Hertzian Tales

Electronic Products, Aesthetic Experience, and Critical Design

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(In)human Factors

Am I a man or a machine? There is no ambiguity in the traditional relationship between man and machine: the worker is always, in a way, a stranger to the machine he operates, and alienated by it. But at least he retains the precious status of alienated man. The new technologies, with their new machines, new images and interactive screens, do not alienate me. Rather, they form an integrated circuit with me.
—J. Baudrillard, "Xerox and Infinity"

In design, the main aim of interactivity has become user-friendliness. Although this ideal is accepted in the workplace as improving productivity and efficiency, its main assumption, that the way to humanize technology is to close the gap between people and machines by designing "transparent" interfaces, is problematic, particularly as this view of interactivity has spread to less utilitarian areas of our lives. According to Virilio (1995): "'Interactive user-friendliness' . . . is just a metaphor for the subtle enslavement of the human being to 'intelligent' machines; a programmed symbiosis of man and computer in which assistance and the much trumpeted 'dialogue between man and the machine' scarcely conceal the premises: . . . the total, unavowed disqualification of the human in favor of the definitive instrumental conditioning of the individual" (135).

This enslavement is not, strictly speaking, to machines, nor to the people who build and own them, but to the conceptual models, values, and systems of thought the machines embody. User-friendliness helps naturalize electronic objects and the values they embody. For example, while electronic objects are being used, their use is constrained by the simple generalized model of a user

these objects are designed around: the more time we spend using them, the more time we spend as a caricature. We unwittingly adopt roles created by the human factors specialists of large corporations. For instance, camcorders have many built-in features that encourage generic usage; a warning light flashes whenever there is a risk of "spoiling" a picture, as if to remind the user that he or she is about to become creative and should immediately return to the norm.

By poeticizing the distance between people and electronic objects, sensitive skepticism might be encouraged, rather than unthinking assimilation of the values and conceptual models embedded in electronic objects. I am not arguing for a way of designing that is free from ideological content but, rather, for one that draws attention to the fact that design is always ideological. User-friendliness helps conceal this fact. The values and ideas about life embodied in designed objects are not natural, objective or fixed, but man-made, artificial, and muteable.

This chapter looks at "poeticizing" the distance between people and electronic objects through "estrangement" and "alienation," locating interactivity between transparency and opaqueness, the pet and the alien, prose and poetry. The first section looks at the origins of user-friendliness in human factors and how it manifests itself in design approaches; the second, on transparency, discusses the implications of closing the distance between people and machines; and the third, on (in)human factors, looks at alternatives based on estrangement.

User-friendliness

Manuel DeLanda (1991) situates the origins of the man-machine interface within a military context:

> It is at the level of the interface that many of the political questions regarding Artificial Intelligence are posed. For instance, one and the same program may be used to take human beings out of the decision-making loop, or on the contrary, [be] interfaced with them so as to create a synergistic whole. It is the design of the interface which will decide whether the machinic phylum will cross between man and machines, whether humans and computers will enter into a symbiotic relationship, or whether humans will be replaced by machines. Although the centralizing tendencies of the military seem to point to a future when computers will replace humans, the question is by no means settled." (176)

DeLanda writes that research into interactivity between people and computers began with the military's desire to visualize data held in computers, and that

interactivity went much further than it intended, giving people total control over their machines. Although scientists such as Doug Engelbert, Alan Kay, J. C. R Licklider, and Murray Turoff managed to gain control of the evolution of computers from the military, developing a vision of interactivity as a partnership between people and machines acted out on the computer screen, they were unable to introduce them into everyday life. It was hackers like Steve Wozniak and Steve Jobs who eventually managed to translate these ideas into a machine that could compete in the marketplace against large corporations like IBM and establish a new model of interactivity.

While interactivity made huge leaps forward before its entry into everyday life through the marketplace, once the computer became a successful mass-produced object, innovation in interactivity shifted from hardware to software, and evolved around screens, keyboards, and mouse-like input devices.

The Human Factors Approach

These days most work on the development of interfaces is by engineers and scientists working for large corporations and universities, and comprising the human factors community. Although mainly concerned with computers, other electronic objects are becoming subject to this approach, particularly as designers have, so far, been unable to develop convincing alternatives.

In a review of *Things That Make Us Smart* by cognitive psychologist Don Norman, Rick Robinson (1994) offers remarks about Norman's view of design that are applicable to the human factors community in general. Robinson argues that Norman's approach results in products that will not confuse or disappoint (which is clearly not enough). His main criticism is that it "misses the essential connection between the power of objects to affect the way in which the world is seen and the mechanism through which that happens. Paradoxically, user-centredness is not just figuring out how people map things, it absolutely requires recognising that the artefacts people interact with have enormous impact on how we think. Affordances, to use Norman's term, are individually, socially, and culturally dynamic. But the artefacts do not merely occupy a slot in that process, they fundamentally shape the dynamic itself" (Robinson 1994, 78).

Design/Aesthetic Manifestations

In the human factors world, objects, it seems, must be understood rather than interpreted. This raises the question: are conventional notions of user-friendliness compatible with aesthetic experience? Perhaps with aesthetics, a different path

must be taken: an aesthetic approach might subsume and subvert the idea of user-friendliness and provide an alternative model of interactivity.

The reduction of the relationship between people and technology to a level of cognitive clarity by the human factors community contrasts with the approach taken by Ettore Sottsass in the late 1950s for the design of the ELEA 9003 computer for Olivetti (figure 2.1):

It was immediately obvious in the first years in which I worked on the ELEA that in the design of certain gigantic instruments, as electronic machines were then, or in the design of groups of machines which have a logical and operational relationship between each other, one ends up immediately designing the working environment; that is, one ends up conditioning the man who is working, not only his direct physical relationship with the instrument, but also his very much larger and more penetrating relationship with the whole act of work and the complex mechanisms of physical culture and psychic actions and reactions with the environment in which he works, the conditionings, the liberty, the destruction, exhaustion and death. (Sottsass, qtd. in Sparke 1982, 63)

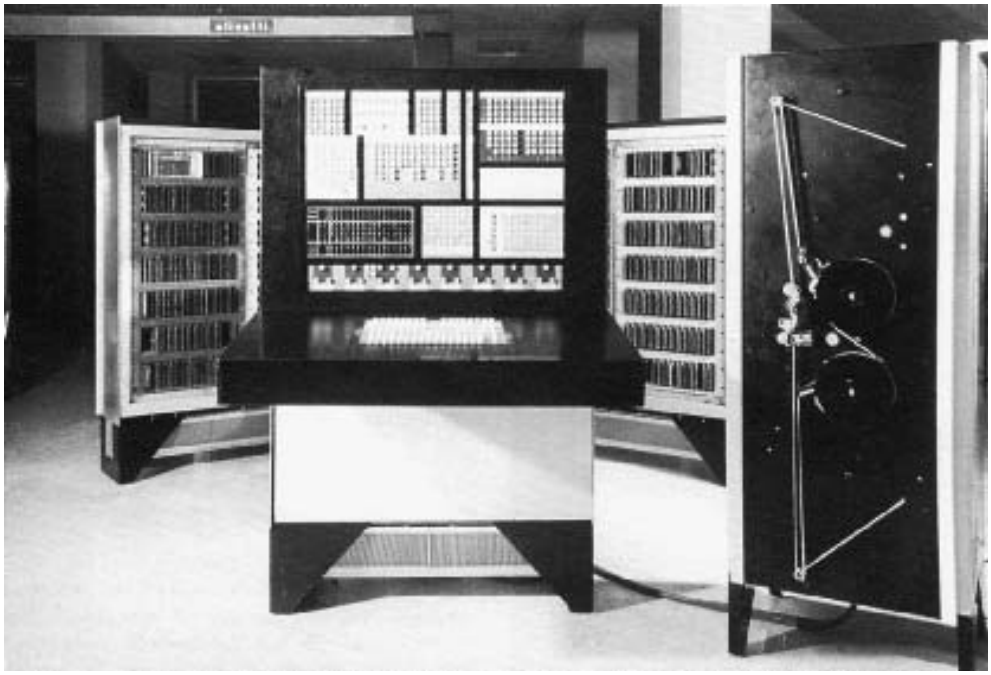

Figure 2.1 The approach taken by Ettore Sottsass for the design of the ELEA 9003 computer for Olivetti (1959) is very different from the "user-friendly" approach taken by the human factors community, which reduces the relationship between people and technology to a level of cognitive clarity.

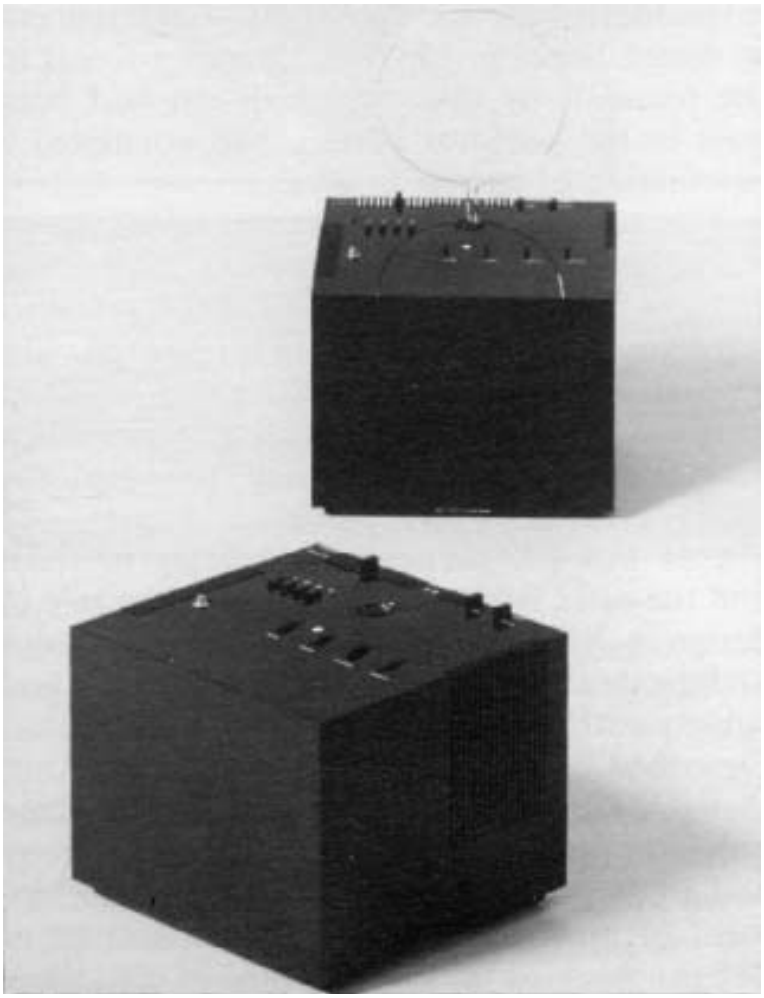

Figure 2.2 Marco Zanuso and Richard Sapper's television for Brion Vega was a sophisticated expression of a new role for the skin of an object, with very different characteristics in both its states. Switching it on or off transformed it from familiar to mysterious object.

Although Sottsass's design for a computer clearly derives from a poetic model of people, few designers have developed such powerful aesthetic responses to electronic objects. An exception was Marco Zanuso, whose television for Brion Vega (figure 2.2) was designed with Richard Sapper in 1969 during the high point of the Italian Radical Design movement, and was at the cutting edge of design thinking, a new expression of an everyday electronic product. It took the notion of the black box to the limit, revealing the magic of technology by dissimulating its functional nature. The whole object became a screen, working equally well aesthetically, on or off. Its minimal black form receded when the television image was shown, and it became a pure object when it was switched

off. It was concerned with not so much form or even material, but rather the problem of an object with different characteristics in both of its states. It represented a sophisticated expression of a new role for the skin of an object.

Despite this, and because the mechanical design of electronic objects gives few clues to their operation, the problem they posed to most designers soon reduced to one of packaging. But for more experimental designers, the image of the black box became the starting point for exploring new languages of representation rather than interactivity.

Representation

During the early 1980s, in the Department of Industrial Design at the Royal College of Art (RCA) many innovative projects were produced (figure 2.3) that exploited the new freedom offered by the fluid qualities of electronic technologies, although most were still concerned more with representation and interpretation than function or interactivity. As a group these works are impressively diverse, original, and fresh. They imply no clear manifesto or philosophy, but rather reflect the individual personalities and interests of the designers. They explore how different languages of form map onto electronic technologies by reinterpreting existing products. Many of the presentation models were simplified, intended to communicate ideas about form and representation rather than manufacture and practicality. The most relevant work from this era, by Weil, is discussed later in this chapter.

Product Semantics

During the 1980s "product semantics" began to influence thinking about electronic products. Semantics and semiotics were originally used by linguists to understand the structure of language and how it conveys meaning, and later by film theorists (often combined with psychoanalysis—e.g, Laura Mulvey) to analyze how codes and conventions work. In design they were used to analyze the way form could be used to express implicit meanings: the flow of air in a fan heater, for instance (figure 2.4).

Cranbrook Academy's industrial design course developed this approach, led by Michael and Katherine McCoy. From the mid-1980s on, its students fed the international design press a steady stream of conceptual designs for electronic products. In 1987 one of them, Lisa Krohn (with Tucker Viemeister), won a competition to promote and exploit the versatile properties of plastics with her design for an answerphone (figure 2.5). The versatility of plastics in this instance

Figure 2.3 Matthew Archer's miniature computer is one of many projects produced in the Industrial Design department at the Royal College of Art during the 1980s that exploited the new freedom offered to design by the fluid qualities of electronic technology.

Figure 2.4 Semiotics and semantics were used by 1980s designers as a framework for analyzing the way industrial designers could use form to express implicit meanings: for instance, the flow of air in this fan heater (1981) by Winfried Scheuer.

Figure 2.5 Lisa Krohn's design (with Tucker Viemeister) for an answerphone (1987) shows how a literal use of analogy results in metaphors with a single meaning. Products become depictive of what they do, limiting the viewer's interpretation of the electronic object to the designer's.

is in the area of linguistic expression: "A combination of telephone and answering machine which transcribes and thermally prints any messages, its modern streamlined appearance uses a book format with the pages serving as switches for the different functions" (Form Finlandia, 1987, n.p.). Such literal use of analogy results in metaphors with a single meaning. Products depict what they do, limiting the viewer's interpretation of the electronic object to the designer's, and, although sometimes the link made between groups of objects is ingenious, the power of these borrowed images to sustain interest is weak—they are the material equivalent of one-liners. Once the viewer grasps the connection, there is little else to engage with.[1]

The new forms are just as vigorously tied to their signifieds as the old ones, albeit signifieds extrinsic to the object, based in a cultural frame of reference. To use preexisting patterns of knowledge to define a new technology's possibilities

for conveying meaning is not far removed from the Victorian use of Corinthian columns to support beam engines; design holds back the potential of electronics to provide new aesthetic meanings: "Official culture still strives to force the new media to do what the old media did. But the horseless carriage did not do the work of the horse; it abolished the horse and did what the horse could never do" (McLuhan 1970, 133).

Transparency

Because the mimetic approach has greatly affected mainstream thinking about electronic objects, most designs for interfaces with electronic products draw on familiar images and clichés rather than stretching design language. Nothing is what it appears, but simply an allusion to something we are already familiar with. Designers using existing codes and conventions to make new products more familiar often unconsciously reproduce aspects of the ideology encoded in their borrowed motifs. The easy communication and transparency striven for by champions of user-friendliness simply make our seduction by machines more comfortable.

Biomorphism

The trend for forms of biomorphic expression, particularly in cameras and other portable devices, can be seen as expressing either an uncritical desire to absorb technologies into the body, a wish to be a cyborg, or, more optimistically, a need to mold technology to the body. But this need for symbiosis does not have to be expressed through the clichéd language of bio-form; after all, the symbiosis yearned for is often mental not physical. An engaging, if conservative, image of this desire for symbiosis between people and the environment of electronic artifacts is provided by the series of kitchen tools designed by Marco Susani and Mario Trimarchi for the 1992 Milan Triennale. A mixture of abstract form and familiar materials, they neither pretend to have always been there nor are they completely alien (figure 2.6).

For extreme expressions of this wish for transparency or symbiosis, we need to look outside the design field, at the work of the artist Stelarc. He describes a synthetic skin that, absorbing oxygen through its pores and efficiently converting light into chemical nutrients, would make our internal organs redundant and allow them to be removed to create room for more useful technological components. In a performance at the Doors of Perception 3 conference in Amsterdam in 1995, remote viewers were able to manipulate his body into positions

Figure 2.6 Marco Susani and Mario Trimarchi's *New Tools (for the kitchen)* for the 1992 Milan Triennale demonstrates that the need for symbiosis does not have to be expressed through the clichéd language of bio-form; after all, the symbiosis yearned for is often mental not physical.

that represented letters; a computer program allowed sequences to be made up forcing the artist, through electrical stimulation of his muscles, to enact a bizarre semaphore. In an earlier piece, *Third Hand,* he wrote single words with a third artificial hand strapped to one of his own (figure 2.7), activated by the EMG signals of the abdominal and leg muscles, while his real arm was remote-controlled and jerked into action by two muscle stimulators. Stelarc's work illustrates one vision of cyborgs. His work explores the interplay between self-control of the body and its control by the technological logic embodied in prosthetic devices.

Pets

If the desire for familiarity is applied to more complex machines with a potential for autonomous behavior, we could find ourselves living in a bestiary of technological "pets," or zoomorphic electronic objects. Although there is plenty of potential for new aesthetic experiences through the expression of electronic objects' behavior, this area is already dominated by an oversimple mimicry of human and animal behavior. The aesthetic experience they give rise to is based on recognition rather than perception.[2] The users experience something familiar rather

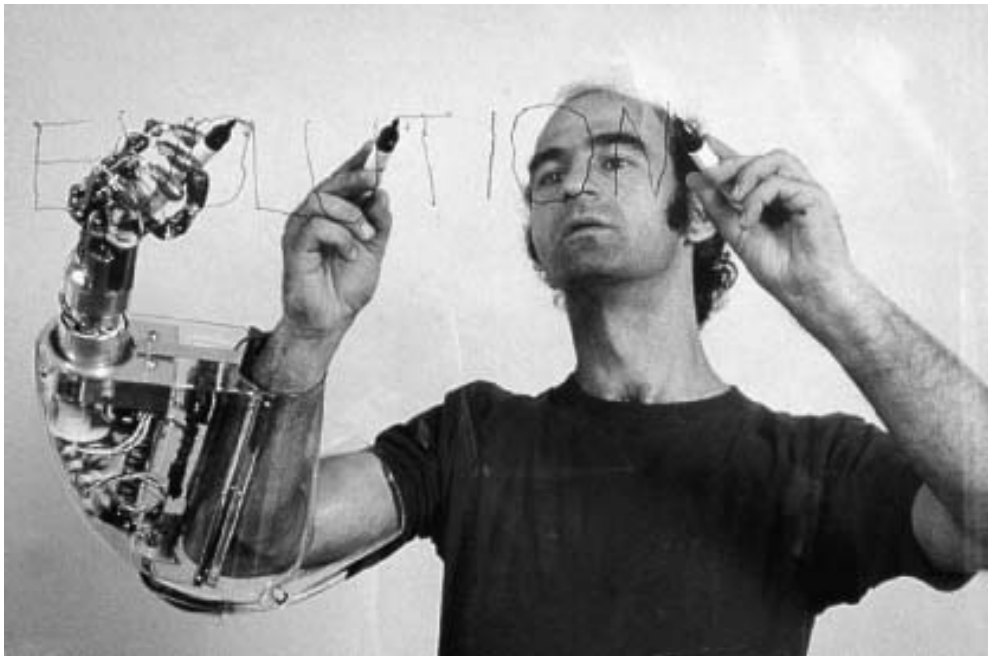

Figure 2.7 In *Third Hand,* Stelarc wrote single words with a third artificial hand strapped to one of his own, activated by the EMG signals of the abdominal and leg muscles, while the real arm was remote-controlled and jerked into action by two muscle stimulators.

than new, so they are conditioned to accept things as they are. Rather than being stimulated to modify their ideas about reality, the users become part of a behavioral "circuit":

> The famous Japanese car that talks to you, that "spontaneously" informs you of its general state and even of your general state, possibly refusing to function if you are not functioning well, the car as deliberating consultant and partner in the general negotiation of a lifestyle, something—or someone: at this point there is no longer any difference—with which you are connected. The fundamental issue becomes the communication with the car itself, a perpetual test of the subject's presence with his own objects, an uninterrupted interface. (Baudrillard 1983, 127)

Not all work in this area closely mimics human and animal behavior. *Satori TV* (figure 2.8), a small television that turns it head to face the viewer when touched, is one of the few objects designed at Cranbrook during the 1980s that goes beyond visual semiotics by using performance. This television suggests a life where our only company will be electronic domestic appliances, which must supply the missing banalities of everyday human contact. The artist Alan Rath

Figure 2.8 Peter Stathis's *Satori TV* (1988), which turns its head to face the viewer when touched, suggests a life where our only company will be the electronic appliances of the home, which must supply the missing banalities of everyday human contact.

goes one step further and literally gives technology a face, but not comfortingly. His faces are juxtaposed and recombined with other body and machine parts to create strange and sinister hybrids of people and machines. He uses videos of parts of the face, or whole faces held captive within cathode ray tubes: in *C-Clamp* a face grimaces while its CRT container is held in a C-clamp (figure 2.9). Many of his pieces rely on puns, are comic and anthropomorphic, and remind us of our fear that machines might have lives of their own. But although such works remind us of a possible future where the human soul becomes literally trapped within the machine, their easy appeal means they are also easily forgotten; they are not disturbing enough to shock.

Aliens

A range of possibility exists between ideas of the "pet" and the "alien." While the pet offers familiarity, affection, submission, and intimacy, the alien is the pet's opposite, misunderstood, and ostracized. The artist Martin Spanjaard

Figure 2.9 Alan Rath's *C-Clamp* (1992) literally gives technology a face, but not in a comforting way. His faces are juxtaposed and recombined with other body and machine parts to create strange and sinister hybrids of people and machines.

explores this space, believing: "In order to get used to talking to a machine, one should have one as a pet. A machine which has no particular function, and cannot actually be operated, but which responds to the events in its environment by producing spoken language. Like a cat, which rubs its head against you and meows when it wants to eat or go outside, or a dog which whines when you kick it" (Van Weelden 1992, 247–250).

Spanjaard's robot Adelbrecht evolved over ten years, starting in 1982, from his desire to build a ball that would roll of its own accord and, when it collided with other objects, reverse, change direction, or take other appropriate action. As technology developed so did Adelbrecht; he can now sense whether he is being picked up or stroked, and whether and by how much light and sound are present, influencing his mood or "lust" as it is termed by the artist. Adelbrecht expresses the level of his "lust" by rolling about and by a voice provided by the Institute for Research on Perception in Eindhoven. For example, if he has not been touched since becoming active, on becoming stuck he will call for help; but if he has been touched, he will call his owner. He says "Nice" on being stroked, and "Is it you?" on being picked up. The artist does not program Adelbrecht to totally replicate human or animal psychology, which results in unexpected and

quite poetic mumblings. Adelbrecht is an example, as boundaries blur between ourselves and our digital environment, of where a new sense of "alienation" or distance may be discovered. The electronic object does not have to fulfill our expectations; it can surprise and provoke. But, to fulfill this potential, designers need to leave behind a desire to model the new world of electronic products in their own, human, image.

(In)human Factors

If user-friendliness characterizes the relationship between the user and the optimal object, user-unfriendliness then, a form of gentle provocation, could characterize the post-optimal object. The emphasis shifts from optimizing the fit between people and electronic objects through transparent communication, to providing aesthetic experiences through the electronic objects themselves.

But if aliens and user-unfriendliness are to be the alternatives to pets and user-friendliness, this user-unfriendliness does not have to mean user-hostility. Constructive user-unfriendliness already exists in poetry:

> The poetic function of language has as its effect that when we read literature we become more aware of language than we are when we are confronted by language in its other functions. To introduce another term dear to the formalists, in literature language is "foregrounded." This, as Jakobson stresses, is the tendency of literature, much more fully recognised in poetry than it is in prose. In the everyday use of language it will seldom be practical and may even be found impolite to "foreground" language. Everyday language is usually informative and instrumental; there is no call for either the speaker/writer or hearer/reader to dwell on the form of what is said/written since if a piece of information has been successfully passed or some action successfully instigated, the words by which this has been managed can count as "transparent." With the poetic function comes a certain opacity, for the writer is no longer passing information nor seeking to instigate action. There may also come an intentional ambiguity." (Sturrock 1986, 109–110)

Defamiliarization

The poetic can offer more than simply enriched involvement. It can provide a complex experience, critical and subversive. The Russian formalist poets of the 1920s based their ideology on estrangement. According to Viktor Shklovsky, the movement's best-known exponent, the function of poetic art is to counteract the familiarization encouraged by routine modes of perception. We readily cease to "see" the world we live in, and become anaesthetized to its distinctive features.

Lebbeus Woods, an architect who has produced imaginary schemes (e.g., Origins) exploring this quality in building, refers to this strangeness as "objectivity," meaning not an analytical state of mind but simply the appreciation of the objects as themselves, independent of the operations of the mind upon them.

The effect of strangeness, infusing an encounter with the unfamiliar and the unknown, was used by Bertolt Brecht to alienate the audience and make them aware that the institutions and social formulae they inherit are not eternal and natural but historical, man-made, and so capable of change through human action. He termed it the "A-Effect," developing the conditions for informed appreciation rather than unthinking assimilation. And Theodore Adorno wrote that authentic art could only function to resist totalization if it was strange and unfamiliar.

Design as Text

Despite an interest in linguistics and texts, the Cranbrook work stopped short of realizing the full potential of the model of meaning it pursued. Rather than radical provocations, it produced beautiful, affirmative designs that were in literary terms structuralist rather than post-structuralist.

Daniel Weil's work, on the other hand, shows what can be achieved if the notion of object as text is taken to its (apparently illogical) logical conclusion, echoing the "death of the author" in literature. His designs challenge the observer to participate in constructing their meaning, with their questions, interpretations, and criticisms becoming part of its meaning.

Weil's designs could be defined as a "text" in Roland Barthes' definition: a "space" of chains and layers of meaning between the object and the viewer, continuously expanding with no fixed origin or closure. When the boundaries of the work are demolished, the text opens out onto other texts. Barthes redefined "text" as a meta-linguistic mechanism that reorganizes the linguistic order, affecting the relationship between writing and reading. Writing and reading, the pre- and post-textual, are of equal value, and both writer and reader are required to exert an equal effort of imagination. Similarly, in the case of a design object as text, designer, and viewer play equal roles. This approach lends itself easily to electronic products, because their components can be freely arranged, unlike mechanical products where the arrangement of components is determined by technical constraints: "In Weil's view the object has a conceptual story which the person owning it has to complete . . . his approach is heavily influenced by Duchamp's conception of the 'unfinished picture'. . . for computer designers, as

for Duchamp, the focus of their work now is the process of use of computer systems . . . security is not the objective. He offers a degree of understanding of technology, but control and domination over it are not assured" (Thackara 1996a, 72).

Weil's radios and clocks of the early 1980s are a good example of a research project exploring the aesthetic nature of electronic objects. Most products from this phase of his work seem transient and cheap. Thackara suggests this is an essential part of their nature, as their frailty reminds us of the delicate nature of our conceptual models too. They are objects about objects in the age of electronics, and they express our changing relationship to objects brought about by electronic technologies. They sometimes do this clearly, as in *Four Boxes and One Radio* (figure 2.10), a literal expression of the fact that all radios are packages in a box: the materials have little intrinsic value but acquire value through the authorship of the designer. At other times they do so more obscurely, as in *Small Door,* another design for a radio (figure 2.11). Weil's designs are conceptual and open-ended, and they challenge the user or viewer to engage with them. In literary terms they are post-structuralist.

Like most experimental designs for electronic objects during the 1980s, though, Weil's designs are reinterpretations of existing objects, primarily radios. Perhaps the radio is the electronic equivalent of the chair: a familiar and culturally rich object used by architects and designers as a vehicle to communicate new ideas. Although clocks and radios might seem trivial as technological objects, this is often the only level at which experimental electronic objects can be batch-produced without large investment. Ultimately, the radicalness of Weil's objects lies in their novel imagery and his open-ended approach to meaning. But they still package technology as a visual sign.

Bypassing the Self

Whereas the apparent strangeness of Weil's objects relates to linguistics and notions of the object as text, the architect Kei'ichi Irie and the computer artist Masaki Fujihata use technology to give strangeness to non-technological objects. They explore ways of incorporating technology into processes that bypass our desire to model reality in our own image. The resulting artifacts are sophisticated and subtle fusions of what is and what might be. They map the interface between the social consciousness of the individual designer and the collective scientific consciousness, the dominant ideology embodied within the operating systems of the computer.

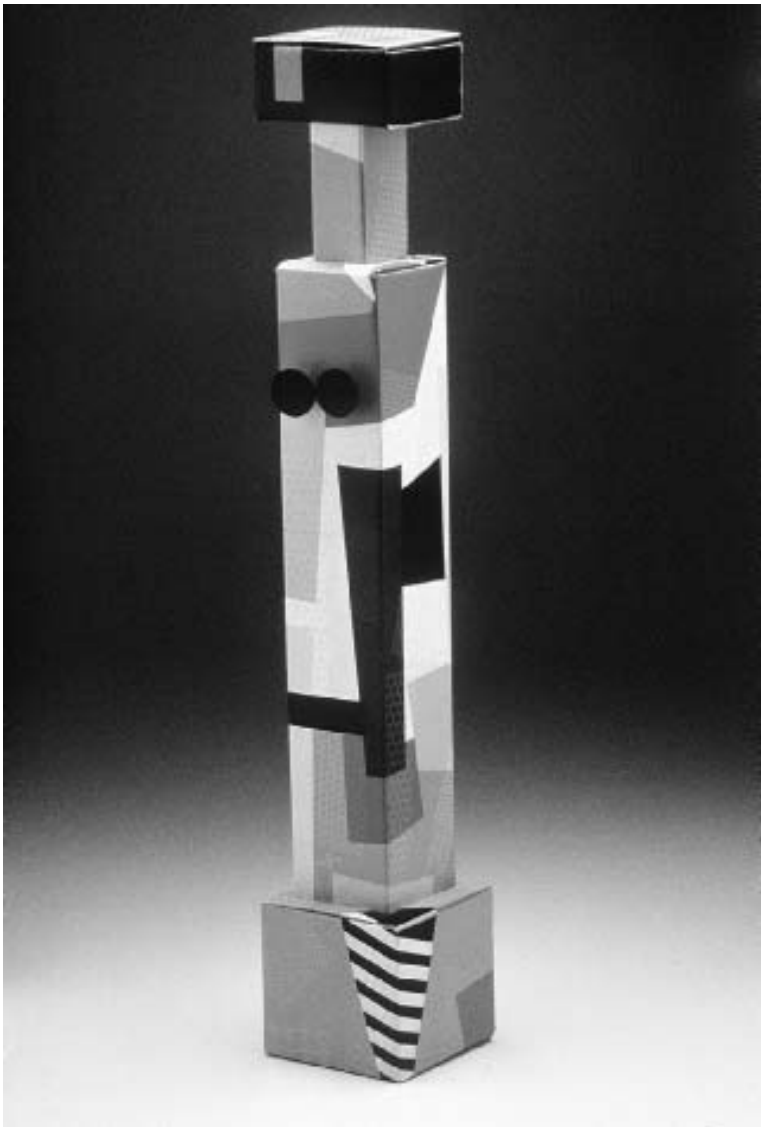

Figure 2.10 Daniel Weil's *Four Boxes and One Radio* (1983) is a literal expression of the fact that materials used in the design of cases for radios have little intrinsic value, but acquire value through the authorship of the designer.

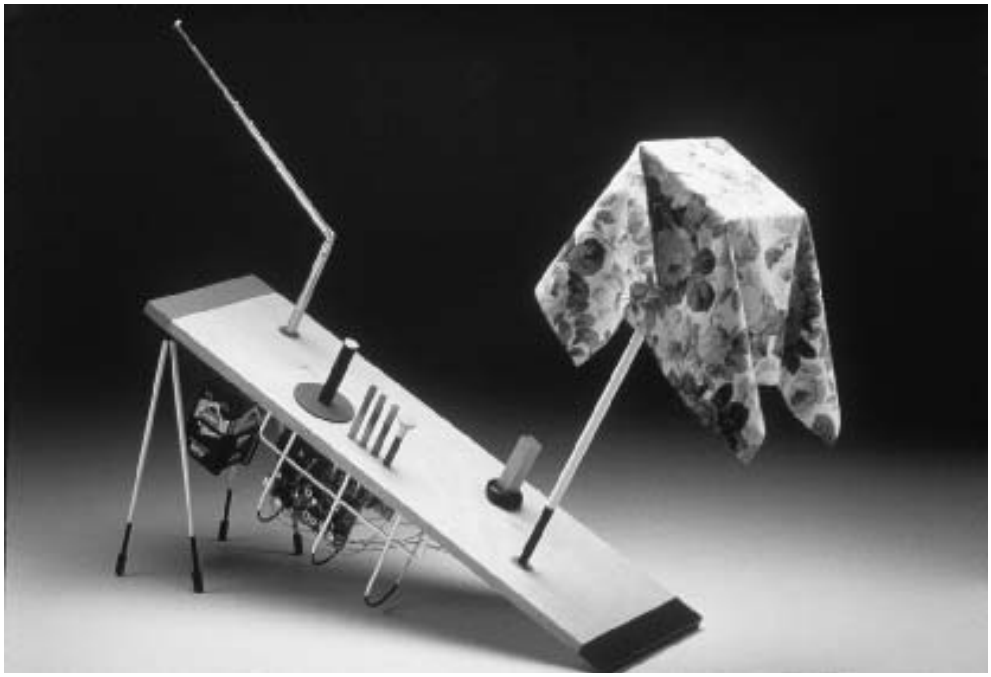

Figure 2.11 Daniel Weil's *Small Door* (1986) is more obscure. It challenges the viewer to participate in constructing its meaning. The viewer's questions, interpretations, and criticisms are part of the object's meaning.

As a designer operating in a media-saturated cultural sphere, Irie utilizes computer errors to escape making uncritical and unconscious use of existing cultural forms and conventions, and reproducing the ideology they encode. He considers designing to be autogenerative, made up of subroutines. For Irie, when anything is possible, design is no longer about necessity but becomes a play between subroutines, exploring what can be used rather than realizing an optimum fit. A valid decision may be made on a whim for, as with Weil, the experience of the work is partly what the viewer brings to it: "Even in my own house at Sangubashi, the meaning came from the programming. Which is to say, the elements and methods I employed may have dictated a 70s Tokyo house, but that filter aside, you can see it was just a program. The final form did not have to come out like that at all. If I had applied another filter—who knows?—a tile roof might have resulted" (Irie 1988, 8–9).

Irie's project for a chair (figure 2.12) experiments "with the interplay of noise and unadulterated parts." He first designed a computer program that generated different configurations for a chair with three legs and a seat. The structure of a practical chair is a main routine, but the program generates a host of variants,

Figure 2.12 Kei'ichi Irie's *Lascaux Chair* (1988) began as a design for a computer program. The structure of a practical chair is a main routine; the program generates variants, splitting legs in two, twisting and stretching elements.

splitting legs into two, twisting and stretching elements. The designer simply edits, making selections and adjusting them to ensure they function as free-standing chairs. To Irie's delight, the addition of a number or two to the program can radically change the structure. He uses the computer as an extension of his consciousness: "My thought processes externalised in the form of a chair, which are in turn output as a terminal device 'chair.'"

Irie applied this thinking to his work as an industrial designer with a large housing manufacturer. In his view each company has a "guiding will" program or main routine. When one understands this progam, it is possible to write "bugs" into it, generating objects that are neither the familiar output of large corporations nor the singular expression of the designer as author, but a new, technologically mediated collaboration between designer as virus and industry as program.

Fujihata (1991) responds to Tokyo's unique mixture of immaterial and material culture through an unconventional and conceptual form of industrial design. *Forbidden Fruits* realizes computer visions (figure 2.13), using a CAD system designed for industrial designers and linked to a model-making system.

Figure 2.13 In *Forbidden Fruits* (1991), Masaki Fujihata regards these computer graphic images as "virtual fruit he is forbidden to hold."

An ultraviolet beam traces forms in a photosensitive resin that solidifies on contact with the light, creating translucent representations of computer data. His introduction claims that photography has generated a special "mental software" that is exploited by computer graphics. Interested in going beyond this to discover new potentials for computer graphics, Fujihata transports forms from the screen into the here and now, using a process very different from classical modes of making pictures and sculptures. He articulates data to edit form, using a tree structure to represent the process. On a whim, he returns to points, suddenly turning, constantly producing the tree map of his explorations from which grows "the virtual fruit he is forbidden to hold."[3]

Functional Estrangement

The objects Irie and Fujihata produce focus attention on the design process. They do not challenge the way we experience reality. To provide conditions where users can be provoked to reflect on their everyday experience of electronic

objects, it is necessary to go beyond forms of estrangement grounded in the visual and instead explore the aesthetics of use grounded in functionality, turning to a form of strangeness that lends the object a purposefulness. This engages the viewer or user very differently than the relatively arbitrary results of Irie or Fujihata, the crude interpretations and explanations offered through the well-mannered and facile metaphors of mainstream design, or the soft cybernetics of the human factors community. This strangeness is found in the category of "gadget" that includes antique scientific instruments and philosophical toys, objects that self-consciously embody theories and ideas.

The fit between ideas and things, particularly where an abstract idea dominates practicality, allows design to be a form of discourse, resulting in poetic inventions that, by challenging laws (physical, social, or political) rather than affirming them, take on a critical function. Such electronic objects would be conceptual tools operating through a language of functionality that is entangled in a web of cultural and social systems that go beyond appearance.

Although transparency might improve efficiency and performance, it limits the potential richness of our engagement with the emerging electronic environment and encourages unthinking assimilation of the ideologies embedded in electronic objects. Instead, the distance between ourselves and the environment of electronic objects might be "poeticized" to encourage skeptical sensitivity to the values and ideas this environment embodies. This could be done in a number of ways, of which the most promising is a form of functional estrangement: "para-functionality." This quality, common to certain types of gadget, is the subject of the next chapter, which reviews projects and objects that work in this way and explores how para-functionality could be applied to electronic objects.

the grasping of an architectural composition and its sophisticated allegories of form." A. Branzi, *The Hot House,* 97–98.

2 (In)human Factors

1. For an excellent critique of product semantics, see A. Richardson, "The Death of the Designer."

2. For a summary of John Dewey's views on aesthetic experience in terms of recognition and perception, see chapter 4.

3. Irie and Fujihata's approaches superficially resemble that of John Frazer who has been involved in computer-generated form and structure since the early 1960s. Like many explorations of autogenerative models, especially in the field of artificial life, Frazer's inventions rarely move beyond the screen into physical space, although their formation often responds to data, such as environmental conditions, from sources outside the computer. See J. Frazer, *Themes VII: An Evolutionary Architecture.*

3 Para-functionality: The Aesthetics of Use

1. This also suggests a way of establishing an architectural role for the object in the sense of Bernard Tschumi's "there is no space without event, no architecture without programme; the meaning of architecture, its social relevance and its formal invention, cannot be dissociated from the events that 'happen' in it." B. Tschumi, "The Discourse of Events," 17.

2. "The Japanese word 'Chindogu' literally means an odd or distorted tool—a faithful representation of a plan that doesn't quite cut the mustard . . . they are products that we believe we want—if not need—the minute we see them. They are gadgets that promise to give us something, and it is only at second or third glance that we realise that their gift is undone by that which they take away." K. Kawakami, *101 Unuseless Japanese Inventions,* 6–7.

3. Thackara, *Design after Modernism,* 22.

4. I refer to those cultural mechanisms that marginalize alternatives to the present, even when economically and technically feasible, as utopian and "unrealistic."

5. This project is of personal interest to me because a similar project, the *Noiseman* (1989) marked my first experience of designing in a critical way while working for a