1988, and Bourdieu, 1975].

26. The quest for artificial intelligence is an example of how we are caught in a nature where computers really are exemplary models of rational thinking. For an exquisite essay on the computerization of genius, see Roland Barthes essay on “The Brain of Einstein.” [Barthes, 1972].

27. On the democratic objectivity and comfort of numbers, see [Porter, 1992].

28. Craniofacicentric is used here to draw attention to the way in which the head and skull are key symbols in our metaphors of personhood and rationality: “numbskull, blockhead, airhead, nothing between the ears, harebrained, thickheaded.” On the history of brain theories, especially the notion that cognitive functions can be illuminated by a study of brain locations, see [Star, 1989; Harrington, 1987].

29. Cf. [Evelyn Fox Keller, 1985].

30. [Fleck, 1979, p. 112]. The validity and analytic usefulness of Fleck’s insight have been borne out by recent anthropological work on scientists and technology. Sharon Traweek, 1988; Hugh Gusterson, 1991; and Gary Downey, in this volume; have focused on the role that education plays in selecting and acculturating prospective researchers, their work has shown how emotions, body-image and relationships with machines are shaped through specific applications and adaptations of popular theorizing.

31. This work draws upon the works of Donna Haraway, Evelyn Fox Keller, Barbara Stafford and Susan Leigh Star. All of these scholars wade into the tropics of discourse in order to locate and analyze ongoing struggles over the fabric of meaning. Stafford eloquently describes the coercive analogies and constitutive metaphors which make it possible to make visible the invisible worlds of the microscope and telescope. Star, attending to the social organization of neuroscientific discovery in brain research, locates metaphors as both enabling and setting limits on ways of looking at the world: “Metaphors are a way of making a bridge between two unlike things...Lakoff’s work on metaphors also shows that, like long-standing arguments, they can define the limits and boundaries of a way of looking at the world—in a sense they beg certain epistemological questions through the act of conjoining that which is unlike, and without questioning in the act” [Lakoff, 1987; Lakoff and Johnson, 1980] [Star, Brain, 205].

32. See esp. [Nelkin, 1989; Terry, 1989] as well as the works of Gilman.

33. See [Foucault, 1978] and also [Gilman, 1988]. Gilman attends to both the iconographic and textual means of producing social truth. He takes up the question of the desire to find definite (i.e. objective) means of discriminating who is different (i.e. not normal) with regard to diseases and mental illness.


35. In the case of BMMs, we can look at how a digital, cyborg gaze is produced with which we see objective images of ourselves in a sublimely taxonomic world of discrete categories of persons and functions. That these categories have to be familiar ones, that they have to reinforce Social Truth, however, is not at all clear. Examining the areas of popular theorizing which shape our desires for these images is one way to imagine alternate identifications.

36. [Hogness, 1983].
38. Ironically, this slogan "Be all that you can be" was itself lifted from the Silva Mind Control movement by an Army investigation into New Age techniques for possible use in leadership training [Swets, 1990].
40. [Mumford, 1971, p. 165].

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