DISCOVERING DESIGN

EXPLORATIONS IN DESIGN STUDIES

EDITED BY

**RICHARD BUCHANAN
AND VICTOR MARGOLIN**

becomes a specialist in psychology or market research to identify and integrate emotional values within a product design.

It does mean, however, that the designer must be able to develop a clearer understanding of where the natural balance point is among the forces of the id, the ego, and the superego for any specific human need. For example, where is the proper balance among these forces in the design of a pacemaker versus a chair, versus a trash bag? Each one has its own appropriate aesthetic, which is inseparable from the proper balance of its functional, ethical, and physical values.

Once the natural balance point for a specific need is understood, then the actual process of design can take place as a collaborative effort among the appropriate specialists. Actual physical form, in many cases, may cease to be the outcome of the design process, which could result, for example, in the elimination of a mostly unnecessary object, or the substitution of a series of electronic signals for a complex mechanical assembly.

In most cases, the designer may find that this process will lead to design concepts which are both simpler and more complete, at the same time. Understanding the proper balance of needs for any specific object will result in design concepts which eliminate the superfluous and elaborate the essential.

Design for the Senses and Kinesthetics

One of the essential areas which will be fertile ground for elaboration through the design process will be sensory stimulation. This will require the designer to become more knowledgeable about the nature of the id. It is the area where the designer must become a more deeply focused expert.

To a great extent, many designers have focused their attention on the sense of sight and, to a much lesser extent, the sense of touch. However, human sensory perception includes other organs besides the eyes and the nerve endings at the ends of our fingers and on our posteriors. Olfactory and auditory considerations and manipulations should also be part of the design process. Frank Lloyd Wright's Falling Water and the Alhambra are two examples where the sounds of water and the scents of the natural components within the human-made environment are intrinsic to the experience of the architecture.

It seems reasonable that the design of many mass-produced products could benefit from a similar sensitivity. A slide projector, for example, would be immeasurably improved by the elimination of the noise produced by the fan which is used to cool the projection lamp. In contrast, the addition of appropriately restful sounds to an electronic alarm clock would potentially assist the user in falling asleep and be less offensive when the time came to awaken.

The thermal qualities of materials and the contrasts between thermal qualities present another untapped opportunity for expanding the sensory experience. Lisa Hershong points out that "the thermal sense cannot be easily isolated from overall experience, unlike seeing and hearing. We cannot close it off like closing our eyes . . . The thermal sense is intricately bound up with the experience of our bodies. . . . Perhaps the human fascination with fire stems from the totality of its sensory stimulation."[2] The thermal properties of spaces clearly offer a great opportunity for a richer sensory experience. However, Hershong points out that "in America, our tendency has been to get away from thermal conditions as a determinant of behavior. Instead, we have used our technology to keep entire living and working complexes at a uniformly comfortable temperature. As a result, our spatial habits have become diffused." In contrast, "In the villages [of Saudi Arabia] people commonly go out in the evening to sit and talk on a nearby sand dune. On a hot night, the north slope of a dune offers a very comfortable and cooling place to sit. When the nights get cooler, the people choose instead to sit against the slope that is still warm from the late afternoon sun."[3]

In product design, the opportunities for orchestrating the thermal qualities of an object within the whole of the aesthetic experience are equally great. Material selection, for example, could be based on the ability of the material to insulate or conduct heat, not just to meet technical or safety requirements but also to provide sensory stimulation. The pleasure derived from consuming a hot liquid from a ceramic cup is due, to a great extent, to the contrast between the cool ceramic and the warm liquid.

Finally, the interrelations among all of the sensory perceptions need to be considered in a dynamic way. Concerns for the kinesthetics associated with the actual use of an object add a new dimension to the design process. As technology becomes more adept

at miniaturization, products will become less static. As objects become wearable, or at least transportable, our interaction with them becomes more complex and the opportunities for kinesthetic experience greater.

In order to understand and manipulate these new, dynamic, and often nonvisual design elements, designers need to move beyond the use of traditional tools. Drawings and renderings, computer-aided design, and computer modeling are all insufficient to manipulate and test designs which integrate such multisensory and dynamic elements. In addition to these two-dimensional tools, the use of more sophisticated ergonomic models is required. These models test more than static biomechanical concerns such as viewing angles, reach, and accessibility. They serve to explore and, ideally, quantify all of the other sensory and kinesthetic dimensions involved.

I believe that the great designers have an intuitive understanding of the true nature of the design process and the totality of aesthetics. Unfortunately, it has been my experience that very few design students are exposed to many of these issues in the various design schools. And, worse still, they are not expected to concern themselves with them once they move on to most professional design studios.

I conclude with some words from the prophetic architect Gottfried Semper: "The abundance of means is the first serious danger with which art has to struggle. This term is in fact a paradox (there is no abundance of means, but rather a lack of ability to master them)."[4]

Notes

1. Gottfried Semper, "Science, Industry, and Art," in *The Bauhaus,* ed. Hans W. Wingler (Cambridge: MIT Press, 1986), p. 18.

2. Lisa Hershong, *Thermal Delight in Architecture* (Cambridge: MIT Press, 1987), p. 29.

3. Ibid., p. 41.

4. Semper, "Science, Industry, and Art," in Wingler, *The Bauhaus,* p. 18.

The Depth of Design

Albert Borgmann

The material culture of modern life is unique in its scale and sophistication. The most awesome and far-flung monuments of premodern life are modest, and its most sophisticated machines are crude, in comparison. In assembling our material culture, we have been much concerned with safety, efficiency, and commodiousness, and we have undertaken gigantic if often insufficient efforts to improve our material surroundings in these respects. At the same time, we almost entirely disavow responsibility for the moral and cultural excellence of our material surroundings.[1]

There is one heading, however, under which we discuss and judge the quality of our material culture, viz., design. Accordingly I propose we think of design as the excellence of material objects. Design in this objective sense is everyone's concern. So are health, justice, and education. And yet society especially entrusts the latter three concerns to particularly qualified people, to doctors, lawyers, and teachers. A group that has been so entrusted with a precious social good we call a profession, and typically such a group discharges its responsibility in a collegial and principled

the Roman republic—stand behind Vitruvius's account of architecture.[7] His portrait of the architect parallels Cicero's portrait of the well-educated rhetorician, except with regard to the type of product that follows from the art. The architect is an individual trained in the liberal arts and sciences of his day, prepared to practice the integrative liberal art of architecture for the fabrication of buildings, instruments for measuring time, and the devices of war.

Integrative Arts in the Renaissance

The relation between rhetoric and the arts of making, whether in words or things, is one of the most complex themes in Western culture. However, the development of this theme in the Renaissance has special significance for the subsequent understanding of design in the twentieth century. In the Renaissance, the fine arts were distinguished from the practical arts in a fashion more complete—or, at any rate, with greater cultural impact—than at any time in the past.[8] The reason for this was an unusual confluence of Platonic and Aristotelian ideas, along with a rebirth of rhetoric through the direct or mediated influence of Cicero, Horace, Quintilian, and Longinus.[9] New readings of Plato supported an intense interest in the imitation of ideal models. In conjunction with the rebirth of rhetoric as a cultural art, this led in turn to the imitation of ideal literary models. Finally, the translation of Aristotle's *Poetics* into a variety of languages in the sixteenth century "provided a technical vocabulary, a statement of problems, and an array of literary data" that was adjusted to the rhetorical tradition of poetry, stemming from Horace and Longinus.[10] The result was the rhetorical humanism of the Renaissance, directed toward the creation of the new liberal art of belles lettres as the highest achievement of culture. This was conceived as a return to the ancient union of the arts of making in words and things. However, it was, in fact, a departure from classical and modern ideas that decisively reoriented culture toward the literary arts.

It is no contradiction that some Renaissance artists explored the practical arts of *architectura* and *grafice* (including the art of *pittura*) at the same time that they explored new literary arts, because the practical arts were conceived as an extension of poetic vision. The highest forms of making remained rhetoric and

poetry, since these arts were regarded as closest to the spirit of the ideal. Nor is it a contradiction that the creation of the liberal art of beaux arts soon followed the creation of belles lettres: the beautiful arts, similarly based on rhetoric, provided a new way for exploring the delightful and noble, thereby extending the subject matter and concepts of beautiful letters.[11] Thus, the first academies of art were created in the sixteenth century, "based originally on the assumption that the visual arts may be analyzed intellectually, and criticized and improved according to laws not different from those governing literature codified by Aristotle and other authors of the ancient world."[12]

The great achievement of the Renaissance was the creation of belles lettres and beaux arts, along with a rebirth of rhetorical thought. This influenced all areas of culture and all arts of making, yielding a secularized humanism which influenced the sciences, as well. Yet this achievement, particularly as carried forward in the seventeenth and eighteenth centuries, ultimately eroded the intellectual foundations of rhetoric and the practical arts of making, with nearly disastrous consequences for the conception and practice of design. Although the Renaissance artist distinguished the rational arts of rhetoric and poetry from the practical or useful arts, he also understood and appreciated their relation, and frequently cultivated the practical arts of making in innovative ways. Leonardo da Vinci's speculations on mechanical devices were simply another expression of his poetic and visual imagination. But the successors of the Renaissance artist, inheriting a reified distinction between the fine and practical arts, progressively lost understanding of, and interest in, the fertile connective link.[13]

Renaissance inventions were based on an architectonic art of rhetoric. However, what was invented by means of rhetoric—the new subject matters of culture, identified as literature, history, the fine arts, science, and philosophy—gradually attracted more interest and attention than the integrative art from which they emerged.[14] For example, Galileo was inspired by the design arts practiced in the great arsenal of Venice, but he directed his work not toward the nature of design but toward the creation of the two new sciences of mechanics. The result is easy to see: the arts of making were progressively distinguished, specialized, and

fragmented into many forms; the practical arts were developed without sound intellectual foundations which could be integrated into a humanistic conception of making; and the theoretical sciences underwent explosive growth, often relying on the industrial, mechanical, and practical arts for inspiration and devices of investigation, but without a framework for relating theoretical knowledge to its practical impact on the development of human character and society. As for rhetoric, it became one more technical, specialized branch of the literary arts, ultimately dissociated by Descartes, Newton, and others from philosophy, practical reasoning, and the new sciences.[15]

It is true that in the period from the Renaissance to the early days of the Industrial Revolution the invention of techniques for mass production in support of the practical arts allowed—and required—a separation of designing from making. However, design was also separated from the intellectual and fine arts, leaving it without an intellectual foundation of its own. Therefore, instead of becoming a unifying discipline directed toward the new productive capabilities and scientific understanding of the modern world, design was diminished in importance and fragmented into the specializations of different types of production, leaving its connection with other human enterprises and bodies of knowledge vague and uncertain. Design was rescued periodically by exceptional individuals with natural talent who could provide examples of successful design thinking, based on an intuitive grasp of broader considerations. But these individuals could not provide a systematic discipline with principles and methods appropriate to the tasks of design.

Following the Renaissance, the consequence of separating the theoretical from the practical, the ideal from the real, and the cognitive from the noncognitive was a loss of the essentially humanistic dimension of production. The forms of making which had the widest impact on the daily life of society—engineering and the other practical arts—were guided merely by a narrow profit motive or by military necessity,[16] rather than a deeper consideration of the interplay between human character and products.[17] Design was practiced by chance and intuition as a trade activity or military occupation, rather than in its full potential as an architectonic master art that guides all of the diverse forms of making which are central to human culture. In short, design became

a servile activity rather than a liberal art. It was not conceived as an art which could promote the freedom of men and women in the circumstances of the newly emerging technological culture.

Integrative Arts in the Twentieth Century

Efforts to reunite design with the arts of making began in the nineteenth century, when Ruskin, Morris, and others attempted to elevate the status of craft production as an alternative to mass production by machines. However, the most significant efforts to rejoin design and making came with the cultural and philosophic revolution at the beginning of the twentieth century. The origins of design are reasonably traced to the early decades of the twentieth century because it was in this period that individuals began to formulate new disciplines of design thinking that would combine theoretical knowledge with practical action for new productive purposes.[18]

Walter Gropius was among the first to recognize in design a new liberal art of technological culture. In the wake of the First World War, he realized that he had a responsibility to train a new generation of architects who could help to overcome the disastrous gulf which had emerged between idealism and reality. The basis of that training would be a "modern architectonic art" of design.

> Thus the Bauhaus was inaugurated in 1919 with the specific object of realizing a modern architectonic art, which like human nature was meant to be all-embracing in its scope. It deliberately concentrated primarily on what has now become a work of imperative urgency—averting mankind's enslavement by the machine by saving the mass-product and the home from mechanical anarchy and by restoring them to purpose, sense and life. This means evolving goods and buildings specifically designed for industrial production. Our object was to eliminate the drawbacks of the machine without sacrificing any one of its real advantages. We aimed at realizing standards of excellence, not creating transient novelties. Experiment once more became the center of architecture, and that demands a broad, coordinating mind, not the narrow specialist.[19]

The ground of the new art of design was not to be found in the principles of idealism, materialism, or "art for art's sake."[20] It

was to be found in human character and in the essential unity of all forms of making in the circumstances of a new cultural environment strongly influenced by engineering, technology, and commerce.[21]

What the Bauhaus preached in practice was the common citizenship of all forms of creative work, and their logical interdependence on one another in the modern world. Our guiding principle was that design is neither an intellectual nor a material affair, but simply an integral part of the stuff of life, necessary for everyone in a civilized society. Our ambition was to rouse the creative artist from his other-worldliness and to reintegrate him into the workaday world of realities and, at the same time, to broaden and humanize the rigid, almost exclusively material mind of the businessman. Our conception of the basic unity of all design in relation to life was in diametric opposition to that of "art for art's sake" and the much more dangerous philosophy it sprang from, business as an end in itself.[22]

However, the significance of the new architectonic art of design lay precisely in encouraging the cultivation of alternative and often conflicting principles as hypotheses for making. Gropius did not claim that the new art of design provided an ultimate solution to the problems of industrialized society. What he claimed was that it revitalized design thinking by initiating a new path of experimentation and pluralistic exploration grounded in art and human character. Aside from the broad principle that an architectonic art of design connected the arts, the path or discipline presented by Gropius did not presuppose or require any particular principles of art. Rather, it was a way to explore a variety of principles in order to discover their potential consequences for making and practical life: "Modern painting, breaking through old conventions, has released countless suggestions which are still waiting to be used by the practical world. But when, in the future, artists who sense new creative values have had practical training in the industrial world, they will themselves possess the means for realizing those values immediately. They will compel industry to serve their idea and industry will seek out and utilize their comprehensive training."[23]

It is easy to confuse the idea of design that gave purpose to the Bauhaus with the separate directions in which it was developed

by the faculty in the short period of the school's institutional existence. Gropius, Moholy-Nagy, Klee, Kandinsky, and others developed individual visions that favored one or another principle of making. But to substitute particular visions and consequent results for the concept of a new discipline of design thinking misses the point of the liberal art that Gropius sought to establish. The goal was to provide a concrete connection between artistic exploration and practical action, where artists could learn how their conceptions of art might be carried forward as experiments in shaping the broad domain of the artificial in human experience, extending beyond traditional forms of artistic expression into making in all phases of life, supported by new technologies and advances in science.

Interpreted in its weakest form, this is "aesthetic" exploration in the reductive sense of the term, leading toward decoration and styling that appeals only to the senses.[24] However, interpreted in the strongest sense, it is "artistic" exploration in the sense that Dewey speaks of art, as the quality of unity and satisfaction belonging to any experience, whether the experience is primarily intellectual, practical, or aesthetic. Art should not be something outside of experience or segregated to a small area of experience. It *is* experience in its most vital and essential form.[25] Mechanization has tended to diminish the human qualities developed in all phases of life, but the new art of design sought by the Bauhaus offered a way to discover and express human qualities and values, to make them an integral part of the human-made environment.

The most important practical criticisms of the Bauhaus do not concern its effort to establish a new architectonic art of design thinking. Rather, they concern what the nature of that art should be. Evidence for this is that subsequent discussion turned toward the proper methodology of design. Unfortunately, "methodology" was interpreted in its narrow form as *specialized techniques or methods* rather than in its architectonic form as *systematic disciplines of integrative thinking*, within which diverse techniques and methods are given direction and purpose.[26] The proper question should have been, what is *forethought* in the new circumstances of twentieth-century culture? The leaders of the Bauhaus expressed a new attitude toward making that was consistent with the cultural and philosophic revolution that began in the early days of the twentieth century. Indeed, the Bauhaus was part of

that revolution precisely because of its effort to establish a new architectonic art of design grounded in character and making. However, the Bauhaus did not fully develop the new disciplines of design thinking. It left the architectonic art of design with open-ended possibilities that required further concrete development in order to be effective. It is no surprise, therefore, that the issue for debate in evaluating the contribution of the Bauhaus soon became whether it succeeded in providing the necessary intellectual tools for integrating the arts of making with knowledge gained from the natural and social sciences, and whether it succeeded in integrating design thinking with industry and the world of practical action.

The Bauhaus opened paths in these directions, but it lacked instrumentalities of forethought essential for further exploration and development—instrumentalities that were required to complete the revolution in attitude and direction of thinking that it helped to initiate. Forethought at the Bauhaus derived its strength from the creative imagination of artists. And, despite debunking by critics, the leaders of the Bauhaus went to a correct source, because all making is, in essence, an artistic, not merely an aesthetic, activity.[27] But the *thought* that must stand behind *making* in the new circumstances that have emerged in the twentieth century was only partly grasped in the vision and preparation of artists that existed at the Bauhaus. When Gropius spoke of the "comprehensive training" of the new artist, it was more an expression of optimism about future possibilities than accurate reporting about the reality of the Bauhaus program.

Considering the relation between rhetoric and making, which has been an ongoing source of innovation in Western culture, it is reasonable to suggest that what the Bauhaus lacked was a revolutionary vision of rhetoric to match its revolutionary vision of making. This would be rhetoric as a broad intellectual discipline, expanded from an art productive of words and verbal arguments to an art of conceiving and planning all of the types of products that human beings are capable of making. Without such a discipline for integrating design and making with science and practical action, the accomplishments of the Bauhaus were necessarily limited. Thus, design may have had its origin at the beginning of the twentieth century, but it required further development appropriate to the new circumstances of culture.

Moholy-Nagy took an important step in this direction when he established the New Bauhaus in Chicago in 1937. As part of the new program, he invited a philosopher from the University of Chicago, Charles W. Morris, to design a component of the curriculum suited to prepare students with a broader understanding of the relations among art, science, and technology that the school was attempting to explore in practice.[28] Morris accepted the challenge with enthusiasm and promptly recruited distinguished colleagues from the university to assist. The resulting curriculum followed the pattern of general education at the University of Chicago, with courses in the subject matter and methods of the physical and biological sciences, the social sciences, and the humanities, as well as two interdisciplinary courses: "intellectual and cultural history," and "intellectual integration."[29]

Morris taught the course in intellectual integration, using the uncorrected galley proof of his *Foundations of the Theory of Signs* as a background reading. His goal was to use "the theory of signs and the results of the unity of science movement to obtain a philosophical perspective on human activity," and thereby broaden the understanding of design students who were active in the workshops and studios of the school.[30] Unfortunately, this experiment was cut short because of financial difficulties, which forced the school to close for a short period. When it reopened, Morris and his colleagues continued to teach for a short time without compensation, but there is little documentation to suggest that the venture in intellectual integration reached its potential. Nonetheless, Moholy-Nagy viewed such explorations as an essential part of the new liberal art of design that he sought to develop and that he described in detail in *Vision in Motion*.[31] Relying on the contingent of professors from the University of Chicago to teach subject matters and methods of intellectual integration, he viewed the overall program of the New Bauhaus as a further integration in the activity of making. This was a concrete development of the original Bauhaus idea, although the significance of the innovation has passed largely unnoticed because it lasted only a short time and few results were immediately evident.

Without a Bauhäusler at once sensitive to the connection between design and making *and* prepared to explore new disciplines of forethought, further development of the Bauhaus idea

was difficult, if not impossible. This is illustrated in the fate of the Hochschule für Gestaltung (HfG) Ulm, widely regarded as the most important and influential school of design since World War II. Founded in 1953 by Max Bill and others to promote the principles of the Bauhaus, HfG Ulm was soon racked by irreconcilable differences between Bill and those among the staff who wanted to pursue new methods suited to the needs of industry. Bill, an alumnus of the Bauhaus, resigned after a short time, succeeded by his deputy, Tomás Maldonado, who encouraged the development of scientific planning more deeply informed with mathematics and analytical techniques.

The differences between Bill and his colleagues are usually described as methodological, but they were far more. The combined influence of the Frankfurt School and the Vienna Circle on Maldonado and his colleagues helps to explain the unusual and, at times, explosive contradictions that formed the atmosphere at HfG Ulm, representing a shift away from the principles of an integrative discipline of design sought by Bill and the leaders of the Bauhaus. The contrast of principles is evident in the confidence displayed by Maldonado that HfG Ulm could tell the world what forms should and should not be created to serve social goals. "The HfG we are building in Ulm intends to redefine the terms of the new culture. Unlike Moholy-Nagy in Chicago, it does not merely want to form men who would be able to create and express themselves. The school at Ulm . . . wants to indicate what the social goal of this creativity should be; in other words, which forms deserve to be created and which do not." [32] While the Bauhaus based its work on a belief in the essential freedom of individual human character in a society and culture influenced by industrialization, Maldonado viewed industry itself as the central agency shaping culture. Indeed, for Maldonado industry was culture.

> Ulm was based on one basic idea, which we all shared in spite of disagreeing on absolutely everything else: the idea that industry is culture, and that there exists the possibility (and also the necessity) of an industrial culture. . . . At that time I was particularly receptive to some of the thinking of the Frankfurt School. Although my own cultural orientation was strongly marked at that time by Neopositivism (I was eagerly reading Carnap, Neurath, Schlick, Morris, Wittgenstein, Reichenback, etc.), the presence of Adorno

> in Frankfurt represented for me, as it were, a contradictory intellectual stimulation. [33]

Focus on methodology was a way of introducing a collection of scientific methods and techniques into design. It promoted the idea of a new science of design, grounded in neopositivist and empiricist philosophy, which some in the theoretical wing of HfG Ulm perhaps naively believed could be harnessed to serve a particular social, political, and intellectual agenda.

> What must be remembered is not only the limitless curiosity that we had in those years about anything that was—or seemed—new. That was a feverish, insatiable curiosity directed above all at the new disciplines that were then coming up: cybernetics, information theory, systems theory, semiotics, ergonomics. But our curiosity went further than this: it also extended, in no small measure, to established disciplines such as the philosophy of science and mathematical logic.
>
> The mainspring of all our curiosity, or reading, and our theoretical work was our determination to find a solid methodological basis for the work of design.
>
> This was a highly ambitious undertaking, admittedly: we were seeking to force through, in the field of design, a transformation equivalent to the process by which chemistry emerged from alchemy. [34]

However, the result of the work at HfG Ulm was not a new integrative science of design, but a further exploration of the relation between design and the natural and behavioral sciences begun at the Bauhaus and continued at the New Bauhaus. [35] Furthermore, without the humanistic orientation of the Bauhaus, the tendency at HfG Ulm was toward specialization, somewhat along the lines developed by Hannes Meyer in the closing days of the Bauhaus, [36] involving a belief in the ability of experts to engineer socially acceptable results through industry. [37] HfG Ulm should not be credited with initiating the "design methods movement" or the effort to find a neopositivist science of design thinking. It was a meeting ground for individuals from around the world who held such interests. It was a place where design educators could experiment with potentially useful techniques generally invented elsewhere.

However, neopositivism and empiricism are not inherently opposed to the concept of an integrative liberal art of design. This is evident in one of the most important works of design theory in the twentieth century, Herbert Simon's *The Sciences of the Artificial.* The problem addressed by Simon is the relation between the *necessary* in natural phenomena and the *contingent* features of the human-made: "The contingency of artificial phenomena has always created doubts as to whether they fall properly within the compass of science. Sometimes these doubts are directed at the teleological character of artificial systems and the consequent difficulty of disentangling prescription from description. This seems to me not to be the real difficulty. The genuine problem is to show how empirical propositions can be made at all about systems that, given different circumstances, might be quite other than they are."[38] His insight was not the reduction of design to any one of the established theoretical sciences—as appears to have been the goal at HfG Ulm. Rather, it was a recognition of the theoretical substance of design *distinct* from the substance of its supporting sciences. The result was the discovery of a new kind of science, radically distinct from the sciences of nature.

> Finally, I thought I began to see in the problem of artificiality an explanation of the difficulty that has been experienced in filling engineering and other professions with empirical and theoretical substance distinct from the substance of their supporting sciences. Engineering, medicine, business, architecture, and painting are concerned not with the necessary but with the contingent—not with how things are but with how they might be—in short, with design. The possibility of creating a science or sciences of design is exactly as great as the possibility of creating any science of the artificial. The two possibilities stand or fall together.[39]

The problem identified by Simon is surprisingly similar to the problems discussed by Aristotle in the first chapter of the *Rhetoric* and in the first chapter of the *Poetics:* how human beings reason and reach decisions about matters which may be other than they are, and how the artificial or human-made is different from, but related to, the natural.[40] Simon's proposed solution is a science of design, with features that are both *rhetorical*—an emphasis on deliberation and decision making—and *poetic,* in the sense that all products made by human beings are subject to analysis and understanding based on the nature of the activity of making.[41] Like the leaders of the Bauhaus, Simon is not concerned with a trenchant Renaissance distinction between the fine and practical arts. He is interested in the elements of forethought operating behind all arts of making.

> The real subjects of the new intellectual free trade among the many cultures are our own thought processes, our processes of *judging, deciding, choosing,* and *creating.* We are importing and exporting from one intellectual discipline to another ideas about how a serially organized information-processing system like a human being—or a computer, or a complex of men and women and computers in organized cooperation—solves problems and achieves goals in outer environments of great complexity.
>
> The proper study of mankind has been said to be man. But I have argued that man—at least the intellective component of man—may be relatively simple, that most of the complexity of his behavior may be drawn from man's environment, from man's search for good designs. If I have made my case, then we can conclude that, in large part, the proper study of mankind is the science of design, not only as a professional component of a technical education but as a core discipline for every liberally educated person.[42]

The basis for the integration that Simon seeks for design is the new discipline of decision making, and he explores this discipline in the context of neopositivist and empiricist philosophy. However, the particular philosophic orientation of Simon's approach should not distract from appreciation of the broader direction of design thinking toward which he points. Simon is investigating the themes and arts of rhetoric in their relation to new arts of making.

Rhetoric and the New Technologies of Design Thinking

The effort to establish a new liberal art of design at the Bauhaus has given way to a search for a plurality of design arts which can provide suitable instrumentalities of forethought for a discipline which increasingly requires the incorporation of diverse kinds of knowledge. Since the search is still underway and no conventions of terminology, description, or formulation have emerged with

clarity, the precise nature of these arts remains uncertain and open to debate. Yet, central themes are evident throughout contemporary explorations of design and reflections on design practice, and the roots of those themes in rhetoric and poetics is an indication of the shape that the new integrative disciplines of design thinking may eventually take.

When Herbert Simon refers to the thought processes of creating, judging, deciding, and choosing as the real subjects of the new intellectual free trade among cultures and disciplines, he is giving new voice to the traditional arts and themes of rhetoric. However, the foundation of these processes of forethought in the disciplines of rhetoric is not yet widely recognized or understood. Rhetoric is still perceived by many people in its Renaissance orientation toward poetry, belles lettres, and beaux arts, rather than in its twentieth-century orientation toward technology as the new science of art, where theory is integrated with practice for productive purposes and where art is no longer confined to an exclusive domain of fine art but extends to all forms of making. Nonetheless, the themes of rhetoric have emerged in twentieth-century design precisely because they provide the integrative connections that are needed in an age of technology.

The pattern of rhetoric in twentieth-century design builds on distinctions which were established early in the formation of rhetorical theory and developed to meet changing circumstances. In earlier periods of Western culture, when rhetoric was oriented toward words and verbal arguments, the traditional divisions of rhetoric were *invention, judgment, disposition* (planning the sequence of argument), *delivery* (choosing the appropriate vehicle for presenting arguments to different audiences), and *expression* (choosing the appropriate stylistic embodiment of arguments). In the expanded rhetoric of Francis Bacon, who sought to overcome the separation between words and things in order to explore science and technology, the traditional divisions of rhetoric survived in the groundplan for the advancement of learning and in the four intellectual arts needed to carry out that advancement: the arts of *invention, judgment, custody,* and *tradition.* Significantly, the fifth division of rhetoric, expression, did not disappear. It was distributed by Bacon among the four intellectual arts, integrated into the larger task of intellectual exploration in each area.

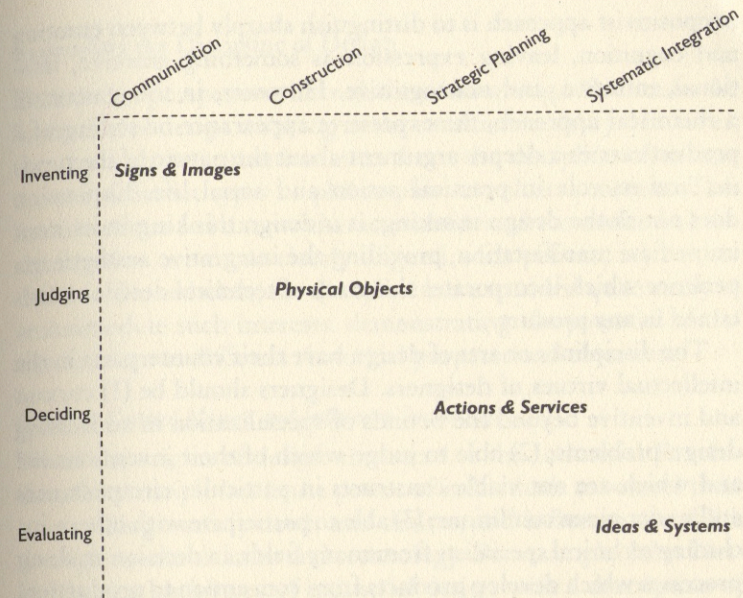In the new rhetoric of twentieth-century design and tech-

Figure 3. Matrix of abilities and disciplines in design

nology, where the effort is also to overcome the separation between words and things, the traditional divisions of rhetoric have emerged once again to give coherence to inquiry. The investigation of design in theory and practice centers around four themes, which may be stated briefly and ambiguously as *invention and communication, judgment and construction, decision making and strategic planning,* and *evaluation and systemic integration.* These themes may be represented in the form of a matrix in order to suggest issues and problems that stand behind the shifting debate about design in the past seventy years (fig. 3).

In this framework, the fifth division of rhetoric, *expression and styling,* emerges as a persistent issue in each of the disciplines. Few designers are content to describe their work as mere styling. Yet, most recognize that the appearance and expressive quality of products is critically important not only in marketing but in the substantive contribution of design to daily living. The problem is how to accommodate sensitivity to expression with the intellectual and analytical issues belonging to communication, construction, strategic planning, and systemic integration. The

neopositivist approach is to distinguish sharply between emotion and cognition, leaving expression as something emotive, irrational, intuitive, and noncognitive. However, in the context of a rhetorical approach, the expressive appearance or styling of a product carries a deeper argument about the nature of the product and its role in practical action and social life. Expression does not clothe design thinking; it *is* design thinking in its most immediate manifestation, providing the integrative aesthetic experience which incorporates the array of technical decisions contained in any product.

The disciplines or arts of design have their counterparts in the intellectual virtues of designers. Designers should be (1) curious and inventive beyond the bounds of specialization in addressing design problems; (2) able to judge which of their inventions are and which are not viable constructs in particular circumstances and under given conditions; (3) able to participate with others, including technical specialists from many fields, in decision-making processes which develop products from conception to production, distribution, disposal, and recycling; (4) able to evaluate the objective worth of products in terms of the needs of manufacturers, individual users, and society at large; and (5) able to embody ideas in appropriately expressive forms throughout the process of conception and planning. The disciplines of design are *enabled* by the rhetorical abilities of designers.

Design has become an art of deliberation essential for making in all phases of human activity. It applies to the making of theories which attempt to explain the natural operations of the world. It applies to making policies and institutions which may guide practical action, as in a constitution for a newly emerging state or in political, social, and economic institutions relevant to new circumstances. And, it applies to making all of the objects in the domain of production that the Renaissance arbitrarily divided into belles lettres, beaux arts, and the practical arts. Deliberation in design yields arguments: the plans, proposals, sketches, models, and prototypes which are presented by designers as the basis for understanding, practical action, or production. Design is the art of shaping arguments about the artificial or human-made world, arguments which may be carried forward in the concrete activities of production in each of these areas, with objective results ultimately judged by individuals, groups, and society.

Expanding the Discipline of Design

Three other perspectives have also exerted strong influence on the formation of design thinking in the twentieth century. However, they have shifted attention away from the discipline of design, toward different types of philosophic or cultural content. This has sometimes led to new characterizations of the method of designing that are more closely aligned with politics, science, or dialectic. Nonetheless, the discipline has expanded quite easily to accommodate such interests, demonstrating the potential of design to adapt to different rhetorical purposes and objectives.

Power to Control Nature and Influence Social Life

When the origins of design are traced to the Industrial Revolution, the principle lies in the power of individuals to control their surroundings, satisfy needs and desires, and influence social life through mechanization and technology. For example, John Heskett begins his history of industrial design with a description of the quantitative and qualitative change that has taken place in the last two hundred years.

> In the last two centuries, human power to control and shape the surroundings we inhabit has been continuously augmented, to the extent that it has become a truism to speak of a man-made world. The instrument of this transformation has been mechanized industry, and from its workshops and factories a swelling flood of artefacts and mechanisms has poured out to satisfy the needs and desires of an ever-greater proportion of the world's population. The change has not only been quantitative, but has also radically altered the qualitative nature of the life we live, or aspire to live.[43]

For writers such as Heskett, the origins of design are best traced to the Industrial Revolution, because it was during this period that the power to invent and shape useful products was distinguished from the laborious physical activities of making them. Prior to this period, design was closely associated with craft methods of production, and the crafts, in their most refined forms, were instruments to satisfy the desire of princes and kings for luxury. With the advent of new techniques for mass production, design became an instrument of merchant princes in a

nonprofessionals of biomedical devices is, in fact, nothing more than the result of discoveries of a new usage as a consequence of experimental action by consumers on themselves.

The third changing design criterion: The vital self-products must be designed not for the utilizator who seeks rationally possible ways of using a product, but for an experimental user, who may modify the purpose of use as well as the instructions for use of the product.

IV. Symbolics of Power

The symbolics of power can be considered one of the highest cultural values that today's designers consciously or unconsciously wish to channel through their creative productions.

In general, most of the literature written on this subject comes from professional sociologists and social critics. By giving this topic the generic name of "symbolics of technology," some of these social-science scholars have observed that besides their internal technical or functional characteristics, new technological goods tend to promote, above all, the images of "immortality," "ubiquity," "sentiments of participation in supreme intelligence," or "powers of divinity."[31]

Looking into this subject from the point of view of design productions, social critic of modern style and industrial aesthetics Stuart Ewen presents some very interesting observations on one of the fundamental aspects of the designers' myths of power, as they appear on ads as well as in the look of the products.

Writing on this particular subject, Ewen says, "The design of many products—particularly appliances and other electronic items—suggests that with the purchase of the products, *you will have your hands on the controls.*" Looking further on this design thematics of "control," he remarks: "Employing a visual idiom drawn loosely from what President Eisenhower termed the 'military-industrial complex,' designers enthusiastically worked to build an environment that was replete with strategically located 'command centers' . . . control panels." To draw our attention to this control panels–oriented design the author reminds us how, "at Chrysler, automotive dashboards were trimmed to suggest the cockpit controls of a jet fighter," and how some household equipment has taken the same direction.[32]

But the phenomenon of the control-panel complex may not always satisfy the client and can also negatively affect the psychology of the user of the new everyday technology. Taking computers as an example, a well-known expert in the study of high-tech products, Tom Forester, suggests that "in the future, all personal computers are likely to become even more 'user-friendly' . . . but in an effort to overcome the keyboard or terminal 'phobia' which affects millions of people, personal computer manufacturers will make greater use of the hand-held mouse, touch screens (etc.)."[33]

We may also take note that this "control panel" or "powerful terminal" symbolism is not intrinsic to household, car, and computer designing but finds most significant expression in health technologies and the biomedical instruments used in clinics and hospitals.

When biomedical technology was entirely in the hands of professionals, it was a symbol of power par excellence, not only for cultural reasons (i.e., hospitals and clinics were the predestinated temples of Asklepius), but also because of the powerful image of the medical profession in our society, an image that had to be maintained to give a rationale for their instruments, and to make the patient feel secure.

When designers finally penetrated the hospital milieu, it is true that they tried to get rid of the "Frankenstein technology" or "laboratory look" of the biomedical devices, but they did not (or could not) touch the "power demonstration" look of the doctors' objects. One has only to observe how much of today's hospital equipment, such as X-rays, electrocardiographs, echocardiographs, and so on, are still victim to the power complex of a doctor's "control panel."

This is not to doubt the designers' efforts and creativity in beautifying the hospital or the physician's private equipment. It is only to underline how designers may sometimes submit unconsciously to the desires of the professional users of biomedical devices.

Many examples can be given to show how efforts made by designers to simplify equipment and to make it look less intimidating have often been rejected by the professionals. For example, there exist today portable X-ray machines and other simplified command-panel equipment *designed for hospitals and clinics* which

work as well as the standard ones. But do the hospital doctors want to purchase them? Not always. Most of the time they give technical arguments (optimal functioning, security, etc.).[34] But it is also possible to interpret their resistance to these instruments as due to their not wanting to give the image of a "tropical medicine" practitioner, but rather preferring to maintain the image of the powerful urban doctor.

On the whole, what seems certain is that if some of the hospital equipment is to enter into the sphere of the individual consumer, this will demand more effort from designers: (1) to remain objective and not be influenced by professional demands, and (2) to always consider these devices as an intimate consumer product.[35]

The fourth changing design criterion: Although today much biomedical technology is still the victim of power symbolism, with the emerging vital self-technologies it will be necessary to give them a less rational look and make them more friendly like any intimate object, agreeable to touch, to wear, or to carry. Especially by remembering that the raison d'être of these devices is not to master and control the world (control-panel complex) or others (medical power of doctors), but to control and master the vital self, by oneself.

V. Symbols of Status and Personal Identity

Even if biomedical instruments eventually get rid of their power (or technological) symbolism as they infiltrate the private sphere as vital self-technologies, we may still ask ourselves whether they will not risk getting caught up in the social web of status values or becoming new symbols of personal identity.

One forecast, proposed by Jacques Attali, economist and personal advisor to President Mitterand and more recently director of the European Bank, considers that in future most biomedical devices will be portable, such as multifunction bracelet-watch devices which will give information on such vital parameters as skin temperature. Calling these medical devices "nomad-objects," the author predicts that they will inevitably be new "signs of distinction" for the future consumer.

Including other portable objects having educational, leisure, and communication as well as medical functions, Attali writes

that "nomad-object" is "the key word to define at best the life styles, the cultural style, and the consumption of the year 2000. Hence everyone will carry with him his whole identity; nomadism will be the supreme form of the Kingdom of Commodity."[36]

Although, for Attali, the term "identity" covers social identification or distinction (relation to others) and personal identity (relation to oneself), he often undervalues the second and puts the emphasis on these new products as status symbols.

This way of looking at the future of personal medical devices seems to me erroneous for two reasons. First, to regard objects as signs of distinction or of status value presumes that all objects necessarily participate or take place in social interaction. But we already know from recent field research[37] that even today not all consumer goods enter into the social sphere of interaction. Furthermore, there is no sound reason why people would make public their most personal objects. Today wearable radios can be hidden inside one's hat, and the techniques of hiding hearing aids are not new. On the contrary, there is a good chance that these objects will be discretely carried on the body like any other intimate or personal object.

Secondly, (and this shows Attali's limited ideas on today's complex object locality) we already know that carrying status objects may not reveal accurate information about one's economic status. To see someone carrying a credit card does not tell us how much money she has in her bank account. To clarify further the future of vital self-technologies, let us look at the prodigious development of biotelemetry and bioteleaction.

Imagine a person who, in his private self-fashioning laboratory, has accumulated very expensive technology. However, he carries on himself only a miniature electronic device which permits him to be in interaction with his material at home. Now, when he is in society, interacting with others, where are his exterior signs of status? On him or in his home? Further, if he does not socially share his self-fashioning laboratory, how can these devices shout out their status value?

This last example brings us closer to the theories of Csikzentmihalyi and Rochberg-Halton, authors of the classical work *The Meaning of Things: Domestic Symbols and the Self.* Talking about the future home and its devices, they write, "What matters about

the home of the future is not so much the number of rooms it will have or the amount of electronic marvels it will contain. The important issue concerns the psychic activity of those who live within." And, further, they make this very significant remark: "The importance of the home derives from the fact that it provides a space for action and interaction in which one can *develop, maintain and change* one's identity"(emphasis added).[38]

The authors are right in insisting that the home, with its intimate everyday objects, is not only a place for maintenance, but also an environment where one can develop and change one's personality. In one sense, this view permits them to go beyond the "conservative" and autoregulative way of looking at everyday hygiene or self-tending activity, as observed, for example, in Gorz's conception of "work for the self." But the way in which they view the self for which the everyday objects are destined still emphasizes a psychological identity. As they mention elsewhere in their work, these objects are to "shape one's personality."[39]

So, should we consider this explanation to be limited because it is influenced by psychological theories that see the role of everyday objects only in fashioning or shaping one's personality? Not really. Their theory proves the nature of objects with which we live today and the popular forecasts about the future of high-tech products, because today's conventional objects and tomorrow's electronic household marvels are indeed for this psychological purpose, which the authors define very well. But what about after tomorrow? If the objects change radically, it may be that individuals will have the opportunity to go further: the possibility of maintaining, repairing, developing, and fashioning not only their personalities or psychological characteristics, but also their biological and existential beings.

Although the vital self-technologies may not necessarily need to be status symbols because of their complex locality of use ("discrete use"), they could nevertheless be chosen as self-identity symbols, though perhaps of a different sort than is proposed today by the lifestyles and psychographics typologies.

Bearing this in mind, we can imagine. for example, a marketing interest based on some biological criteria: taking into consideration, for example, age or gender of the user. The observations on usage locality may also help to develop, for example, ongoing

marketing research on "usage situations,"[40] and maybe some new interest in color research. But this research should not be the same type as is used in the study of color in hospital and clinical instruments, to appease and calm the patient in front of medical instruments. On the contrary, it should address the personal color myths of the vital self-technologies user.

The fifth changing design criterion: Designing vital self-technologies may not need to be concerned with status symbolism or any other socio-style criteria. Designers should concentrate more on research of usage locality, color, and other concerns directly related to intimate objects. But they should bear in mind that consumers can frequently and unexpectedly change their psychological relations (and tastes) with these intimate objects proportionately to the discoveries they make about themselves by experimenting with these objects.

VI. Product Maintenance and Users Requirements

"An organism does not live *in* an environment, it lives by means of an environment." This remark by John Dewey, taken as a metaphor, can help us to illustrate how the mode of existence of industrial products began to be conceived in the consumer society of today.

In the early days of consumer society, when the products (the closed-objects, as we mentioned before) were manufactured and put on the market, it was left to their owners to use them on the basis of a set of "frozen" functions which were defined when the products left their natural environment (the factories), the place where they were born.

This mechanistic approach to industrial products has today given place to a more organic view, in the sense that the more complex the products became (like a living organism), the more the industry realized that the initial natural environment should be extended by means of a permanent institutional relation to products and to their users: to the products, because they have to be taken care of—preventive maintenance—and also repaired; and to the users, because they need training and to be listened to, concerning their desires for the possible development of the products.

products that can explain their relation to human activity. What is needed is an understanding of the product that connects it to action in such a way that it does not simplistically mediate between motives and acts but functions instead as a dynamic factor in the development of both.

By "products" I mean the human-made material and immaterial objects, activities, and services, and complex systems or environments that constitute the domain of the artificial.[4] And I intend "design" to denote the conception and planning of these products. As I apply the term "products" in this essay, I refer not only to the outcomes of professional design practice but also to the vast results of design activity that everyone engages in.[6]

I have chosen the term "product milieu" to represent the aggregate of objects, activities, services, and environments that fills the lifeworld.[7] Although it is the site of both material and immaterial products, this milieu is nonetheless always physically or psychically tangible and must be accounted for in the interpretation of action. Even an immaterial product such as a zoning code or a customer-service strategy in a bank has a distinct form that defines parameters of activity. I have designated activities, services, and environments as products in order to maintain the unity of the product milieu as a single field of activity and to make greater connections among its diverse components.

The product milieu is not a neutral layer that mediates between prior motivation and subsequent action. It is an interactive presence in the lifeworld. We are always in the midst of it and we experience it as something lively, flexible, and even aggressive. While it offers possibilities for action, it also inhibits action both through the more permanent components of the built environment and through immaterial things such as legal codes and service delivery systems.[8] Such products are not inflexible, however, and often invoke oppositional action to alter or remove them.[9]

Conceiving design broadly enough to include buildings and corporate identity programs, spoons and towns, computer software and health care delivery systems, adds a new and needed dimension to our reflection on it as a social practice.[10] Thinking of all these products as *designed* makes us more aware that they are conceived, discussed, and planned, before they are made. As the results of human decisions, they can always be questioned. Just as children come to the realization that the printed words on

a page are there by choice rather than necessity, so can we come to realize that we design and make the product milieu ourselves. By recognizing this, we can engage its components with more awareness, either by supporting them or attempting to alter or eliminate them. The debates over whether or not to preserve specific buildings as historic landmarks and over the laws that prevent or allow abortions are good examples. Preservation groups realize that they can oppose developers just as pro-choice advocates understand that they must fight to defend the legal encoding of this position against pro-life opponents.

What Is Design and Who Is a Designer?

A liberal definition of "design" calls into question the rules we now use to demarcate terrains of subject matter. It also creates opportunities for new relations between isolated practices. Lawyers study the law, architects learn about building, and graphic designers master typography and layout. While these activities tend to be constituted on distinct terrains of knowledge, they nonetheless intersect frequently in the lifeworld and might therefore be defined differently at the stage of professional preparation. The result would be a different quality of practice that could open up new possibilities of collaboration among professionals through a greater understanding of what others do.

Besides challenging the way professionals define their own spheres of knowledge, a broad definition of "design" also confronts the boundaries of professionalism itself. In order to explore the product milieu in all its fullness, we need to recognize the way that everyone, not only professionals, contributes to it. Therefore an understanding of what distinguishes professional from nonprofessional activity becomes crucial.[11]

Professionalism is based on knowledge and skills. In professions such as mechanical engineering or medicine it is difficult if not impossible to develop sufficient expertise without some type of institutional formation. In the case of medical training, for example, this formation provides training experiences that are impossible to come by otherwise. Based on the perceived importance of institutional experiences, licensing requirements are established that prevent nonlicensed practitioners from officially engaging in these activities.[12]

Even when knowledge and skills are readily accessible to non-professionals, as in graphic design, professionals may still reserve some criterion such as aesthetic judgment or taste to distinguish them from nonprofessionals. But even here, aesthetic judgment is becoming more accessible through computer software that incorporates it within its programs. It is increasingly easier to manage a desktop publishing enterprise and turn out publications that are at least marked by their competence if not by some modicum of invention.

To counter the challenge to professional boundaries that such access implies, more rigorous criteria for establishing professional identity are then established. Lev Manovich has described how the smoothness of an image has become a criterion of professionalism among computer animators, who themselves have access to the expensive equipment that makes such smoothness possible.[13]

Conditions of professional exclusion do not, however, prevent people from designing and building their own homes, drawing up their own legal documents, publishing their own books, healing themselves, or otherwise becoming proficient and self-sufficient in fields normally dominated by professionals.[14]

Nigel Cross notes a shift within design studies in the conceptualization of design ability. He compares earlier attempts to develop design as a normative science of planning to the current interest in discovering characteristics of design ability that are inherent in everyone.[15] He points out that the distinction between professional and amateur designers is more of an issue in industrialized countries than in craft-based societies, particularly traditional ones, where almost everyone makes things. In industrialized countries, Cross says, "Everyone makes decisions about arrangements and combinations of clothes, furniture, and so forth—although in industrial societies it is rare for this to extend beyond making selections from available goods that have already been designed by someone else."[16] Despite the fact that more people actually make products of their own than Cross's statement would suggest, even the selection of available goods usually requires the conception and planning of an outcome—the ensemble—which functions as a product. A style of dress will evoke particular responses from others just as an arrangement of furniture and decorative objects will.

To identify another example of combinatory design, let us con-sider the domestic space, which is the most prevalent site of design activity. People arrange their living spaces, plan meals, organize social rituals, build domestic objects, and so forth. While a certain amount of this activity follows existing plans, recipes, photographic models, kits, and guidebooks, there is usually some measure of invention in the organization of domestic life. Like play, the domestic space offers most individuals the greatest degree of freedom to make choices about product invention and adoption.

The body is another important site for invention, as Dick Hebdige notes in his important study, *Subcultures,* and in a later essay on punk hair styles.[17] But here we must distinguish between original designs and imitations, although the point in inventing a new style is often not to be unique but to be recognized as part of a group, albeit with one's own accent.

Today the ever-widening access to new technologies is giving people the chance to do more than simply combine existing products into ensembles or adorn their bodies. It is breaking down the distinction between industrialized and craft-based societies by enabling people to do for themselves what professionals once did for them. For example, millions of people in the United States, men included, own sewing machines and make everything from costumes and children's clothes to curtains and slipcovers for couches. This spreading interest in sewing has also spawned a booming industry in fabric stores.

At the same time, flexible manufacturing systems, which facilitate small-batch production, are increasing the opportunities for user participation in the choice of product components. We can see this in the most advanced sector of the automobile industry, for example.

To argue, however, that design ability and opportunities for practice are more widespread than the spheres of professional activity is not to ignore qualitative differences in expertise among those who design. We can easily rely on well-established social conventions to distinguish between degrees of skill mastery in the areas of problem formulation, product invention, tool manipulation, model execution, and adaptability for production. But we should also note that high levels of competency, measured by the same conventions, are evident in many products made by nonprofessionals.

Thus it is not innate capability, exclusive access to knowledge,

or the capacity to master skills that determines the social distinctions between professional and nonprofessional designers, but other qualities such as motivation, experience, access to design tools and production facilities, along with criteria determined by professional associations, cultural institutions, and the media. We must therefore disregard the model of the designer as a demiurge who creates products that are then adopted by a public with a lesser consciousness of what it needs than professional designers have.

Human beings engage with design in four ways, all of which are active rather than passive:

1. they design products *for* others;
2. they design products for themselves;
3. they use products designed *by* others; and
4. they use products they design for themselves.

We cannot disregard the inventiveness of professionals, but we must also pay attention to the innovative activities of nonprofessionals as designers of products for themselves and others. At the same time we need to recognize as design activity the role that large numbers of nonprofessionals play in public debates about design policy. These debates address such topics as whether or not to fund weapons systems, what devices automobile manufacturers need to install for maximum safety, and what forms of packaging produce the least landfill refuse. They focus as well on many other topics that range from issues of national and international import to local community concerns. Citizen activism in these debates is a part of the design process. It is an attempt to support or oppose the development of a product based on a variety of factors: social value, environmental impact, and cost of production, to name a few. In recent years, consumer movements have made a growing impact on what products companies make and how they make them. A precedent for citizen activism in product development was Ralph Nader's 1965 book *Unsafe at Any Speed,* which strongly critiqued the safety deficiencies in American automobiles and thus encouraged a protest movement that has led to the installation of new features such as seatbelts and air bags. Such activities are increasingly part of the conception and planning of new products as a result of the growth of consumer movements.

Besides considering the roles that nonprofessionals play in the design process itself, we must also acknowledge the creativity involved in using products, whether they are designed by oneself or others. The identification of the user as a collaborator with the designer has become especially relevant with the advent of smart products that are not in themselves complete but rather invite the creative participation of users to achieve results.

The Creation and Classification of Products

Having acknowledged the broad participation of many different people in the design of products, we need to portray the extent of the product milieu. I want to argue for the integration of three spheres of design within this milieu: civic and state projects, the market, and independent design. My intention in being so inclusive is to identify design as a unified presence in multiple spheres of activity that are usually regarded as separate from one another.

Civic and State Projects

We can begin at the macroscale by considering large civic projects such as dams, bridges, highways, parks, electricity generation and distribution facilities, public buildings, and the entire realm of weapons technology. We need also to include here the design of service delivery systems such as medical assistance, welfare, and recycling activities. For the most part these projects are administered by public officials who conceive them and plan their execution. Depending on the political sensitivity of the project, the public may have more or less access to the planning process. In the case of some civic projects, particularly those that have an environmental impact, there are open hearings and opportunities for citizens to register opinions. But other projects, such as weapons systems that are deemed to be more politically sensitive, exclude public participation, and people must get involved indirectly through public forums, usually with insufficient information to debate the issues in a thorough way.

Depending on the degree of centralized government control in an economy, the macroscale may encompass almost all of the built environment as well as a near monopoly of social service delivery systems. This has been the case in the formerly socialist countries which are now beginning to change as they move toward more

marketing," which is based on a high degree of intersubjective awareness.

While Kotler's typologies of seller orientations suggest the diversity of design qualities that relate to them, we also need to consider what Schutz's and Luckmann's theories of action mean for an understanding of design in a more fundamental sense. Most important is their recognition of the project as a plan that is "brought to fulfillment by *action*."[31] Without stretching the term "design" too far, we can argue that the project as plan is also a *design of action,* a broad concept that denotes the relation between projects and acts. Projection, the process of formulating projects, is designing activity, although in the usage proposed here it is not necessarily directed to the act of making a product.[32] Taking a walk may involve designing an itinerary and planning some activities along the way, but there will be no product at the end. The same might be said for a game of tennis.

The design of products, then, is a particular kind of action, whose results make up the product milieu. In some design processes, we can distinguish stages of projection—developing an initial concept, planning, modeling, making prototypes, and so forth. Variants of this process will also apply to the design of immaterial products such as organizational structures or service delivery systems. In such cases we can delineate the roles of different kinds of designers, such as social planners, product designers, engineers, and marketing experts.

In some instances, the stages of projection cannot be identified as separate entities, nor can the division between designing and making. An improvised splint for an injured person is one example. Found materials are brought together to create a splint. The final product—the splint—is designed, but in an ad hoc manner rather than a systematic way that involves distinct stages of conception.

Throwing a clay pot also exemplifies the fusion of designing and making. The self-conscious planning involves selecting the clay and deciding to turn it on the potter's wheel. But as the clay turns and the potter shapes it, only with difficulty, if at all, can we separate the conception of the shape from its embodiment in the clay. The distinctions between conception, planning, and making will vary from one project to another. The design of products therefore cannot be characterized by a singular process or methodology.

To the degree that actions depend on products, the design of action is thus shaped by what is available in the product milieu. When we refer to the design of products we are also referring indirectly to the possible acts that products enable. These actions may or may not be foreseen by the product designer. As an example of unforeseen action, we can think of the way Chinese students used fax machines to send information to the West during the demonstrations on Tienanmen Square in 1990. The fax machine in this instance became a people's telegraph, enabling the students to transmit information cheaply in order to gain support for their resistance.

The Influence of Products on Action

When Schutz discusses intersubjectivity, he does not give sufficient attention to the rhetorical aim of action. He emphasizes intersubjective understanding, suggesting that we address our actions to others as we come to know who they are. But a rhetorical interpretation suggests that actions are also attempts to persuade others to act differently than they might otherwise. As Richard Buchanan states, "By presenting an audience of potential users with a new product—whether as simple as a plow or a new form of hybrid seed corn, or as complex as an electric light bulb or a computer—designers have directly influenced the actions of individuals and communities, changed attitudes and values, and shaped society in surprisingly fundamental ways."[33]

The story of the Rollerblade is a good example of how a new product fulfills a rhetorical function. The Rollerblade is a skate whose wheels are arranged in a single line like the blade of an ice skate. It was developed in the Netherlands for racing on land and then adapted for summer hockey training in the United States. Initially the manufacturer sold in-line rollers that could be attached to ice hockey skates in the off season. The company then aimed the skate at the general fitness market. In 1987, it gave away hundreds of pairs of Rollerblades to beachside skate rental shops in Los Angeles, which led to the burgeoning of a Rollerblade subculture across the United States. The enthusiastic adop-

tion of these skates spawned a new line of ancillary equipment such as knee and elbow pads, and special helmets.

The Rollerblade success is not a typical story of product development. As Theodore Levitt has noted, "In spite of the extraordinary outpouring of totally and partially new products and new ways of doing things that we are witnessing today, by far the greatest flow of newness is not innovation at all. Rather it is *imitation*. A simple look around us will, I think, quickly show that imitation is not only more abundant than innovation, but actually a much more prevalent road to business growth and profit."[34] Levitt coined the term "innovative imitation," to designate a successful strategy of capitalizing on risks taken by other companies. He suggested that companies adopt a policy of "reverse R&D" to create their own versions of innovative products which are introduced into the market by others. Within Levitt's concept, companies might imitate newer products like the digital clipboard computer as well as more traditional ones like the coffeemaker. But they would normally have to offer some innovation to establish a market niche. This could be a slight improvement in function or form, or, as in the case of computer clones, a lower price.

Most products support traditional patterns of activity rather than create new ones. For every pair of Rollerblades, there are hundreds, if not thousands, of products, that conform to existing conventions of action. Seen in a broader sense than business competitiveness, product imitation supports these conventions through maintaining existing typologies of objects or services.

To better understand the interactivity between products and actions in the lifeworld we need a characterization that recognizes the full complex of objects, activities, systems, services, and environments that individuals engage with in three spheres of the product milieu. I call this complex the *product web*. At the center of each web is an individual or group that animates a set of relations with products. Some of the products in a web, such as a lipstick, are used by a single individual, while others, such as a public building, are shared by thousands of people. Some products, such as certain kinds of office equipment or networking software, are used only by groups.[35]

Market research tends to define users in relation to manufactured consumable products. The system known as VALS (Values

and Lifestyles), for example, identifies a spectrum of consumers that ranges from "belongers," who are considered conservative and conformist, to "experientials" who are regarded as innovators. While this research is useful for manufacturers who are concerned with identifying markets for specific products, it is misleading as a broad profile of user activity in the lifeworld.

Firstly, market research does not sufficiently account for the fullness of the product web. It defines use specifically in terms of primary market exchange rather than the broader milieu that includes civic projects as well as independent design. Even within the exchange framework, such research rarely accounts for the secondary and tertiary markets for used goods, for barter and underground economies, or for the things people make themselves with materials they buy. The definition of action within the market research framework is therefore limited by what is bought rather than by the totality of what is used.[36]

Whereas market studies such as the VALS system construct typologies of social actors which are located along a scale of product adoption that ranges from aggressive to passive, in actual fact the way in which product webs are constituted is much more complex. First, we must note the absence of a user profile that seeks correlations between the three spheres of the product milieu. Nor would such a profile be easy to ascertain. Given the extreme differences between the design processes in the three spheres, it is difficult to imagine how an engagement with them might be envisioned within a single personality type.

Barring the likelihood of a unified set of principles that might characterize different types of user action across the three spheres, we are left to reflect on the complexity of product use. While market surveys are often good at predicting consumer behavior within specific market niches, we are only dealing with one segment of a user profile in such cases and may well find through the kinds of interview techniques used by interpretive social scientists that people are inconsistent in their relations to different types of products. A community activist who is extremely involved in supporting a civic plan for a new health-care facility might be extremely passive in relation to new technology such as cellular phones, computers, or fax machines. Although this passivity can sometimes be attributed to the cost of such products, it may also be evidence of the different values that operate in the decision to

support a civic plan and one to adopt a new technological object. People have different tolerances and capacities for innovation and may trade off an activist practice in one sphere for a more passive engagement with products in another.

In a collective sense, product webs form patterns of culture that are both stable and innovative. The design of homes, for example, falls within a set of conventions that may vary only slightly for most people. According to these conventions, interior spaces are divided into kitchens, living rooms, bedrooms, etc. Experimental houses that differ from this division are rather rare within the total aggregate of dwellings. They become showcase homes, extensively publicized in architecture and design magazines, but not widely adopted by the public.

Conversely, we can cite among more innovative cultural patterns the continuous transformation of high-technology communication products—cellular telephones, computers, beepers, and fax machines—that are constantly being replaced by newer, more powerful ones.

Users interact with the product milieu, supporting those products such as the VCR and the personal computer that are valuable to them and ignoring those that are not. They engage in a process of indirect negotiation with producers by deciding whether or not a product is worth sustaining. When people either ignore a product or consciously refuse to use it, that product's influence wanes, and we even refer to a product's "death" when it is no longer deemed useful for human projects. Not only may small products like items of clothing disappear from the product milieu for lack of use, but large ones like buildings may be torn down or rehabbed for a new function.

The term "negotiation" denotes a relation between products and users that is flexible rather than fixed. When Karl Marx spoke about "commodity fetishism" in *Capital,* he presupposed a power that objects had over people.[37] We can call this a determinist relation. It is the base on which most Marxist and neo-Marxist critiques of consumer capitalism are founded. In such critiques, the market with its concomitant apparatuses of analysis and sales is at odds with the real needs of users who are persuaded to buy products they neither need nor value in a true sense. We can contrast this determinism with its opposite, user autonomy, exemplified by the user who is in full control of his or her projects and fashions a

product web independently of the stimuli and persuasive activities of others within the product milieu. Reductive representations of a consumer capitalism that dictates behavior through an aggressive manipulation of the market or a free market that postulates the consumer's autonomy are both inadequate to explain the product-action relation. I prefer to characterize this relation as one of negotiation rather than domination. This means that the locus of power is not inherently identified with either products or users. In given circumstances it may reside with one or the other but it may easily shift from one to the other or be divided between them. Therefore, we need interpretive strategies that do not prefigure an a priori power relation between the two. What makes more sense than either of these is the recognition that users relate to the product milieu interactively, trying to make a space for their projects and actions amidst an array of products and product proposals which they either support or resist in varying degrees.

Products are only successful if they can be incorporated into the product webs of enough users to develop sufficient networks of support. Involvement with a product may be as simple as purchasing it, which provides capital to the company that makes it. Greater engagement comes from utilizing whatever ancillary services are necessary to maintain it, or providing user feedback to the manufacturer. Besides the role of individual users in such networks, we should also acknowledge the involvement of advertising agencies, journalists, retailers, and others. It is the users, however, who provide the ultimate support through their informal constitution as a viable market.

New products do not simply appear in the lifeworld, but are heralded and accompanied by extensive promotional campaigns that both argue for their superiority to competitive products and suggest new uses. Ads that proclaim the value of having copying machines at home, for example, are attempts to change behavior and introduce an activity that was formerly reserved for the office into the domestic setting.[38]

In recent years the VCR, the personal computer, the fax machine, the video cassette recorder, the Walkman, and the copying machine, have all become important objects in the lives of many people. But the purchasers of these products do not necessarily follow the suggested uses of the manufacturers. Often they invent new actions and the objects become consonant with human

projects in ways that were not foreseen by their designers or manufacturers. A good example is the video of a group of Los Angeles policemen beating Rodney King, an unarmed black motorist who had been pulled from his car. The video was shot from a nearby balcony by a man who just happened to have his video cassette-recorder with him. The tape was shown on national television, instigated a countrywide debate on police brutality, and played a central role in the conviction of two of the officers.[39]

Conclusion

In this essay, I have attempted to present the product milieu as a unified field comprising spheres of activity that are not usually considered together. By joining the spheres of civic and state projects, the market, and independent design, I am proposing an experience of products that is continuous across the entire social space in which humans act. It includes objects designed with the most advanced technology as well as simple things that people make themselves.

The relation I establish between design, projects, and action may appear to some to be too liberal a use of the term "design." But I seek to recognize design as a fundamental constituent of all human action.[40] Hence, my interest in questioning the socially constructed distinctions between professional and nonprofessional designers and in delineating the social space for professionally designed products as only part of the larger space in which humans act.

My use of action theory as the basis for interpreting social behavior, along with my conception of product webs and product support networks, is intended to contest the often reductive postulations of a consumer culture in which people are manipulated by advertisers to buy things they don't need or should not have.[41] I have attempted to restore more power to the social actor, without asserting that the product milieu lacks influence on the way she or he lives.

Although the concreteness or presentness or products does constitute a discourse about action, it is only one among many. Discourses about how we might live take many social forms, from mythic projections to public debates. While actual products often stimulate or arouse action, humans envisioned themselves flying well before the invention of the airplane and imaginative writers like Jules Verne and H. G. Wells were postulating the exploration of space and the ocean floor long before the technology existed to carry out these activities. Likewise discussions and debates about human values often precede the development of products that enable these values to be turned into action. The current debates about the relation between nature and the expansive domain of the artificial, for example, are affecting the realm of design and production in a way that will only increase in years to come.

In conclusion, my description of the product milieu is intended to expand our awareness of how we participate as designers and users in the lifeworld. Design, once narrowly defined as a marginal activity concerned with the aesthetic appeal of a limited range of consumer goods, can now be seen to be at the core of all our conceptions and plans for our personal and collective social lives. To recognize this concept and develop our understanding of it, we need such an all-encompassing terrain as the product milieu, where we can explore the multiple dimensions of design activity and the way it operates as a powerful instrument of social construction.

Notes

1. Saint Augustine, *On Christian Doctrine* (Indianapolis: Bobbs-Merrill, 1958), p. 9.

2. For an account of action theory in sociology see Jonathan H. Turner, "The Concept of 'Action' in Social Analysis," in *Social Action,* ed. Gottfried Seebass and Raimo Tuomela, Theory and Decision Library, vol. 5 (Doordrecht: Reidel, 1985) pp. 61–87. See also George Herbert Mead, *The Philosophy of the Act* (Chicago: University of Chicago Press, 1938); Max Weber, *Economy and Society,* trans. Günther Roth (New York: Bedminster Press, 1968); Talcott Parsons, *The Social System* (New York: Free Press, 1951); Alfred Schutz, *The Phenomenology of the Social World,* Northwestern University Studies in Phenomenology and Existential Philosophy (Evanston, IL: Northwestern University Press, 1967); Alfred Schutz and Thomas Luckmann, *The Structures of the Life-World,* 2 vols., Northwestern University Studies in Phenomenology and Existential Philosophy (Evanston, IL; Northwestern University Press, 1973); and Alaine Touraine, *Return of the Actor: Social Theory in Postindustrial Society,* trans. Myrna Godzich (Minneapolis: University of Minnesota Press, 1988).

3. See Abraham Moles and Elisabeth Rohmer, *Théorie des Actes: Vers une*

other demands is not to be altogether discounted: It deals with a choice, an option among many possibilities. Responding to all demands then is not required but, in all its consequences, is an ethical choice. However, to move in this direction in a significant manner, to contribute to giving more ample voice to the weak signs that society is transmitting, requires a cultural transformation more fundamental than that which has occurred so far. The spontaneous adjustments that have taken place up to now do not suffice; the question of rethinking the relation between the human race and the environment must be asked in a radical manner, beginning with the deepest aspects that characterize it.

The Culture of "Doing"

A profound redefinition of the relation between human beings and their environment can take as a point of departure an up-to-date consideration of the meaning of the term *to do:* today it means to design and to produce. Why and for whom are things designed and produced? This question, though seemingly simple, leads directly to more radical questions, practically, the ultimate meaning of life. It is not my intention to confront that question except on a philosophical plane.

For the moment, then, we will disregard the commonsense view, which says that human beings design and produce because it is in their nature to do so. We will also disregard a view that derives from this affirmation: everything made by human beings, all design and productive work from one generation to another, the transformations generated, and the progressive artificiality of the environment that derives from these activities are all natural consequences of this particular trait of the species *homo sapiens.* With this ahistorical background, moment by moment, situation by situation, designing and producing has meant various things; it appears as a complex of historically and socially determined activities. Thus human beings, among other peculiarities, have a tendency to construct a system of internal meanings in which to place their own existence and thus also their own doing. For American Indians, but also for the great number of cultures that humanity has generated with infinite variations throughout the course of history, "to do" means to produce and reproduce their cultural—and thus artificial—world, seeking to be in tune with

the natural environment. They situate themselves in a framework that, on a temporal scale of individual experience, seems locked into immobile cycles.

On the other hand, for the past two or three centuries, Europeans have tended to think of "acting to change things," "acting to dominate nature," "acting to seek a different type of welfare," and "acting for a better tomorrow." All these conceptions have been developed over a short period of time (a few centuries) and only by a relatively limited number of people in Europe. That these ideas have become the basis for an upsetting and devastating practice which, in spite of a thousand contradictions, has been imposed upon the whole planet, in no way changes the contingent nature of their historical character. Beginning with this confrontation between different cultures of doing does not reopen the debate about which is the preferable cultural model; it only makes modern Western thought upon "doing" relative; the culture of design, production, and consumption that the West has generated is a historical phenomenon. As such, its destiny is open: it can continue, die, or change.

As it has been formulated, the modern Western culture of doing cannot continue for a practical reason: Its goal of dominating nature must confront the grave obstacle that nature can be manipulated locally but cannot be dominated globally. Western doing cannot continue for an ethical reason, as well: the tradition and basically elementary elaboration of the goal to "act for a better tomorrow" no longer yields satisfactory answers. The ethical force of modern industry is really an idea about the democracy of consumption. The equation "a better tomorrow equals the diffusion of products" links together the notion of progress and quantitative parameters that are imagined to be infinitely expandable. This victorious idea moved and acted as a catalyst for a whole society. However, this idea has lost its force today.

Today we must look with a critical eye upon the way things are really going. We must evaluate both the pros and cons of product diffusion; we must perceive the social inequalities that can be verified and must state the environmental costs that we are paying. Concerning these points, we can express differing judgments. We can draw up negative balance sheets or underline the advantages that are commonly acquired.

But in both cases, the traditional justification of doing cannot

be proposed in the same terms as before. The idea that increasing production automatically disseminates well-being is no longer valid. Linking progress to parameters of quantitative growth could seem acceptable in a world that still seemed simple (assuming elementary needs that could be met by standard products). But now the themes of quantity are being undermined by those of quality. This is not because there are no further problems concerning quantity which are urgent, whether in the sense of increasing it in some contexts or diminishing it in others. Rather we realize that if there is progress, it can be judged only by qualitative measures. The qualitative dimension cannot be measured by simple frames of reference: In fact, quality means complexity.

On the other hand, neither can the Western culture of doing die. The transformations on the planetary level are such that, for good or ill, they now constitute an irreplaceable element in the functioning of the technological macrosystem on which rests the existence of the whole human race. If, as we must hope, the planet finds its equilibrium, it will have to be an ecotechnological equilibrium. As far as cultural transformations, hybridism, and cross-breeding can take place, something from the starting point of modern technology, of the Western idea of doing, must be inscribed in the DNA of the technological system that will support eight billion people in the near future. To find the means of escaping this impasse, trying to look more deeply into the characteristics of Western doing will be useful. One way to do so is to begin with the concept of "finalized consciousness," as proposed by Gregory Bateson.

Purposive Consciousness

"On the one hand," writes Bateson, "we have the systemic nature of the individual human being, the systemic nature of the culture in which he lives, and the systemic nature of the biological, ecological system around him; and, on the other hand, the curious twist in the systemic nature of the individual man whereby consciousness is, almost of necessity, blinded to the systemic nature of the man himself. Purposive consciousness pulls out from the total mind sequences that do not have the loop structure which is characteristic of the whole systematic structure."[8]

The problem we are facing then is rooted in the human specificity of acting in a purposive way. It is just this purposive action that meanwhile leads to obtaining results and to avoiding what would be wise behavior in systemic terms: "It [consciousness] is organized in terms of purpose. It is a shortcut device to enable you to get quickly at what you want; not to act with maximum wisdom in order to live, but to follow the shortest logical or causal path to get what you next want, which may be dinner, it may be a Beethoven sonata, or it may be sex. Above all, it may be money or power."[9]

At a time when human beings are questioning themselves about their goals, these thoughts and preoccupations of Bateson could be a radically antagonistic point of departure in respect to everything that has been said and thought up to now. What Bateson brings into the discussion is really not just the functionalist paradigm of modern design (precisely defined as optimally constructing design and manufacture as a function of its achievement), but also the more general matrix, the purposive consciousness, a factor characterizing the totality of humanity. "But you may say, 'Yes, but we have lived this way for a million years . . . why worry about that? But what worries me is the addition of modern technology to the old system. Today the purposes of consciousness are implemented by more and more effective machinery. . . . Conscious purpose is now empowered to upset the balance of the body, of society, and of the biological world about us."[10]

The discussion of how purposive consciousness—the way it is expressed and is specific to humans—can now relate to the available technological apparatus does not exempt us from an in-depth consideration of the functionalist form that Western culture has assumed in the modern period. This is the form of consciousness that is dominant today, if only because it has been shaped by the technological system that we must use to investigate it. If it is true that the development of technology is coeval with that of purposive consciousness, the extraordinary growth of its power, the acceleration of its rhythms of innovation, is also coeval with the entrance by purposive consciousness into the path of thought, functionalist procedure, and present-day technology that is, for good and ill, the offspring of this thought and this practice.