Art and Technology

AESTHETICS REDEFINED

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Prologue

The industrial revolution resulted when the concept of labor expanded from the earlier notion that individual craftsmen were responsible for the creation of entire objects. The division of labor introduced the idea of a more efficient specialization. The products of the craft age reflected the single-minded but limited capabilities and energies of the individual. In contrast, the products of the industrial evolution were conceived, developed, and assembled as a result of the collective efforts of many experts, each focusing on a specific aspect of the product. The products of the industrial age often reflect the homogeneity and compromise of an otherwise unlimited group of capabilities and energies.

If the efficiencies of an industrialized society have resulted in a wealth of material goods, it can be argued that in the midst of so much quantity, there is too little quality. By quality I do not mean the individual components of quality such as reliability, performance, value, or visual appeal. Rather, I am referring to the simultaneous presence of all of these values and something more. The exact nature of the missing ingredients is difficult to define. This absence is perceptible, however, in the fact that most

of these objects are not sufficiently satisfying to either our souls or our senses.

Too many of the things we produce, use, and discard force us to make social and ecological compromises for the sake of too narrowly defined and short-term convenience. Such compromises, besides inflicting obvious damage to society and our environment, are corrupting to our psyche. At the same time, the superficiality of the sensory experiences associated with actual use of these objects eliminates the possibility for emotional connection between them and the human beings they are meant to serve. The likelihood further increases that they will be quickly and thoughtlessly discarded. This may be a very catholic perspective, but I feel that as consumers we are all too often forced to become sinners with very little physical gratification in return.

Why is it that a system which has as its great strength the ability to assemble highly trained and specialized experts for the purpose of creating specific products rarely is able to produce objects which elicit the same spiritual and emotional connection with their users as the objects produced by our craftsmen ancestors? To put it another way, why can we produce so many mountains of manufactured waste while being unable to reproduce the equivalent of a single Stradivarius?

The answer to this question is critical if we hope to move from being an industrial society with its ever expanding production of mass-market, disposable commodities, to the much talked-about postindustrial society, where long-lived, tailored products meet individual needs while being sensitive to humanistic and environmental concerns.

The Expanding Role of Design in a Postindustrial Society

The subdivision of tasks and their assignment to individual experts is both the great strength and the Achilles' heel of our industrial society. Because of the notion of a division of labor, we have structured a society which tends to classify its individual members from an early age.

Based on the talents and interests exhibited by an adolescent, he or she is encouraged to select one of three major areas of specialization: science and technology, business and finance, or

the arts and humanities. For the sake of expediency we treat these disciplines as if they existed in isolation from each other. We encourage people to select one of these areas after providing them with only a broad-brush exposure to the others. Once a selection has been made, we further restrict their breadth of vision by requiring further specialization in ever more focused subsets of their selected field. For example, a person with an interest in science may focus his or her education on medicine, but may ultimately become an expert only in the workings of the cardiovascular system. While the cardiovascular system is an essential component of human anatomy, it cannot survive on its own.

The depth of knowledge resident in a group of narrowly focused medical specialists can provide for better health care, but only if three conditions are present. First, there must exist a broadly trained general practitioner, in addition to the narrowly focused specialist, to make sure that the whole human being is diagnosed and attended. Second, areas of expertise and specialization must mesh seamlessly, to ensure that no gaps exist. Third, generalists and specialists must be equally sensitive to both the physiological and the psychological needs of the patient.

These are matters about which we can all agree, but what does this have to do with product development and product design in a postindustrial age? If we consider the product development process in analogous terms, we see that ideal conditions seldom exist. Why?

First, marketing has claimed the role of generalist in the product development process, while acting as essentially only a slightly more broadly focused specialist whose primary focus is on short-term financial performance. In my opinion, it is for this reason that marketing as a discipline has not done a very good job of anticipating, in a comprehensive manner, the developing needs of individual consumers and society as a whole. Rather, it has most often become a force for the status quo. The analysis of past trends is often projected into the future, and decisions are guided by the need for short-term profits and the need to minimize risk.

Second, experts often do not mesh seamlessly in the product development team. Technical specialists are trained to value the quantifiable in areas such as price and performance and dismiss

the ephemeral in areas such as psychological and social concern. Marketing specialists, if they are able to identify ephemeral issues at all, have difficulty communicating them in meaningful ways to other technical specialists.

Third, design, in addition to abdicating its role as generalist to marketing, has not developed enough depth in its role as specialist in the meaning of aesthetics.

What is required if design is to play a fundamental role in the development of products and environments which fully meet the needs of human users? First, designers will have to reclaim and deepen their role as visionary generalists and coordinators in the product development process. Second, the original meaning of aesthetics must be rediscovered. We need to understand that aesthetics is not simply a visual exercise, but rather the appropriate and harmonious balancing of all user needs and wants within technical and social constraints. The designer must successfully integrate all of the requirements that balance the rational, sensory, and emotional expectations of the individual user and of society as a whole. To accomplish this in a complex social and technical environment, the designer must be able to complement and leverage the depth of knowledge resident in other specialties. Finally, designers must develop a much deeper knowledge of kinesthetics, demonstrating a concern for all of the ways human beings perceive and interact with physical objects. We must go beyond a concern for visual form and the static, mechanical treatment of ergonomics to consider the interaction among all of the senses in a dynamic state.

Historical Perspective

The industrial age was successful in exploiting efficiencies of specialization to an unprecedented degree. However, the resulting specialization largely favored efficiencies of mass production and mass distribution at the expense of humanistic values.

During the first century of the industrial revolution, the most basic needs of large numbers of people were met through development of new materials and technologies and the implementation of highly productive manufacturing systems. The prime forces which shaped the products of this period were the narrow

focus of the technically trained specialist and the constraints imposed by superficially understood technologies. Technical specialists played the dominant role in this process.

The more enlightened manufacturers of this era sensed that the products and environments produced through this process, although technically functional, often did not meet the requirements of their consumers and, as a result, could be undermined by more desirable alternatives. Consequently, other specialists from the arts, sales, and finance were recruited to participate in the product development process.

The first nontechnical specialist to be brought into this process was the artist/architect. In 1907 the Allgemaine Elektrizitats-Gesellschaft (AEG) Company hired Peter Bahrens to improve and coordinate the visual appearance of the company's products and facilities. Bahrens, who was trained as an architect, could not rely on the accumulated knowledge of architectural technologies and architectural design theory to master the full spectrum of requirements associated with mass-produced electrical products. He and many of the industrial designers who followed him focused their talents on the development of a "machine aesthetic." This new industrial aesthetic, it was assumed, would reconcile the presumed technical functionality of a machine-produced object with the human desire for visual beauty. The availability of affordable mass-produced objects to a populace desperate for them insured that the appreciative consumer would overlook the many other shortcomings of these objects.

As more manufacturers developed competitive technologies, they decided to utilize designers not for the purpose of fundamental product improvement, but rather to gain competitive advantages through superficial manipulations of the product's outer enclosures. This practice was encouraged by the appearance of a new specialist in the product development process: marketing.

During the first half of this century, the product development process was entrusted to technical specialists working in conjunction with humanist designers. The appearance of the marketing specialist during the second half of this century meant that designers could further abdicate their role of generalist in the product development process. It was assumed that the historical

division of labor could be reconciled with the disparate needs of the consumer so long as each specialist, or better yet each team of specialists, concentrated on one of the three distinct aspects of the collective consumer psyche.

The marketing specialist would focus on divining the emotional expectations of the consumer. The technical specialists would focus on the rational requirements of the product's physical performance. And the designer would focus on "aesthetics," commonly understood as the sensory need for visual appeal and differentiation.

There are several reasons why this is a highly efficient way of producing mediocre products. First, only the technical specialist, among the three specialists, has been able to develop the great depth required to solve complex technological problems. Second, marketing has not been able to develop the expertise needed to understand even more complex emotional expectations of human beings. Third, design, which has developed a superficial knowledge of ergonomics to complement its knowledge of the machine aesthetic, has not developed a deeper understanding of what might be called a humanistic aesthetic, which encompasses the intellect, the soul, and all of the senses.

Aesthetics Redefined

If we consider the consumer psyche as an extension of the individual psyche, as defined in psychoanalytic theory, we could insert certain terms as follows: the "superego" defines emotional requirements, the "ego" defines rational requirements, and the "id" defines sensory requirements.

We quickly realize that these are not distinct and independent components of an individual, but highly interactive and interdependent forces which constitute the whole person. They must be simultaneously balanced and satisfied. The failure to find a proper balance among the three means that all are compromised to some degree.

In other words, if the real focus of design is not the object, but the human user of that object, then the entire psyche of the individual must be satisfied. If we, as designers, focus most of our energy on only one aspect of the psyche, the id, for example, then we are doomed to fail. Furthermore, if we focus on only one aspect

of the id, the aspect perceived by the sense of sight, we will also fail miserably.

This is not a new concept. In 1852 Gottfried Semper wrote,

> Style is the elevation to artistic significance of the content of the basic idea and all the external and internal coefficients, which, by their incorporation into a work of art, are able to modify it actively. Lack of style, by this definition, [is] the term for what is lacking in a work, which accrues from a disregard for the basic idea and from clumsiness in the esthetics utilization of the available means for its accomplishment. The basic form, as the simplest expression of the idea, is modified particularly by the materials that are used for the improvement of the form, as well as by the instruments employed. Finally, there exist many influences outside the work itself which are important factors contributing to its design—for example, location, climate, time, custom, particular characteristics, rank, the position of the person for whom the work is intended and so on.[1]

Aesthetics in regard to any object, therefore, is not an absolute and separate value. Rather, it is totally related to our ability to see a congruence among our intellectual expectations of an object's functional characteristics, our emotional need to feel that ethical and social values are met, and finally, our physical need for sensory stimulation.

If the traditional roles of the technical, marketing, and design specialists define a triangle, then the superimposition of the complexities of the id, ego, and superego suggests that the triangle stretches much further than we had assumed. In fact, we would find that the triangle is not flat at all. As the three points are expanded by our more complete understanding of their fundamental nature, we find that the triangle becomes a curving plane. At a certain point the seemingly divergent requirements of technical rationalism, emotional content, and sensory perception converge and complete a sphere. It is that sphere which defines the true nature of aesthetics and the role of the designer in the product development process. With this definition, the designer must feel equally responsible for all aspects of the total product.

This does not mean that the designer becomes totally proficient in all, or even any, of the many technical specialties required to solve physical problems. It also does not mean that the designer

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