4_GOVERNING

Designing Information and Reconfiguring Population circa 1959

The eye speaks to the brain in a language already highly organized and interpreted. —**J. Y. Lettvin**, **H. R. Maturana**, and **W. S. McCulloch**, "What the Frog's Eye Tells the Frog's Brain," (1959) reprinted in *Embodiments of the Mind*, 231

My problem is that I have been persecuted by an integer. . . . The persistence with which this number plagues me is far more than a random accident. There is, to quote a famous senator, a design behind it, some pattern governing its appearances. Either there really is something unusual about the number or else I am suffering from delusions of persecution.—**George Miller**, "The Magical Number Seven" (1956), 81

In 1959 in the labyrinth of a laboratory named the Research Lab for Electronics at MIT, a team of cybernetic researchers were busy studying that most primary of electrical systems— the nervous system. On a petri dish before them they had laid out a poor *Rana pipiens* frog. The flap of skin behind the frog's eye had been cut open, and the frog lay pinned, unable to move for pain, on the dish. A number of phototubes and cameras finely tuned to detect and image the electrical movements of the optic nerve were arrayed around the poor animal. The endeavor at hand was to isolate and analyze the actions of the nerve separate from the brain. The researchers sought to extract the process of vision itself. Beautiful (to the researchers) images of "frog-like" environments were displayed to the frog's eye, with no reaction. But when small rotating disks and small black objects were twitched, a volley of electrical impulses was released and transmitted through the nerve fibers. Having recorded the actions of the

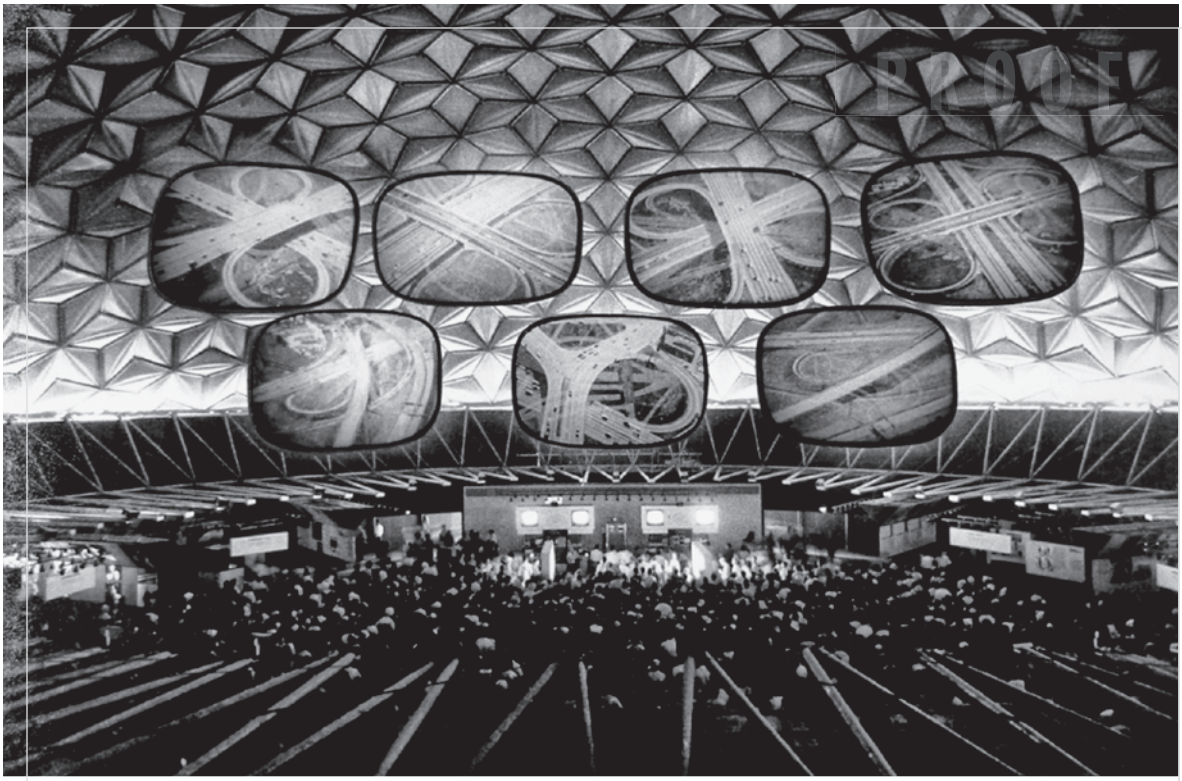


FIG 4.1__*Glimpses of the USA*, installation by Charles and Ray Eames, Moscow (1959). The Works of Charles and Ray Eames, lot 13393, no. 14, Photography and Print Division, Library of Congress. © 2013 Eames Office, LLC.

nerve isolated from the brain, the researchers came to the conclusion that "a frog hunts on land by vision. He escapes enemies mainly by seeing them. . . . The frog does not seem to see or, at any rate, is not concerned with the detail of stationary parts of the world around him. He will starve to death surrounded by food if it is not moving." The eye, without the brain, could recognize moving targets.

These words should immediately call our attention to two features: the mobility of vision and the capacity of vision to act (or hunt). The very title of the piece, "What the Frog's Eye Tells the Frog's Brain," suggests an eye autonomously speaking to the brain; an eye capable of cognition. Vision, the research group argued, can act—it operates on algorithmic principles, making decisions such as identifying "prey" or an "enemy."

Since when, we might ask, could eyes talk and think? I have opened this chapter with the discovery of the minute isolated optic nerve because the implications of this revision of perception did not end at the boundaries of the Research Laboratory for Electronics at MIT. This emergent discourse of vision

as a channel endowed with capacities to act linked the nascent neurosciences of the period to broader changes in governmentality relating to how perception, cognition, and power were organized. In the last two chapters, I began to intimate a relationship between changing forms and practices of planning and design, an algorithmic optic, and the emergence of rationality and data visualization as democratic virtues and economic values. In this chapter I want to return to these themes by continuing to interrogate the historical and conceptual relationship between cybernetics, design, vision, and cognition. How do circuits link from within the eye to the structure of cognition and to the governance of attention? I want to run a cumulative experiment surveying the practices and objects introduced throughout this book—linking the transformations in design to the cybernetic reformulation of memory and cognition to demonstrate the affective, and aesthetic, infrastructure of Cold War politics, and perhaps to begin asking about the forms of power and media that operate in our present.

To do so, let me offer two further examples, culled from the archives of the Cold War that reflect this transformation of our ideas about how we think and how we see. If the mind has long been considered the site of the *cogito* and human autonomy, and if optic nerves were capable of cognition—then what might a cybernetic account of the mind look like when applied to seeing and remembering information? A few years earlier in 1956, one of the most famous articles in psychology (to this day, if assessed by number of citations in professional literature and downloads) was published—"The Magical Number Seven, Plus or Minus Two: Some Limits on Our Capacity for Processing Information." Reframing memory and decision-making in terms of information, recoding, and data compression, the psychologist George Miller, in keeping with the account of "rationality" discussed in chapter 3, created a new account of psychology, arguing that cognition was an algorithmic process that could be manipulated. In cognitive science, as in neuroscience, cognition and perception were rendered equivalent—both treatable as communication channels, and subsequently both subject to new forms of intervention. Just as communication channels in telephones and computer systems can be manipulated and constructed in different ways to increase capacities, thresholds, and action potentials, the same, Miller implicitly argued, could be done with the mind. This historical change in the accounts of the physiology of perception and psychology laid the groundwork for a novel science of the mind, and arguably, brain.[1]

In the same year that the frog's eye learned to speak, 1959, a new political structure of spectacle also emerged. In Sokolniki Park in Moscow, the United

States and the Soviet Union embarked on the first of a series of programs in "cultural exchange." Here, at this site, many new forms of presentation were paraded. As audiences were shown multi-screen-channel exhibits (fig 4.1) based on psychological theories of feedback and communication theories of information, Khrushchev and Nixon debated the variable merits of American and Soviet kitchen design and technology in front of the new television cameras. Five hundred American corporations displayed their wares, along with models of the "splitnik," the Levitt-style suburban tract homes into which these commodities were to be placed. Fashion shows paraded the ideal nuclear American family, selected to appear normal, without distinguishing features or abilities. Beneath the images of commodities and gigantic screens of American landscapes was exhibited the pioneering photo-essay "The Family of Man," which documented a biologically diverse but still singular and universal human species.[2] The pavilion was an architecture of perception and data that revealed both new forms of spectacle . . . and politics. Or perhaps politics as spectacle.[3]

The chief administrator of this design spectacle, George Nelson, spoke of this exhibition as an "enlargement of vision." Whereas his predecessor designer and influence on display structure, the Bauhaus member Herbert Bayer, spoke of stretching vision along horizontal and vertical axes, the postwar American designers discussed their work not as prosthesis but as an autonomous visual terrain capable of expanding infinitely and moving through many territories. Nelson critically argued that people view the world "atomistically"—"everything is seen as a separate, static object or idea."[4] For Nelson such a form of vision could not serve the newly integrated and sociotechnically dynamic postwar world.

His attitude to building the U.S. pavilions directly mirrored, in his terms, the disappearance of the author in modern art. He wrote: "it is of no coincidence [of late] that . . . the individual dissolved into an almost incomprehensibly abstract network of relationship and that the same thing happened to his concept of inanimate matter. Both developments, you will note, tended to substitute transparency, in a sense, for solidity, relationships for dissociated entities, and tension or energy for mass."[5] It is possible to deduce from this statement that Nelson was arguing that subjectivity in its stable and egocentric form could no longer be the basic substrate for either design or vision. We might also take a moment to notice that the dissolution of the individual artist was related to a transformation from matter and representation to "tension," "abstract network," and "transparency." Nelson forcefully insisted on substituting "relationships" for "entities." In design, as in the anatomies of neuro-

science, visuality gained a new logic to be encoded into the architecture of USIA Cold War propaganda and the nervous system of the spectator.

If, as Jacques Rancière argues, politics is the organization of the sensible, then I can only presume that this moment in the 1950s marks a profound reorganization of affect, with logistical implications for governance, autonomy, and subjectivity.[6] Furthermore, in that vision and power have long been linked in Western philosophy and scholarship, the mention of autonomy, survival, capacities, and channels as related to sight might also inspire us to reconsider our contemporary concerns with security, information, and biopolitics.[7] In the course of this chapter I will draw a map linking the three aforementioned examples to show how circuits and networks travel between nervous networks and eyes to overstimulated spectators and to the logic of government. I want to ask how the act of surviving through the identification of the prey and enemy becomes an autonomous and self-referential technology embedded in our machines, media environments, and medicine. In tracing this topography, I argue that we can begin a historical excavation into how vision and power were reconfigured through discourses of control and communication in the immediate postwar period and pose some preliminary questions about the implications of this condition for our present. Most critically, these practices demonstrated internal foldings between older concepts of territory, population, and subjectivity and emerging computational models of perception and cognition. These internal multiplications are the infrastructures to our present, and they complicate any simple understanding of what it means, in the words of the art historian Beatriz Colomina, to be "enclosed by images."[8] While so much has been written about the place of aesthetics in supporting politics, and the place of the Eameses, and design more broadly, and the military in establishing our present conditions of attention,[9] much less attention has been paid to defining what "vision," "politics," "attention," or even an "image" constitute at this historical threshold. More centrally, my intention is to extend the important work already done on Cold War propaganda, and the work done by this exhibition in particular, to complicate our understanding of today's biopolitics. To do so, it is not sufficient only to examine the design practices. I argue we must also link them back to the cognitive and emerging neuroscience of the time, so as to examine more completely how vision was being reformulated and scaled from within the optic nerve to the massive global demonstrations of superpower ambition.

In this final moment, I want to accumulate artifacts from the book to make visible these biopolitical processes, by which life itself is now governed; and to ask about how historical concepts of identity and space relate to emerging

forms of sensorial territory and globalization. I seek to ask the one question that architectural and art historians have not asked: how was population transformed through the integration of emerging cybernetic models of perception and cognition into design?

Cybernetic Vision

While today it may appear self-evident that vision is a material process that can be performed by machines, and rebuilt as medical prosthesis, it was not always so. The nascent neurosciences and cognitive sciences took the concepts of perception as an autonomous process as outlined in chapter 2 quite literally.

That vision and the identification of "prey" and enemy (even in frogs) would be of prime interest to cybernetically informed researchers should come of little surprise. Cybernetics, as I mentioned earlier and is by now well documented, emerged, after all, within the context of antiaircraft defense and radar research in World War II. Cyberneticians who were focused on shooting down planes came to treat the relationship between the gun and the plane behaviorally and statistically; their analysis thus shifted from documenting the present to predicting the future on the basis of the extraction of patterns from past data on system action.[10]

Vision became an algorithmic process for pattern extraction. Vision, as already demonstrated at the time and in this book by the work of Béla Julesz, Gyorgy Kepes, and Charles Eames, came to be compressed with cognition as a channel capable of autonomously analyzing data and patterns out of information-rich fields. Warren McCulloch—neural net pioneer, cofounder of cybernetics, and psychiatrist—and his colleagues at the Research Laboratory for Electronics at MIT, with their autonomously cognating optic nerves offered another example of this process by which perception was reconfigured.

In their article, Lettvin, Maturana, and McCulloch opened with a seemingly simple question: assuming a world of informatic overload, how can we assume that all processing occurs in the brain? Their answer was revolutionary from the vantage point of history: it does not. Cognition, they argued, *does not* happen in a centralized location (the brain). They argued that the management of data emerged through the networked organization of the sensation-perception-cognition system.

Their initial logic was critical. They hypothesized that the optic nerve does not transmit every piece of data (light) it contacts. Such an assumption reconfigured their experimental practice. Rather than test discrete stimuli, they exposed an optic nerve to *variations* in light. They created a test environment

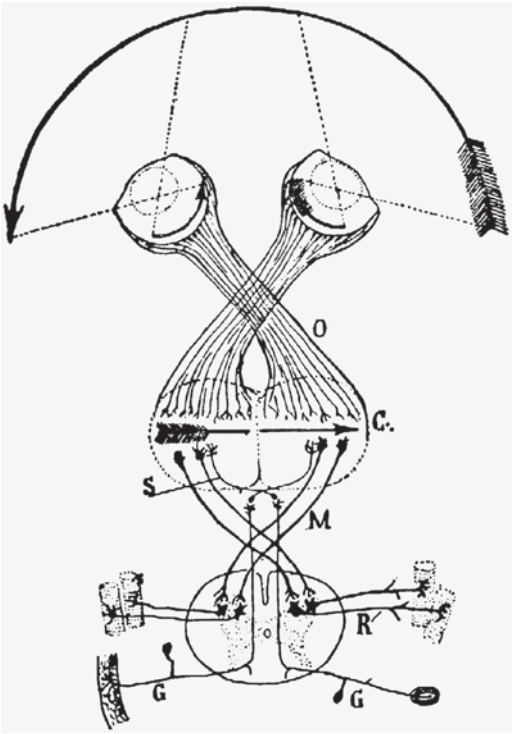


FIG 4.2__Frog optical system. From Lettvin et al., "What the Frog's Eye Tells the Frog's Brain" (1959). Courtesy of MIT Press.

where a series of myelinated and unmyelinated fibers in the intact optic nerve were exposed to variations in light stimuli. Working on these moving edge detectors, the team discovered a fiber that "responds best when a dark object, smaller than a receptive field enters that field, stops, and moves about intermittently thereafter." From the measurement of subsequent electronic impulse activity, they wished "to discover what common features are abstracted by whatever groups of fibers we could find in the optic nerve."[11] What they discovered was that when the eye was exposed to stimuli simulating a moving insect or an enemy (stimuli that moved or changed from light to dark) the electrical impulse given off changed *before* ever arriving at the brain, demonstrating that the eye—and they were studying only the actions of the optic nerve—was capable of making decisions between such binaries as prey or enemy and nonprey and nonenemy.

They concluded that "the eye speaks to the brain in a language already highly organized and interpreted, instead of transmitting some more or less accurate copy of the distribution of light on the receptors."[12] Their colleague Michael Arbib summarized this finding as proof that the frog's eye could deal

with universals like "prey" and "enemy."[13] In summary, eyes were found to be Turing machines. Perception, therefore, became the same as cognition, as autonomous entities, like eyes, began the process of abstracting and processing information. This analysis opened up the possibility that perception as an autonomous process could be technologically replicated—a conclusion further substantiated by the fact that this research continues to underpin much computer science work on vision.

The emerging postwar neurosciences did not understand the image as a representation being transmitted and then translated on arrival in the brain but redefined vision as encompassing the entire relationship structuring the act of observation: a communication channel.

These neurosciences thus produced a flexible barrier between the realms of stimulus, the form of the data, the organs of reception, and the site of processing. While such subjective perception had been found in nineteenth-century physiology and psychology, it was now no longer a problem for scientific objectivity and knowledge, and was positively embraced for technological potential in neural nets.[14] The very nerves, extracted from any particular body, are capable of processing and analyzing data. I would even argue that ontology and epistemology were both collapsed into another approach, which focused on method, process, and feedback. The act of processing information and the act of analyzing it became the same, and the possibility emerged that this decontextualized seeing process could be rebuilt in other locations.

This is not an insignificant experiment in the histories of visuality.[15] The cybernetic model of perception desired a purely technical and autonomous eye. If one wished to see an insect, then one built a frog's eye; if one wants to see a missile silo, perhaps one builds a different form. Vision circulated. There was no single norm for vision. The ideal of a singular, or objective, form of vision was replaced by a fantasy of effectiveness serving particular functions. Historically I wish to focus on the critical function that the lack of concern for static ontologies played in facilitating a shift in the conception of sense perception as an interactive process and a material technology in design, cognitive science, and cybernetics. This was an eye extended into the body and out into the world, a vision that was material and could now act on its own—flies eaten and airplanes blown up, for example—a networked cognition beyond the brain and a new way to understand the differences between subjects and objects. There was no ontological stability in cybernetic visuality; there were no stable enemies or preys.[16]

There was, however, a curious indexical and temporal nature to this ability to materialize vision. To focus on how eyes "speak" to the brain demanded a

lack of regard for, or perhaps an automation of, recording and an assumption of an informatically dense world. The impossibility of ever accessing and processing all this data was no longer the problem. Instead the question became how to manage and utilize the unknown. This subtle but important revision of attitudes to knowledge and objectivity was first articulated in McCulloch's classic piece, written with Pitts in 1943, establishing the equivalence between neurons and Turing machines and conceiving of a "neural net." As I explained in chapter 3, McCulloch ends the piece with an astonishing statement concerning scientific claims: "thus [this research proves] that our knowledge of the world, including ourselves, is incomplete as to space and indefinite as to time. This ignorance, implicit in all our brains, is the counterpart of the abstraction which renders our knowledge useful."[17] This "ignorance" or subjective quality of all cognition was now the "abstraction" that produced "use." Subjective perception was equated with technological potential without concern for mediation, and efficacy replaced the concept of an absolute reality as the measure of truth. McCulloch not only took a non-Cartesian perspective but also resolutely declared any split between the mind and the body, or reality and cognition, both undesirable and impossible.[18]

Cybernetic Cognition

Cyberneticians thus existed in an environment of infinite potentiality, a chaos of informational excess, out of which process, order, and meaning were carved. Theirs was a world of infinitely available data from which patterns, techniques, and potentials for actions—psychological, technological, behavioral—could emerge.

Structuring the frog's eye was a broader claim that perception could be modeled as a communication channel, and subsequently enhanced, mobilized, reconstructed, and modulated. Underpinning the equivalence between the senses and communication channels was a revision of the relationship of perception to cognition. If eyes could think, then minds and now brains were also part of the communication structure. An entire science—cognitive science, a field that continues to dominate contemporary psychology and particularly administrative and organizational psychology—emerged whose concern was to model thought processes in algorithmic manner. Like the autonomous speech of eyes, the ability to study cognition separate from psychology or physiology identified an important change in the constitution of knowledge and the experimental practice of psychology.

A few years earlier, the purported founder of cognitive science, George

Miller, had written the aforementioned paper that continues to be the single most cited piece in contemporary psychology: "The Magical Number Seven, Plus or Minus Two: Some Limits on Our Capacity for Processing Information." A young faculty member at Harvard, Miller was working at the high temple of behavioral psychology. Perhaps as a matter of proximity (or rebellion), Miller was explicit throughout his writing in the 1950s that his prime concern was deploying cybernetics and information theory to challenge behavioralist psychologies and psychoanalysis simultaneously.

His explicit use of cybernetics was not coincidental. As a soldier and a graduate student, Miller had worked during the war on signal processing and speech perception, and later on radar engineering. As a result of this crossover between studying signal processing and psychological processes, Miller was very familiar with dominant theories in computing, cybernetics, and communication.[19]

It is somewhat telling, then, that this most famous of all psychology articles was an act of archival recombination. The text is an analysis of other researcher's work on memory, recall, and identification. No experiments were done by Miller to write the piece. The scientists' practice was already seemingly grounded in an epistemology of informational surfeit.

"The Magical Number Seven" opens with a political reference that serves as a gateway to rethinking psychology, politics, and aesthetics. Miller appeared haunted, perhaps deluded, by the very histories of psychology he was attempting to overturn. "My problem," wrote Miller, "is that I have been persecuted by an integer. For seven years this number has followed me around, has intruded in my most private data. . . . The persistence with which this number plagues me is far more than a random accident. There is, to quote a famous senator, a design behind it, some pattern governing its appearances. Either there really is something unusual about the number or else I am suffering from delusions of persecution." That senator was, of course, McCarthy, and the delusional form of persecution Miller described was none other than a faith that seven defines a natural and normative limit, structurally and mechanically ingrained into our minds; a pattern produced by nature or a higher power, a pattern not amenable to change. However, just as organizations like governments could assume paranoid formations, scientists could be deceived by their own minds; a pathway was thus opened by which the single psyche and the networked organization could collapse and be similarly treated by science through the notion of "information."[20]

The article then proceeded to survey an entire history of research on judgment and memory recall, first covering articles on the ability of individuals to

distinguish tone, then pitch, then visual data points. The article treated any form of stimulus the same. But Miller repeatedly argued that cognitive limit reappeared. Test subjects in psychological studies, given certain amounts of data, can only seem to remember or differentiate between seven data points.

Before, however, being deluded into believing that there was only one normal standard for human memory and information processing (in relation to which individuals may either be normal, subpar, or geniuses), Miller argued that thinking of psychology in terms of information might transform a set and stable limit to a permeable threshold.[21]

What does Miller mean by information? Here he called on the mathematical theory of communication and the communication sciences to revise the current idea of psychology. Miller equated information with the amount of variance in a study. "The equations," he wrote, "are different, but if we hold tight to the idea that anything that increases the variance also increases the amount of information we cannot go far astray."[22] Another way to understand this equivalence is to think that if a study demonstrates a very wide number of different cognitive responses, then finding the single unitary pattern is more difficult, or wields more information about psychology than a study in which all test subjects perform the same. One study (the more variant) reveals there are many more options or possibilities for action than another. This increase in possible outcomes is equivalent to the probabilistic nature of cybernetic and communication sciences.

The advantages of this new way of talking about variance were, he continued, "simple" enough. Variance was always stated in terms of the unit of measurement. By rethinking variance as equal to information and "amount of transmitted information" as equivalent to "covariance" or "correlation," Miller opened the possibility of a stable scale or curve becoming mobile and relational. Instead of thinking in terms of set units, we could begin to think, in his words, in terms of "channel capacities." Here the explicit introduction of "capacity" mirrors the engineering imperative of finding out how much information *can* be compressed into a particular channel or structure. By removing any set or stable scale or unit of measurement, it is made immediately evident that cognition can now be thought about at different scales (organizational to individual) and extracted as a material process to be modeled and enhanced.[23]

Having established both the apparent repetitive nature of the "magical number seven" and the equivalence between psychological responses and communication theory, Miller then proceeded to explain the implications of this finding. He argued that if we consider an observer in terms of channel capacities and information, we can also begin to think about the limitations

to recall and judgment in terms of compression and recoding—computational terms. Miller claimed that the way to increase the amount of information an observer could listen to was by changing either the number of items per input (chunks) or the bits of information (number of decisions or relations per input). Chunks were related to immediate memory and recall, and bits were related to immediate decisions or judgment. Miller's analysis thus splits psychic processes into space and time—immediate assessments of difference between visual and aural stimuli versus durational recollections of data points. This separation between the location of immediate decision-making and the transfer of past data into the present mirrors the structure of computers, allowing Miller to consider how to store data separately from how to operate on it.[24]

So, for example, in memory, Miller noted that we can remember and differentiate many faces (more than seven) and that test subjects had easier times remembering sentences or full grammars than discrete letters. For visual data, subjects judged differences between multidimensional inputs, for example changes in color, when given a comparison color field, better than when shown one input at a time separately. These were all examples of information compression and, in Miller's language, "recoding"; each of these experiments dealt with relational data points rather than discrete stimuli. Recoding for Miller is putting more bits into each chunk. So for example, when giving subjects decimal numbers to remember, if the numbers are grouped together in some pattern then subjects can remember and recall many more numbers then if just shown a series of discrete numbers with no "chunking" (this finding is supposedly the reason we have seven digit phone numbers in the United States). The studies he mentioned also noted that speed was a factor in cognitive performance. The velocity by which data was given as well as the tempo of data delivery, for example how long each input stimulus lasted, or how long one had to watch or listen before given a break, all impacted the specific ability to recall or discriminate between inputs. If information could be recoded, ever more of it could be processed and remembered by the individual, the psyche for Miller was elastic.[25]

The article thus paralleled the relationship developed by McCulloch and his colleagues in their work on the eye. It should come as little surprise that Miller's article was written at the same laboratory that McCulloch, Lettvin, and Miller were all members of (the Research Laboratory on Electronics at MIT) or that there was a close correspondence between all these researchers concerning the use of cybernetic principles in their research.[26] More significant, it was this deferral of interest in static ontologies (what we might label "content"), and the shift to examining interactions made possible by using the

frameworks of communication theory, that transformed the nature of psychological inquiry, making cognitive processes visible, modelable, and technically replicatable.

Miller's work created a new way to approach perception and cognition. Like the neuroscientists, he was not concerned with separating the senses; the process of perception was interchangeable between acoustic and visual stimulus. More important, Miller treated the perception and cognition of stimuli as a relational feedback interaction. He wanted to model the *process* of perception and memory, not delineate the divide between an external stimulus and an internal response. In rethinking the "observer" in terms of "channel capacities" instead of as stimulus-response or a conscious-unconscious subject, Miller opened the path to the augmentation, and perhaps automation, of both memory and decision-making. No longer concerned with normative performance, or a single locus on which the subject was to focus his or her attention, cognitive science turned to understanding how channel capacities could be modulated and directly acted on. The primary concern was enhancing the subject's ability to consume information. Psychologies and machines became epistemologically equivalent, and the intent was to figure out how to model the process of perception as a channel capable of operating in informationally dense environments.

The final lingering problem that Miller returned to, at the end of his article, was whether seven was arbitrary or necessary, a reality or a construction. He answered that even posing such a question would induce pathology. Perhaps, if instead of obsessing about the number seven, we noticed a pattern and stopped looking for causal reasons, we could avoid sinking into any delusional or paranoid states at all. Miller implied that a brain reconfigured through communication theory would be less susceptible to paranoia and delusions. Or perhaps, in keeping with the extended networked intelligence of the frog's eye, a psychotic structure would become the normal model for cognition. Asking such paranoid questions, Miller intimated, such as whether seven was really a natural, immutable, and eternal truth or whether it was a "construction," or contemplating whether the number seven came from nature or G-d or from environment and society to persecute our minds, would only make us ill. Since we are all now provably subjective in our perception and cognition, and unable to tell if input is from inside or outside our own nervous systems, there could be little productivity in attempting to reassert those boundaries in scientific research.

The scientific question, Miller implied, was what work does seven do? What can it teach you about how to recode information? Miller never assumed a

genetic stability architecting the mind's cognitive processes. In a moment before either minds or machines were as well known as they are today, a mind-machine was conceived that was both biological and emerging, computational but not mechanistically reductive. This ontologically unstable mind-machine emerged logically from psychologists' embrace of communication, since communication was where the threshold between the exterior and the interior and the stability of reference or scale were both abandoned. The observer configured as a communication channel stood prepared to serve as a conduit for ever more data.

Political Spectacle

But why stop with the reconfiguration of vision and psychology? In the same year the frog's eye learned to speak to the brain (fig 4.2), in the midst of the Cold War, another architecture of perception emerged at Sokolniki Park: a vast cavern filled with seven screens, built by Buckminster Fuller and designed by Charles and Ray Eames. I want to return here to chapter 3's intimation of a relationship between politics and aesthetics to ask about the implications of this emergent technical and autonomous form of vision imagined into being through cognitive science, cybernetics, and design.

A "totally new type of presentation," in the words of Charles and Ray, the seven channel presentation was envisioned as a "letter," perhaps of love, between two nations in a world where writing would no longer suffice; a "glimpse" of the United States, a day in this foreign country's "life" that by the end would cease to be foreign. In the face of this imagined textual and lingual collapse, the designers believed visual images might serve as a new mode of human interaction. The Eameses believed in spectatorship as choice. The idea of spectatorship invoked in their work was to force users to interactively choose the images they wanted to watch and to find their own patterns in the vast data field of images. Twenty-two hundred images were shown on seven screens for thirteen minutes—data inundation as design and pedagogy principle. Charles Eames has been quoted (chapter 2), in discussing his design and pedagogy for engineering, architecture, and business students, as arguing that vision was a new "language" and that the function of his multimedia displays was to test "how much information *could* be given" to a spectator in an allotted time.[27] Hundreds of thousands, if not millions, of people saw the installation.[28] Everyone, according to the architecture curator Peter Blake, "had tears in their eyes as they came out" of the opening show, rumor had it especially Khrushchev. American officials were alleged to have called it one of the most

successful acts of psychological warfare ever conducted. Ray Eames called it an "affective" experience.[29]

Despite the universal acclaim of the success of the American Pavilion, it might be noted that it was also deeply contentious. Rather than emerging from a clearly defined and authoritative government plan, the pavilion emerged from a series of accidents and assembled interests. While officials at USIA claimed that the exhibition was about promoting "improved understanding" between the two nations, this was hardly the only agenda. William Benton, a former assistant secretary of state, remarked that the State Department "was in the propaganda not art business."[30] The art exhibition was embroiled in attacks by congressmen against the supposed Communist associations of participating artists. George Nelson personally had to guarantee that the Eames exhibit could be produced without government oversight or prescreening, because the designers were concerned about excessive interference.

More broadly, the United States struggled with its "soft" tactics. On the one hand U.S. government officials realized the salience and popularity of American products and entertainments; on the other hand officials desired to educate viewers in the evils of Communism. These two goals often seemingly warred with each other as pedagogical propaganda demonstrating the moral virtues of capitalism and the supremacy of American science and technology warred with the (always seemingly more popular) pleasures of Hollywood film entertainments that offered a spectacle of the United States as one of fast women and criminal men obsessed by material wealth and bereft of soul.[31] Public furor and congressional anxiety aside, the show went on.

Scales of the Image

The movie opens with the view from above, the aerial flight. In the night sky, the voiceover intones, Russian and American cities look the same. The scene from the plane is ominous in the midst of concerns over thermonuclear war. But this view from above rapidly condenses into the network on the ground, such that the memory of aerial bombing is not memorialized but rather becomes an aesthetic device to enter the circuit. Central are images of highways, modular housing, speeding cars and transport, infrastructures of power and industrial plants, conspicuous consumption, seven screens of Marilyn Monroe winking from *Some Like it Hot* (the Russians clapped every time) and perhaps most critically, signs of a perfectly racially integrated society (fig 4.3).[32] The irony that it was the very infrastructure for an emerging American spatial apartheid, highways and modular tract housing, that was the substrate for a

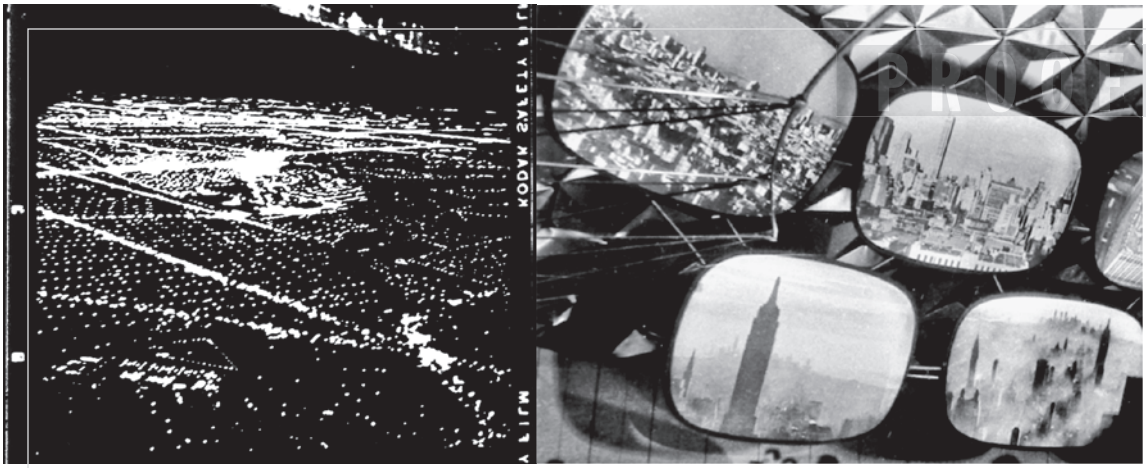
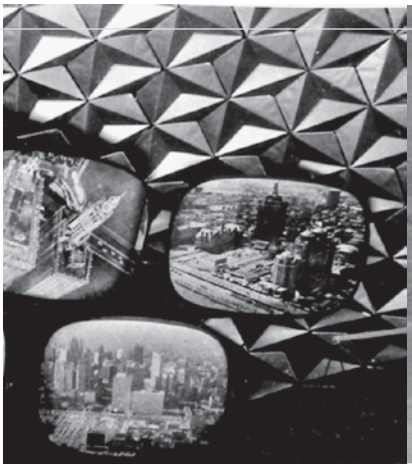


FIG 4.3__Stills and production shots for *Glimpses of the USA*, installation by Charles and Ray Eames, Moscow (1959). Aerial views; images of cities and infrastructure; scenes of racial integration on the playground. The Work of Charles and Ray Eames, lot 13234–1, no. 24, 42, Photography and Print Collection, Library of Congress. © 2013 Eames Office, LLC.

collective vision of a single humanity should not be lost, but the movie's major statement was that flow, and communication, would overcome difference—between nations, between people.[33]

The democracy of viewership was affirmed by the computer display outside the pavilion. Immediately at the entrance was a RAMAC computer by IBM, programmed to interact and poll entering viewers about their attitudes to the United States. The computer asked questions about what the Russians thought about the United States and allowed them to "vote" for presidents and policy decisions, while simultaneously responding to questions about the culture, people, and politics of the United States. From the very opening of the pavilion, it would appear, an aesthetic of assimilation, interaction, and consumption operated (fig 4.4).[34]

As part of the complex in a smaller pavilion that served as a corridor leading to this enormous installation, viewers experienced another pathbreaking exhibition in the history of visuality—*The Family of Man*. Curated by Edward Steichen, the chief photography curator of the Museum of Modern Art in New York, based on 1930s Farm Security Administration documentary project aesthetics, the show was a photo-essay depicting the "human" condition on earth. Drawn from Magnum and other press photo archives as well as work solicited from many of the most famous documentary photographers of the time, the display consisted of hundreds of photographs with titles documenting a single species; an ode to biological diversity in humanity, framed by the narrative



of a standard heteronormative life cycle with the nuclear family at its center. Compared to the multimedia spectacle accompanying it, the tempo of *The Family of Man* was slower and mapped the photograph to a text to mobilize melodramatic sentiment or empathetic relationality (depending on your standpoint toward the show). The dominant reading of Steichen's work by such critics as Roland Barthes, Susan Sontag, and Allan Sekula was as a sentimental representation of the human condition in the name of propagating American imperial ambitions, in fact a pivotal part of the aesthetics of empire by which the United States presented the face of a new global consumer species.[35] *The Family of Man* arguably still operated on a model of legibility produced through the aesthetic conventions of documentary realism and the temporal narrative of a linear life pattern. As an exhibition, and in contrast to the Eames work, it maintained fidelity to textuality as necessary for, and abetting, visuality.[36]

Algorithmic Cinema

But this story of an aesthetic of imperial ambition operating through still modern forms of sentiment, identification, and ideology may be too simple. The installation accompanying Steichen's show had a different logic. The Eameses were not interested in life as a linear progress through stages. While children and mothers appeared, and faith, certainly, in *Glimpses*, overwhelmingly it was infrastructure, roads, electric bridges, material pleasures such as food, nightclubs, winking women, flying kites, and other moments of pure gesture such as the cycles and rhythms of mobility and labor as people dashed into cars for work. If Steichen's exhibit has been understood as presenting a single idea for how human beings share a world and a definitive historical and life cycle/biological time, the Eameses had a different idea—one of choice, patterning, reverberations, and redundancies.

FIG 4.4__The floor of the Moscow Exhibit (1959), with multiple types of display operating; integrated children play at a fountain in front of the *Glimpses of the USA* installation. *The Family of Man* exhibit was in a pavilion, to the side of the central oval that led into this space. The Work of Charles and Ray Eames, lot 13234–2, no. 27, Photography and Print Collection, Library of Congress. © 2013 Eames Office, LLC.

Anticipating our arguments today that that moment in history heralded both new forms of perception and novel forms of economy, Charles Eames insisted on the historical specificity of this form of visuality and media. He was explicit that this form of exhibition was an architecture of multimedia and *not* cinema.[37]

The installation was, indeed, a case study in communication theory—a critical experiment in information management. The seven-channel installation was carefully timed. The flow charts made by Charles Eames and his editor, miming those in computer science (with which they were familiar through their major client, IBM, see fig 4.5), cadenced the presentation; breaking editing velocity and acoustic flow into clear cut steps. The Eameses viewed communication theories as central to their design principles and regularly worked with cyberneticians, such as Norbert Wiener, and corresponded with Jerome Lettvin (of frog's eye fame).

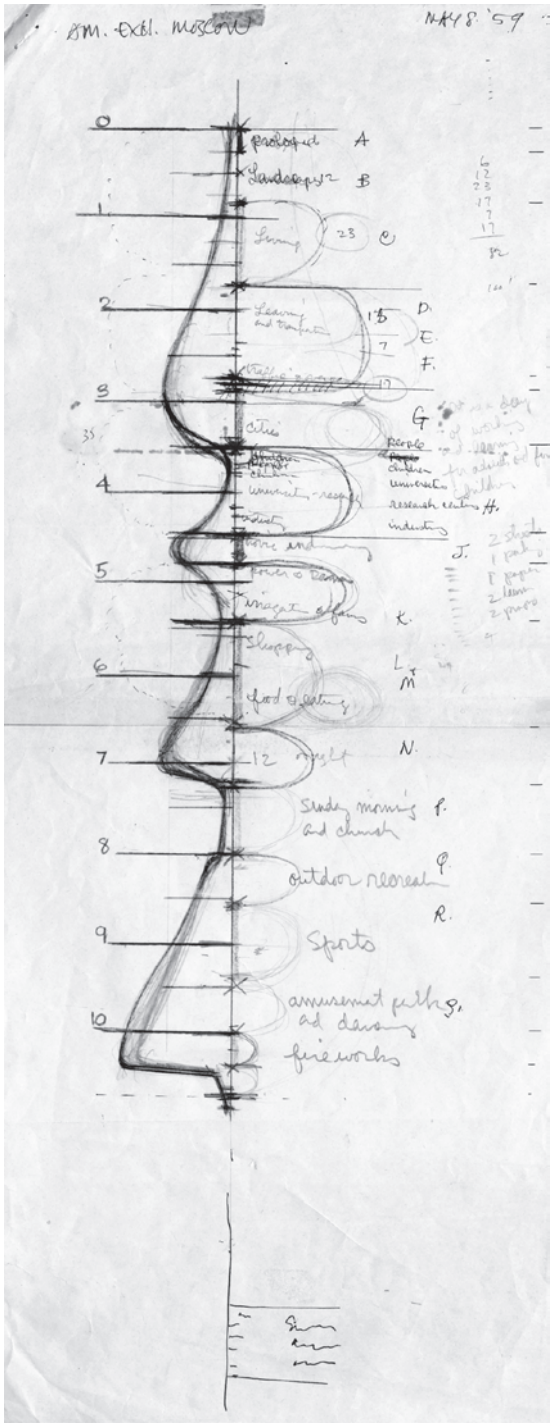


FIG 4.5__Final editing flow chart for *Glimpses of the USA*, installation by Charles and Ray Eames, Moscow (1959), The Work of Charles and Ray Eames, (C-12r), Manuscript Division, Library of Congress. © 2013 Eames Office, LLC.

The movie was carefully, thought out, timed to the moment, seemingly grounded in theories of cognition and information and based on a model of iterative feedback between spectator and screen. The chief editor of the seven-channel presentation, *Glimpses of the United States*, was the avant-garde moviemaker John Whitney, Sr., a pioneer in computer graphics and animation and famous for using cybernetic concepts in making his films.[38] In discussing his editing tactics he wrote of producing a "liquid architecture" that would create "structured motion that begets emotion."[39] Whitney sought a machine cinema no longer in the realm of image and index to produce a new world of entropic potentials that would directly tap the nervous system and produce a mobile space. "As early as 1957," he recalled, "I had begun to construct mechanical drawing machines. . . . I was not motivated to create representational images with these machines but, instead, wanted to create abstract pattern in motion . . . to evoke the most explicit emotions directly by its [the film's] simple patterned configurations of tones in time."[40] To accomplish this ambition of surpassing the image to directly induce emotion, Whitney used the remains of antiaircraft servomechanisms from the navy to construct machines that could produce graphics on film without filming any original drawing or live action.[41] Whitney sought an algorithmic vision that made machines authors in the production of human experience; a form of machine vision whose work did not operate at the level of the visible image but through the attenuation of the nervous system, by way of computational logic.

The production notes are copious, and correspondences between Whitney and Eames afterward indicate the centrality of ideas of feedback and psychology to Whitney's thinking about editing and cadencing. Whitney in a later letter to Eames cited Kenneth Clark, a prominent British art historian, to make his point about the changing cosmology of the "image" and to argue that he (Whitney) sought to make a less "anthropomorphic" image.[42] A less anthropocentric image for a new age, one Whitney inaugurated with his work on animation, starting in the late 1950s.

If the organizers of the USIA pavilions still thought in terms of images, and architectures of geographical space, Whitney discussed his work in terms of harmonies, fluids, sine waves, raw patterns, and "material abstractions," implying the production of a visual-acoustic sensory environment that would transform cinema and in fact territory (fig 4.6). Vision took materiality for Whitney as a process to be designed, replicated, and computationally programmed. In design, as in the anatomies of neuroscience, visuality gained a new logic, to be encoded into the architecture of USIA Cold War propaganda and the nervous system of the spectator.

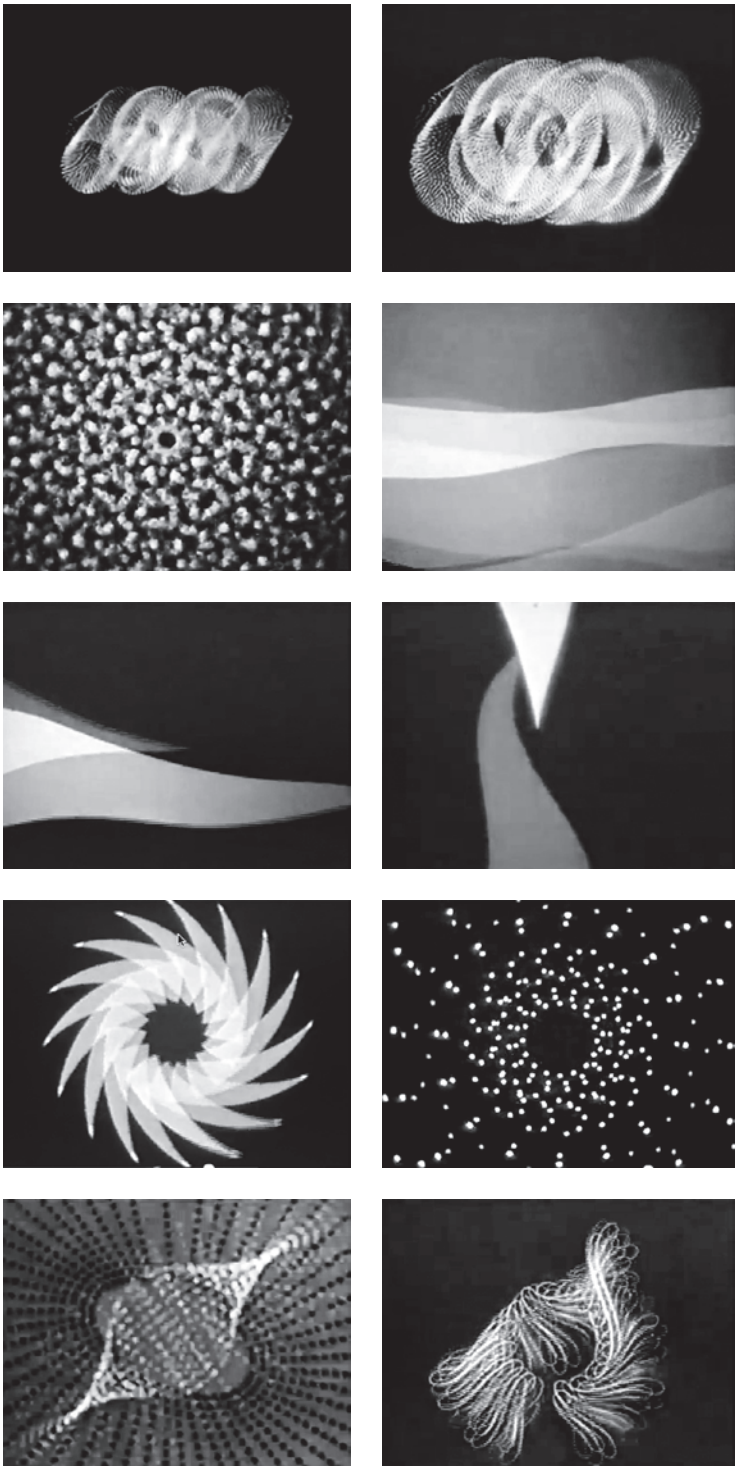


FIG 4.6__Screen stills from *Catalog*, by John Whitney, Sr. (1961). He used his adapted servomechanisms-camera machines to produce the patterns and animations without pre-drawing the stills and to create patterned mutations and movements. This was one of the first examples of computer animation, produced shortly after *Glimpses of the USA*. Image capture from YouTube, https://www.youtube.com/watch?v=TbV7loKp69s.

Of greatest interest to us in demarcating a historical shift in media strategy and the management of attention was the Eameses' and Whitney's attitude to cutting and the image. They viewed idiosyncratic changes of images as useless but viewed relational shifts, the changing of a series or set of images together, as facilitating information exchange. In *Glimpses* only sets of images could shift. Charles Eames argued that changing one image at a time was useless. Only changing images in groups of three or four so the eye could find a pattern was useful. Transfer would always start at the bottom of the screen, and a number of screens would change together to allow the eye to pick up patterns. He labeled this a new form of relational editing.[43]

If the Steichen show was laid out in a linear flow, driving users to choose a pathway through a historical life cycle centered on the drama of motherhood and child development, for Whitney and the Eameses the spectacle had to be produced through redundancy and repetition. Whereas Steichen only occasionally used landscapes, tending to focus on midlength shots or close-ups that clearly showed emotion, and allowed individuals to be singled out as unique, in the Eameses' films extreme long range and extreme close-ups were the standard, usually following one after the other. Whitney's editing style followed the logic of musical scoring, favoring repetition, cadencing, and harmony. *Glimpses* operated by repeating cycles of slowness, accelerating images, and then again slowness as a way to move viewers through a "day" that was mostly about showing repetitive patterns of infrastructure and activity. This speed was paralleled musically and in scaling images, the crescendos being the closest or furthest moments—many highways at once or Marilyn's face.

Machine Vision

It should perhaps be no surprise that it was the figure of the movie star's close-up that served as the locus of transfer from human to inhuman vision. The close-up, as the feminist film theorist Mary Ann Doane has written, is the moment when that which is human (the face), the very sign of subjectivity, condenses into raw gesture and form. Film critics obsess about the close-up as the very mark of the cinematic medium, the singular operation that separates classical cinema from other performative and spectacular media, such as theater or panoramas. The close-up, however, demonstrates a built-in contradiction. The close-up simultaneously demonstrates how the cinema exceeds language and human perception, the inhumanity of the camera, while also asserting the human body (the star) at its center. As Doane demonstrates, the discourse on the close-up in film theory is fraught with an effort to maintain this human at

the center. At the same time, the theory of cinema must repress the features of time and scale that make the close-up operate not through identification with the star but through a spectatorial immersion into the image. The close-up is a perspective that, despite its content, cannot be seen or fully accessed by human vision, it is too large, its scale and proximity impossible for an unaided human eye to actually see. It drives an effort, a desire even, to be able to image the medium, even as it makes it impossible for a human being to do so. The star is not available to be apprehended by the spectator.

Perhaps surprisingly, what results is an intensification of media consumption. This joint feature, the intimacy of the face and the size of the screen, drives a frenzied proliferation of screens—both very small and very large—in an attempt to both enjoy the cinematic spectacle (IMAX) and maintain control over the image through personalization (handhelds). At the zenith of Doane's argument may be the failure, entirely, of the cinema as a medium in the face of another media landscape; a failure the multiscreen installations, signifying a new form of spectatorship and medium, appear to embody in proliferating screens, scales, and media.[44]

This installation did appear to be an exercise in eliminating older forms of spectatorship. Utilizing the latest imaging technologies—aerial views, microscopic close-ups—the purpose was not to align the human eye with the machine eye. There was no mis-en-scène in the piece. It was not that the Eameses saw everything through a camera, and that the view of the camera and that of the human being were being aligned, but rather that the camera took an autonomous role. Mechanical vision emerged because of the focus on relationships and scale providing the direct conduit to emotion, as the editors of the piece imagined, rather than a conduit to seeing discrete images. This was not training in seeing like a machine but in being part of one.

If Steichen argued for the "oneness of man," the Eameses argued that images, such as highway interchanges, would be universally "familiar" (which is questionable).[45] This assumption of universality appeared to imply that the installation provided a format of species unification, perhaps an alternative definition of population to Steichen's, one grounded not at the level of the organism, or the human body and subject as the basis of the collective, but at a cellular or even molecular level, based on sharing neural patterns and forms of attention rather than identifying with similar subjects.

This global nervous network was propagated through a conception of vision as a channel or threshold. Charles Eames spoke of the choice of seven screens in terms of producing "credibility," which he defined as offering people a sense that they had seen something they were familiar with and was real in

a documentary sense, without necessarily allowing them to focus or fulfill a total identification with any one image. "We wanted," Eames said in a later interview, "to have a credible number of images, but not so many that they [the spectators] couldn't be scanned in the time allotted. At the same time, the number of images had to be large enough so that people wouldn't be exactly sure how many they have seen. We arrived at the number seven." (We might also wonder if seven was arbitrary.)[46] Eames suggests that vision is a threshold operating between the "credibility" of large data sets and the scanning capacity of the human sensorium. This perceptual architecture insisted on an eye capable of finding patterns in vast data flows. This eye, however, could never be fully "sure"; it had to be never stable, always available—as in the new epistemology of cognitive science and cybernetics—to anticipate and assimilate more data.[47] This lack of "surety" mirrors Miller's expunging of paranoia and delusion. All three figures gesture at an epistemic transformation in the definition of observation and authenticity. Credibility, here, was not about knowledge but about capacities.

Most times, Charles argued, people confused multimedia with multiimages. In that case, this logic implied, any film is multimedia. But, he continued, the work of the Eames Office was different: "it had not only multiple images, including the relationship between still and motion pictures, but also sensory things. . . . We used a lot of sound, sometimes carried to a very high volume so you could feel the vibrations. . . . We did it because we wanted to heighten awareness."[48] The language alerts us to a new site of technical articulation. Awareness itself takes on a materiality, to be modeled and encoded as a form of media. Unlike their predecessor, Herbert Bayer (who had provided inspiration for the Steichen layout), the Eameses created architectural diagrams of their installation that showed no observer; they rendered the installation as itself an eye, perhaps a cognating one. The spectator had disappeared (fig 4.7).

Perversely, the cinematic tactics of the Eames installation, along with earlier USIA films already shown at the world's fair in Belgium in 1958, more closely aligned themselves to Soviet constructivist conceptions of an autonomous and machine vision than to the classical Hollywood organization of spectacle, where the spectator is safely comforted into an alignment with the camera in the hope of reasserting the place of the human body as the measure of the screen image.[49] But if constructivism was linked to both behavioral psychology and utopian politics, this new multimedia practice linked to the cognitive and computational sciences had different understandings of truth and human subjectivity; gone were the notions of absolute truths or teleological progress, replaced by circuits of information.

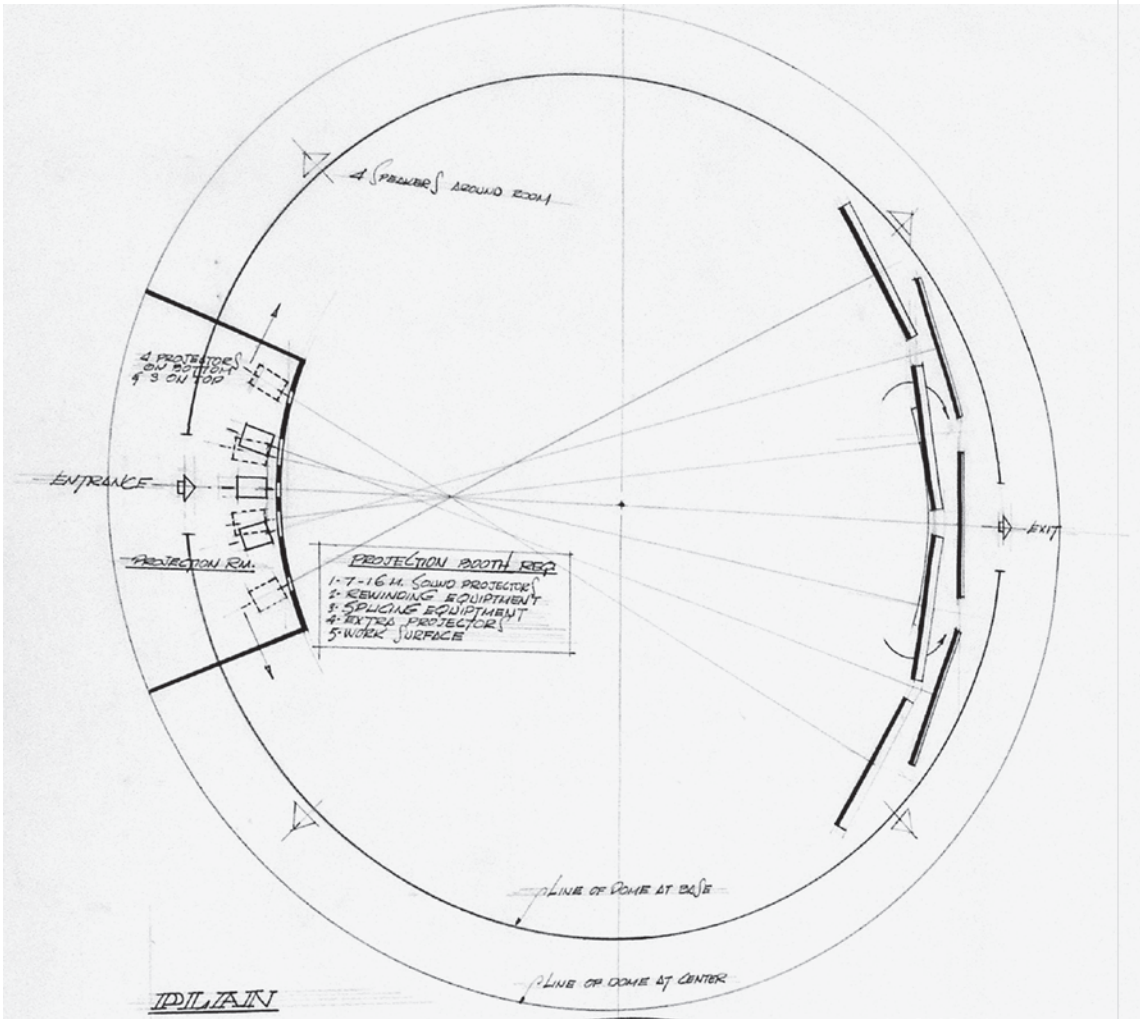


FIG 4.7__Architectural renderings of *Glimpses of the USA*, installation by Charles and Ray Eames, Moscow (1959). Viewpoints are taken from the perspective of the apparatus-projectors, not the observers; the piece is rendered as an "eye." The Works of Charles and Ray Eames, ADE unit 2833 no. 3, Photography and Prints Collection, Library of Congress. © 2013 Eames Office, LLC.

Theirs was a world emerging through the careful timing of data delivery, "We have always been committed to information," Charles recalled.[50] The Eames motto: information, not representation. For the Eameses, there was only communication. Sense made a channel that merged with cognition and was reformulated in terms of capacity and surety, always available to be re-coded in the terms of cognitive science.

Whether pattern recognition and subjectivization should be considered equivalent is unclear either at the time or in our present. This architecture of interactivity introduced in the 1950's was not the architecture of distraction put forth by Walter Benjamin and postulated by architectural historians as applying to 1959. The concepts of the individuated subject produced through normative images of the self, or of propaganda assaulting psychology, do not describe this new media practice. Domesticity, often associated with mid-century design and considered by design and architecture theorists like Beatriz Colomina long the hallmark of theorizing Eames, needs to be rethought. It was Steichen's show that facilitated affiliation and identification with clear subjectivities. The forms of spectatorship produced by the multichannel installation utilized the observer's presumed familiarity with the image for another purpose—to attune the spectator to finding patterns and consume information. This spectator, therefore, was no longer linked to norms and populations through identifying with ideal forms like the nuclear family or a stable subjectivity. The relationship between the anatomo-politics of the body and the population, posited by Foucault as the foundation of modern biopower had been severed.[51]

Instead, this was an architecture of the network, producing a new form of spectator who was simultaneously hyperindividuated and linked into a broader circuit, whose very nervous system was already conceived as a part of an interface. Perhaps this was not even an anthropocentric form of spectatorship. Certainly it was not one necessarily linked to the assumption of a stable human subject linked to a national population. A French press write-up covering the exhibit was titled "Le Cinema Prend L'Oeil De L'Insecte" and argued that a new form of vision, a challenge to cinema, had emerged in the cyclorama of the Moscow pavilion. This journalist equated the "vision" of the cinema with that of an "insect." The inventor, Charles Eames, had, according to the article, produced a new optic, utilizing the rules of psychology and physics to produce, for the first time in the history of cinema, a new view of the world: bifurcated into multiple points of view but synchronized temporally. These multiple viewpoints that were still synchronically coordinated the reviewer equated with the eye of an insect, which also has multiple lenses and

does not see the world through the cyclopean (to use language from chapter 1) synthesis of stereoscopic vision. Eames was thus credited with producing a radical, perhaps nonhuman, point of view.[52]

It is also worth noting that USIA-administered exit polls at numerous exhibitions at the time demonstrated that the "soft" message of U.S. cultural initiatives often originated because of the rather diffuse and unclear message of the installations. Counter to the Soviet installations, which offered clear points on the virtues of Communism and the technical prowess of the state, viewers tended to articulate pleasure at American exhibitions but lack of clarity as to the message.[53] Spectators were offered affective sensation without clear representation and without point of view.

Archive

But if the past was forgotten, it was still stored. For there was another (curious) feature of these installations that is never commented upon. Efficiency or speed was not the only temporality of this perceptual architecture. These installations had an archival sensibility. Absolute storage, the ability to save everything, was the unconscious desire structuring this form of visuality. However, the nature and organization of this storage system, and the identities it creates concerning race, nature, sex, human, and non-human—those questions that defined the nineteenth-century archival impulse in the work of Foucault, and so much colonial, postcolonial, and postmodern discourse, were repressed in the interest of producing these relational forms of seeing. There was no stable ontology or concern with recording here. Perhaps this attitude inflected itself in the cannibalization of the imagery of civil rights and human diversity into this architecture. It was a smooth space for global integration where the autonomy of vision, the interactivity of attention, and the absolute recordability of the world were givens.[54]

The relationship between the two displays, however, both as differing historical forms of visuality and as temporal experiences, at juxtaposition within the same space and operating in collaboration and competition is worth noting. This emergent perceptual territory of the American exhibition in Moscow relied, therefore, on maintaining an ongoing tension between multiple forms of spectatorship and perception. Observers' senses vacillated *between* these two different modes of interaction. Shuttling viewers between identification and a logistics of assimilation/substitution, the affective field wavered. While the Eames display targeted circulation and arguably consumption, Steichen's show resolutely focused on the human condition as separable from

the material or consumer habits of its subjects. For while the Eames show may have espoused choice, Steichen also believed in choice, but still affiliated to individual subjects and to relationships between individuals who recognized each other. For Steichen choice was about politics, not consumption. While much has been said to critique Steichen's exhibition as Fred Turner has recently noted, the *Family of Man* exhibited a deeply democratic impulse critical of the forms of nationalism and identity that had supported totalitarianism, fascism, and Nazism during the war. The democratic subject was one who could choose how and where to look. Within the historical situation Steichen's impulses were in many ways, progressive. He, in fact, often warred with the USIA over the specific content and fought to have the United States represented in some of its diversity—of class and race—even if his dominant life narrative was heteronormative.[55]

The only element unifying the field between the two displays was the specter of the Cold War itself—the Bomb. In *The Family of Man* the atomic bomb figured as a color image only in the hardcover catalogue; it had been removed from the actual installation.[56] But its logic was central to the notion of a unified but differentiated humanity. The Bomb had no direct representation (but then, nothing does) in the Eames installation, but the idea of a perfectly communicated affective environment spoke to averting such a technical disaster. The entire space operated, therefore, to defer one possible future (nuclear annihilation) through the technical manipulation of the image archive and the modulation of attention. This then was a curious form of futurity, whose imaginary was both radically nihilistic and abundantly optimistic. The viewer experienced the universality and potentiality of a not-yet-realized human vacillating with the inevitability of technical disaster and extinction.[57]

In cybernetics the tension between storage and circulation continued to animate the production of endless interfaces. Between the Eameses' autonomous machine vision no longer linked to geographical space or humanity and the vision of a biologically threatened human species presented by Steichen lay the infrastructure for our current data-filled and sensory environments. This relationship between older forms of spectatorship and subjectivity linked to recognition and identification in the image and the proliferation of interfaces where data inundation and pattern-seeking are the dominant modes of observation are the two poles that substantiate our contemporary aesthetic and political situation. These two different architectures of perception drive a contradictory recentering on identity and subjectivity at the same time that the human measure of the screen is effaced in the name of another discourse of direct neural and cognitive interaction and manipulation. This contradic-

tion emerges in our present through the ubiquity of computing interfaces and global social networks, while reactionary and identity politics are resurgent in many forms.

Violence?

Traveling from the interior of nervous systems to global media spectacles, I am left to ask about the implications of this situation for the remains of older political orders. As one USIA officer commented, this was the greatest piece of "psychological warfare" ever waged.[58] At the same time, Russian journalists and spectators kept asking: where were the "technical" exhibits, industry, and science?[59] The exhibition seemed to lack any examples of national might or military capacities. The consumer aesthetic did not seem to befit a superpower in the midst of a global conflict framed by nuclear weapons and conducted at the level of postcolonial civil wars. One might extrapolate from these overheard comments that Soviet viewers wanted to know where are the weapons, where is the violence? What state shows up to prove its power by showing winking girls and playing children organized through circulative networks?

Charles Eames also appears to have had a number of reservations. Our own work, he recalled twenty years later, "has come back to haunt us." He went on to say that "franticness of cutting tends to degenerate the information quality. We have always been committed to information: it's not a psychedelic scene in any way."[60] We were not, Eames implied, inducing nonrational mental states (although in a world where eyes can cognate, the definition of "rational" should not be clear). Implicitly, he understood that his installations were drug-like. While seeking to distance himself from the counterculture and the Happenings of the (historical) day, this statement is also an implicit confession of affiliation on Eames's part. These massive installations bombarding their spectators with data produced a space where the boundaries of the body, perception, and environment might be reconfigured; but also a space where the ability to create legibility, meaning, or signals was threatened. Eames's statement can be read as an oblique confession that his own search for industrial efficiency, scientific authority, and legibility had been undercut by the very environment and techniques he generated.

The American National Exhibition in Moscow, therefore, poses critical questions about today's new forms of governance through media, and the infrastructures of psychology, perception, and cognition that underpin them. How do we reconcile the seeming disappearance of violence with these new models of psychic manipulation? What do these statements about the loss of a

centered viewing subject, and the invisibility of violence, on the part of newspaper journalists and designers say about the perseverance or denigration of identity, geography, and recognition in the context of an emerging interactive media practice? In this attentive environment that integrated observers' neural nets and their governments, their marketing mechanisms and their optic nerves, where difference—racial, national, biological—itself was deferred as a question (I didn't say eliminated) and rendered politically impotent through consumption into an interactive architecture of hypervisualization, what still haunted, in the words of Eames, this machine?

The USIA pavilion was certainly a performance in making the infrastructures of American life stunningly visualized yet impossible to comprehend. If anything, this pavilion cannibalized older structures of vision and gaze in the interest of consuming the possibility of evidence or witnessing altogether. I might ask if this is the genealogical underpinning to what the anthropologist Rosalind Morris has argued is the "narcissistic economy" of contemporary warfare and torture?[61]

In our present, despite a ubiquity of violent images and performances of ethical horror at torture, there appears to be no scopophilia, or pleasure in looking. It is possible that looking is not even possible. Images appear to no longer prompt identification or desire—whether in love, hate, or disgust. Morris argues that what has disappeared is any concept of a social structure that organizes vision and judges witnesses or participants. This is a "shamelessness," to use Lacan's terms, that emerges because the always recorded world is always available to be personally replayed in the very near future. The censure of surveillance by anything but the self is obliterated in the self-referential circuit of images.

Under such conditions, circulating images do not produce evidence, proof, or emotional attachment (even if negative) but only an imperative to circulate more images. Thus, soldiers who torture prisoners continue to circulate images of their work, despite potential judgment by military tribunal, without, in her words, "satisfaction," on the Internet, and we as a public "see" them, but only as an incentive, perhaps, to use Facebook or YouTube, and not, as one might hope, as an invitation to action or commitment to stop these actions.[62] In the ability to always already feed the image of ourselves to ourselves in the near future, we make it impossible to feel shame or remorse. Morris stunningly argues that we cannot encounter difference in the field of vision. The imperative to encounter is renegotiated toward an imperative for interactivity and informational circulation.

It is possible to read the consumption of racial iconography into these ar-

chitectures of 1959 as servicing such a narcissistic economy of torture. In these architectures one can envision that the relationship between the subject, the body, population, and territory had been severed and remixed, consuming identities and differences into a new logic of a global species-attentive field, where histories of inequality continue to operate but without recourse to representation or voice, thus posing a terminal threat to older forms of civic life (not to mention the civil rights movement, whose very iconography it has consumed) in the name of avoiding thermonuclear conflict. The elimination of civil rights in the name of global love. In this world where eyes speak but no longer in any language of translation, only in action, the resurrection of threat from within the network is always a possibility. Morris's account aligns the reformulation of desire and encounter from chapter 3 with the media strategies and psychologies of this chapter.

Histories Should Multiply

But the death drive of the contemporary media system is also suspect. I return to Eames's concern with psychedelic states as a double-coded concern about Communism and the counterculture, one that weakly confesses to an affiliation while recognizing that the very architectures being designed service as an apparatus for perpetual war. It is a concern for the fate of the species, now potentially homogenously dictated in the neurophysiological language of drugs or technology—the result of a paradigm where dedication to "information" has produced a global attentive infrastructure.

In response it may be worth returning to the earlier moment in this book when I discussed cybernetics and the archive in order to recall Marx's statements on language and translation. For Marx circulation is contingent on translation, and thus money and ideas can be made analogous.[63] The bourgeoisie and structuralist response to this assumption is to fantasize a global language, in this case of sense, to overcome the resistances within capital to circulation.[64] This is a fantasy we could extrapolate into the obsession with information and circulation; a dream once articulated in the massive multichannel installation in Moscow. If we believe Marx's dictum, then we will lose all possible forms of encounter, and even future, to the seamless coupling of the nervous system into the interface, resulting in an orgy of "narcissistic violence."

This is not, however, a predetermined fate. Earlier I turned to a "foreignness" within representation that is the source of difference and futurity. Here I wish to turn to an alienness that emerges from within the image. This radi-

cal exteriority is the source of a complex, but possible, form of encounter with differences—both among subjects and in thought. This encounter emerges at the moments of internal contradiction between circulation and identification that parallels Derrida's concept of différance, and Deleuze's notion of encounter in the time-image.

This alienness lies within the cybernetic discovery of a vision capable of destabilizing the boundaries of the human subject. And it lies in the space between older archival orders of memory and visuality and informational regimes—the haunting that troubles and inspires Charles Eames. How we define and maintain the temporal and spatial separation between the archives of visuality and the interface is part of this struggle. Does communication and translation automatically assume homogeneity and convergence between all mediums and entities? And times? The study of the past demonstrates that the field of vision is never coherent, and always multiplicitous. Circulation demands resistances; empires are affective and vacillating entities.

It is perhaps worth contemplating more seriously, then, the differentiations between Eames and Steichen and, further, the multiplications of the image emerging from this media condition. At that moment, when discourses of ideology and consciousness shifted to those of technology, cognition, and communication, we must ask, what alternative possibilities were never realized? Could the reformulation of bodies, identities, and screens have been reattached to a global human imaginary in different ways that would not lead to a Vietnam War or American racial apartheids, for example?

In 1966, the famous figurehead of American avant-garde cinema Jonas Mekas published a special issue of *Film Culture* dedicated to "Expanded Arts." In the issue, George Maciunas included the Charles Eames's multimedia installations as part of an image titled the "Expanded Arts Diagram."[65] This work was presented along with (ironically) mostly psychedelic works. Artists, movements, and other agents of aesthetic transformation were listed. The diagrams create creative genealogies that stretch from Walt Disney to, in the words of one title, "Anti-Bourgeois Popular Art," from the rather staid figures of Charles Eames to radical feminist artists like Carolee Schneeman. These figures were all diagramed creatively with all sorts of new categories and histories. As for the "expanded cinema" with which Eames and Whitney are credited, histories of "electronics, optics," "Fairs," "Disneyland," and "Collage, Junk Art, Concretism" lead to it, and emerging from it is "pseudotechnology," which makes "expanded cinema" a sibling, perhaps even mother or father, of "Kinaesthetic Theater" and "Neo-Baroque Happenings." It's not known what Charles Eames thought about all this, considering his concerns about con-

fusing good information design and psychedelic art.[66] It is all patently absurd, and incredibly logical. The diagram is a flow chart leading to an alternative art history; perhaps a diagram to another future? Soon, following the "expanded arts" diagrams of Fluxus (fig 4.8), came the pathbreaking text *Expanded Cinema* by Gene Youngblood—a manifesto for a new type of image making in the 1970s. Youngblood prominently mentions Charles Eames and particularly gives homage to John Whitney, Sr., as a pioneer in computer animation.

In his work beginning in the late 1950s, John Whitney, Sr., had used the machinery of servomechanical antiaircraft defenses to achieve the direct input of the image into the nervous system. Whitney lovingly recalled that these experiments in autonomous animation were initially made because antiaircraft servomechanisms had become available to him as a result of their obsolescence. These machines had been thrown out by the military because they had been replaced by other technologies—mainly computers—or were no longer needed. In these scrap heaps of Los Angeles, Whitney found desire and inspiration. For a moment, it might be interesting to take the obsolescence, and even untimeliness, of the antiaircraft gun sight as a form of seeing seriously—perhaps as a way to contemplate the idea that we don't actually see through the gun sight in our present; that something *has* changed in the field of vision.

His first film compiled from outtakes of all his experiments with the M-5 and M-7 Anti-Aircraft Directors, *Catalog* (1961), is in fact a "catalogue." The film is composed of all the different tactics Whitney developed using his machines. The film is thus an archive of pure optical strategies, set to the music of dissonant strings, somewhat recalling the sound of an Indian sitar.

In the film, numbers dissolve into circular spirals that turn into waves, and then return to circular spirals. The transitions have no cuts, no seeming edits. There is no montage, just the movements of machines inscribing themselves on film. Although Whitney did edit, in connecting the disparate sequences together, he conceals those cuts. He presents the sequences as series, mutating in forms rather than scenes.

As the spirals of the films made by John Whitney, Sr., unfold, they turn slowly into new forms, unfocused vacillations and movements, the result of the very machines responding to their own positive feedback and oscillating, thus transforming the patterns of animation. If Norbert Wiener had originally proposed that vision must be a process of abstraction in order to maintain homeostatic equilibrium, here abstraction itself becomes the source of emergence, as the absolutely random patterns generated by servomechanisms start to imbalance themselves through feedback, transforming the image, directly imprinting it on the retina.

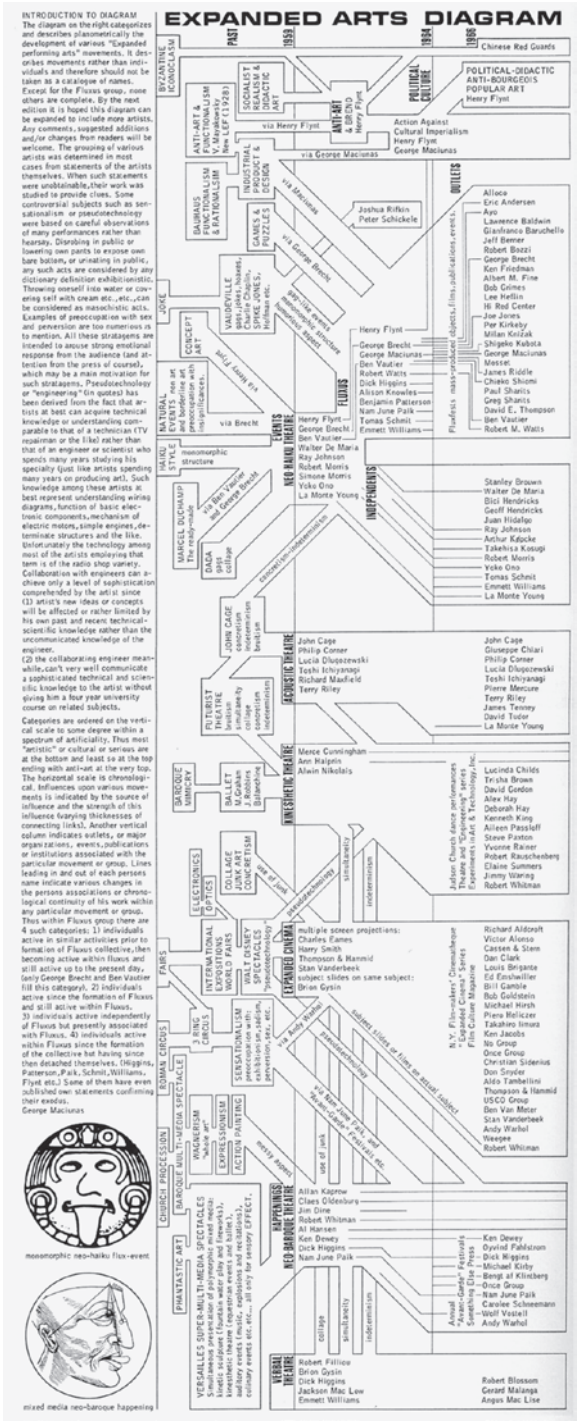


FIG 4.8__Expanded Arts Diagram, by George Maciunas (1966). © All Rights Reserved, George Maciunas Foundation, Inc., 2013. The captions under the two illustrations on the lower left are: (top) "monomorphic neo-haiku flux event"; (bottom) "mixed media neo-baroque happening."

For Whitney this image was no longer, perhaps, even linked to the cinematic image. Instead it was music that he named as inspiration. However, unlike Hans Richter or Oskar Fischinger, with whom he worked, who had also aspired to produce a visual music with animation, Whitney had a different idea. Music for him was not a separable sense; it was rather a different method or approach to organizing perception:

> people talk about abstraction in graphics as being cold or inhuman. I just don't see that at all. What is a musical note? It's totally abstract. That's the essential point and that's why I use the *musical analogy*. The essential problem with my kind of graphics must resemble the creative problem of melody writing. . . . Music really is the art that moves in time. The many statements about architecture being frozen music notwithstanding, here we are truly looking at another art that moves in time. Someone once said about musical compositions: "Time and tone completely fill each other . . . what the hearer perceives in the tones and rests of a musical work is not simply time but shaped and organized time . . . music is a temporal art because, shaping the stuff of time, *it creates an image of time*." I like that idea very much, so I ask myself, what can be essentially the image of time for the eye to perceive?[67]

In these time-images, as labeled by their makers, architecture and space are undone. Whitney envisioned a new territory of sensory reformulation. He wrote of his later films that they contained patterns, which produced "words," but not in any language of speech; rather, they produced serial resemblances, structural and syntactical similarities that would also differentiate in meaning and experience. This language he analogized again to music: "I am moved to draw parallels with music. The very next term I wish to use is 'counterpoint.'"[68] Counterpoint for Whitney denoted the layering of graphics, superimposed in time—backward and forward—on animation cells. Whitney insisted, in fact, that his thinking about music started with the image.

In watching Whitney's films, they operate through a layering of perception. This layering is topological, it does not emerge from dialectical relationships between images and sound. It is flat, but immersive and active. It is depth through time. The forms move through screens by way of mutation, usually in rotation, or through changing shape, not through a literal movement across a screen.

When Whitney speaks of "counterpoints," what is actually experienced is a structure, like the corner of two walls, which joins two senses in a relationship. The sound does not operate to produce movement; it is not precisely timed to

the animation. Rather, the soundtrack is a bit off in timing. The strings are a distinct experience producing immersion into the image (sound of course has long been considered adding dimensionality to cinema), but without actually offering coordinates spatially.

The temporal, rather than spatial, logic of this cinema also operates through an absence of devices of scale. There are no establishing forms that changes are compared to, no moments of stoppage in the image transform. Certainly this cinema is absolutely absent of figural devices, close-ups, or establishing shots or devices of recognition or affiliation—the reverse shot, for example. It is not the only cinema to attempt such strategies, but it was the first to do it through the operations entirely of the machine.

But these were dynamic machines. While the analogue machines used required the input of an initial pattern, the results would always be surprising. The outcome was structured by the original input but never fully predictable, differentiating from within the actions of machines. Gene Youngblood wrote of John Whitney's films that they possessed a "seriality":

> Second, is the quite noticeable seriality of the composition, the unified wholeness of the statement, although it is composed of discrete elements. In defining "serial" in this context I should like to quote the art critic John Coplans: "to paint in series is not necessarily to be serial. Neither the number of works nor the similarity of theme in a given group determines whether a [work] is serial. Rather, seriality is identified by a particular interrelationship, rigorously consistent, of structure and syntax: serial structures are produced by a single indivisible process that links the internal structure of a work to that of other works within a differentiated whole.[69]

These wholes emerge in the films through a pushing of vision and sound into singular relationships through a similar process. Each data point, or input, may be different, but the method is not. But here, rather than culminating in homogeneity, we see the opening up of the image; a reorganization of affective forces. In fact, while starting with analogue, Whitney's interest in the digital emerged because he continued to believe that the complexity and interactivity available through formal algorithms would become emergent, and unpredictable, when they were actually responding to their own feedback.

Cybernetics opens from within these circuits and channels. The teleology culminating in the destruction of the enemy, the original purpose of gun direction, is eclipsed by a logic of capacities and thresholds. These images par-

ticipate in producing a sensory infrastructure with no teleological endpoint, whose seeming aftereffect is the proliferation of ever more images.

One can imagine, therefore, that in these oscillations subscribing to a pure algorithmic logic, these images break from all purpose. One might even imagine these images pushing the very logic of military vision to the point where the necessary alignments between sentiment and action (particularly aggression) necessitated by our contemporary wars on terror, for example, are not invoked.

At the same time, when contemplating the screen-filled environments of such sensorial consumer landscapes as Songdo, the place of such a purely affective image must be understood as related to our contemporary architectures of responsiveness and interactivity. Whitney created a new image that reconfigured the senses, and even bodily relations. The question is whether such maneuvers need to be channeled into a relentless need to "use" interfaces in the interest of circulating data, or whether they can produce other forms of relationality. In his day, Whitney hoped it would be a "human" image.[70]

What makes Whitney's work uncanny, in the way that circuits vibrate, and porpoises suddenly perform novel tricks, is its resemblance to another discourse. In *Cinema 2: The Time-Image*, Gilles Deleuze seeks to recuperate the "image" for "thought." While the language of encounter rarely appears in the text, it is implicit to the discussion. For Deleuze certain cinematic operations force encounter with the unthought, the virtual, that which is not apparent or available to our limited imaginations in the present. These operations create an encounter with an alienness within the image, something that exceeds what we think we know or any image we already possess for thought.

This encounter bases itself in the de- and rerealization of the perceptual field; the interruption of homogeneity and circulation in an otherwise seamless channel. Deleuze argues that in rare works of art, "there is no longer any movement of internalization or externalization, integration or differentiation, but a confrontation of an outside and inside independent of distance, this thought outside itself and thus un-thought within thought."[71] Here Deleuze repeats a longer running theme in his work. Already in *Difference and Repetition*, Deleuze stated that the condition for thought must emanate from within a system, from within thought, and relies on the destruction of any coherent image. The image of thought, Deleuze argued, must be opposed to "recognition" and can only be "sensed."[72] In insisting that this "inside" and "outside" are not a matter of subjects linked to individual bodies, but another type of encounter altogether, Deleuze repeats the injunction that thought cannot arrive through

identity or object relations. Encounter is, therefore, not a matter of "distance" or space. It is the production of thought through the self-produced actions of systems; perhaps the oscillations of machines.

Deleuze then turns to a term that preoccupies his work on cinema—temporality. he specifies that time-images are capable of "a perceptual re-linkage. Speech reaches its own limit which separates it from the visual; but the visual reaches its own limit which separates it from sound. So each one reaching its own limit which separates it from the other thus discovers the common limit which connects them to each other in the incommensurable relation of an irrational cut, the right side and its obverse, the outside and the inside . . . the visual image become stratigraphic is for its part all the more readable in that the speech-act becomes an autonomous creator."[73] While time is not mentioned here, implicit is the idea that these thresholds and folds are ongoing processes, and that this reintegration of the perceptual field is a durational operation. This differentiation and then encounter between the senses in the *time-image* does not occur because senses are discretely separated and atomized, but rather through the pushing of thresholds to absolute capacity, a sort of "counterpoint," to use Whitney's phrase, where sense deterritorialized is reorganized.

Deleuze appears to seek a moment of differentiation and reintegration in the midst of new proximities between sentiments and technologies. Difference, here, an encounter with the "unthought," comes only in delay, and only through the radical incongruity but simultaneous reassembling between different forms of image and sense. These encounters with the "unthought" that produce "thought" emerge from the internal multiplications of the system, the generative feedback loops of the now cybernetically infected cinema.[74] Perhaps this is the "seriality" Youngblood deploys to contemplate the new computer animation? This incongruity sees itself perhaps mirrored in the splits between an identificatory image and the circulative channels embedded in our contemporary infrastructures of sense. But for Deleuze it is only the rare practice that can unleash this possibility to create an "image" of thought. What Deleuze points out to us is that the organization of affect into encounter is the central dilemma for both politics and philosophy; perhaps it always was.

In 1959, the new biopolitics of reconfiguring population through data inundation and the reformulation of perception had already begun to emerge. Our historical vantage point allows us to understand the heterogeneity of that moment, and the possibility that these new techniques could have been (but largely were not) attached to different historical and spatial configurations. At that moment, a brief interlude of détente in the Cold War, the affective field

wavered between global identification, circulative consumption, and individual identity, between species being and hyperpersonalization. Older histories of vision and documentation supported the emerging computational and algorithmic visions. The image itself continued to multiply—computational, representational, neural. This image had not yet formalized into a memory capable of attacking the present, as in the image of torture. In the example of Abu Gharib images of war are replayed and reenacted not as a form of working through but as a form of operant conditioning and integration into the media network. There is nothing alien and no encounter at the interface in the instance of torture, only the seamless redirection of attention into the circuits of war and capital.

But history demonstrates that this state was not, and is not, inevitable. It is the work of critique in the present to explore and remember these instabilities and contests over how perception and cognition would be organized, integrated and modulated through the built environment, and used for political and economic purposes. In contemplating this history, we realize that the vast wavering space of that Moscow pavilion was a moment of potential, and missed, encounters.

Perhaps it is worth recalling George Miller's initial comments about delusion and paranoia. Miller also wondered about the surprising changes that happen from inside of circuits. He contemplated a thought game. Perhaps, instead of acting like Senator McCarthy and assuming that that which emerges from within the mind is an external and persecuting force, if we began to investigate the way our own networks haunt, trouble, and delude us, then perhaps we would end with something different from what we started with. Patterns can emerge that are not necessarily static or eternal but are arbitrary and chancy. These patterns may teach us something about how our own systems work and can be enhanced without necessarily falling to a reductive history. This is what the frog's eyes and the magical and mystical number seven, a biblical and mythological number, can foretell—a future that we may approach and anticipate without fully knowing it. McCulloch's "ignorance" that produces knowledge perhaps? Miller closes his essay:

> and finally, what about the magical number seven? What about the seven wonders of the world, the seven seas, the seven deadly sins, the seven daughters of Atlas in the Pleiades, the seven ages of man, the seven levels of hell, the seven primary colors, the seven notes of the musical scale, and the seven days of the week? What about the seven-point rating scale, the seven categories for absolute judgment, the seven objects in the span

> of attention, and the seven digits in the span of immediate memory? For the present I propose to withhold judgment. Perhaps there is something deep and profound behind all these sevens, something just calling out for us to discover it. But I suspect that it is only a pernicious, Pythagorean coincidence.[75]

There are no enemies. But these older histories also remind us that there are no fully built, or entirely familiar and known, machines and minds. But our paranoia has taught us that we can recode our memories, transform our cognition, embrace chance without nihilism. Cybernetic eyes and minds have many different forms of time and truth simultaneously operating—mystical and predictive, archival and historical; the trick is to use them to push the system into the future, and to "withhold judgment" on the present. This perhaps was the ethical lesson we could have learned, and continue to forget, in 1959—but one of the many violent political tragedies emerging from the Cold War confrontation.

If today we think we can know our minds and each other because our brains work like genetically programmable computers and our environments have been automated to modulate attention, we may wish to remember that there was a time when people considered machines, eyes, and minds to be far less knowable and far more capable. A moment when the very logic of paranoia or embodiment was subverted and rechanneled into another discourse of capacity, and where the internal differentiations of the image were available for multiple uses. Humanitarianism, pure affect, nonhuman vision—all these multiple forms of imagining the world constantly erupt out of the translations between our myriad databanks and interfaces.

The ethics, and politics, of that transformation are still being negotiated. This is the nature of politics now, negotiated at the level of attention and nervous networks, structured into our architectures of perception and affect; feedback providing the opening to chance and the danger of repetition without difference. Forget me not—both a promise to rethink difference, life, and our relations to each other and a warning that we will not.