

Prometheus of the Everyday: The Ecology of the Artificial and the Designer's Responsibility

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Prometheus of the Everyday: The Ecology of the Artificial and the Designer's Responsibility

This paper was first presented at the "Prométhée éclairé" conference organized at the University of Montreal in May 1991.

- 1) The problems of the relationship between technology and ethics are already the object of a lengthy debate, beginning with Heidegger's reflections and continuing in the recent controversies on bioethics. The articles and bibliographies in *Prométhée éclairé* (a special number of *Informel* vol. 3, no. 2, Summer 1990) offers a vast and interesting survey of this argument.
- 2) The articulation of the relationship between technology and ethics at the design level of industrial products and, particularly, of consumer goods, is touched on by some design theoreticians. I would particularly mention two authors, Victor Papanek and Tomas Maldonado. See Tomas Maldonado, *La speranza progettuale* (Turin: Einaudi, 1970); Maldonado, *Il futuro della modernità* (Milan: Feltrinelli, 1987); Maldonado, *Cultura, democrazia, ambiente* (Milan: Feltrinelli, 1990); and Victor Papanek, *Design for Human Scale* (New York: Van Nostrand Reinhold, 1983). Other texts on this theme include Mary Douglas and Baron Isherwood, *The World of Goods* (New York: Basic Books, 1979); Donald A. Norman, *The Psychology of Everyday Things* (New York: Basic Books, 1988); Gilbert Simondon, *Du monde d'existence des objets techniques* (Paris: Editions Mouton, 1958). See also my book, *Artefatti: Verso una nuova ecologia dell'ambiente artificiale* (Milan: Edizioni Domus Academy, 1990).

One Promethean ability of human beings, to act in a purposeful manner upon the environment, is articulated on various planes: from the most advanced research topics (artificial intelligence, genetic engineering, new materials) to grand programs to intervene in environmental structures (alimentary systems, energy systems, telematic systems, transport systems) to the diffuse production of material and immaterial artifacts from which we build the daily environment.

These first two planes have been the subject of profound critical analysis of for quite some time,¹ but the level of reflection upon the third plane is much poorer: What are the anthropological implications of the widespread penetration of technological science on the products of our daily lives? When this question is asked,² too few useful hints exist to predict a system of values—and therefore an ethics—that can be adapted to whatever is proposed for purposeful action on this level. In other words, the debate on ethics, that is defined in reference to large choices, is hard to articulate in relation to the smaller and more minute choices made in the manufacture of daily objects. We continue to lack, then, an ethics of design adequate to the new problematic framework and to new sensibilities.

I'm certainly in no position to offer exhaustive responses to these arguments. In the following remarks, I limit myself therefore to proposing a general scenario concerning the problems that have arisen and to articulating it, as far as possible, in reference to the designer's activity. My thesis is that the environmental problematic can generate a new sensuous horizon for design and can be the source of a vast series of cultural transformations and contemporary societal practices. More specifically, starting from inevitable discussions about industrial society's values, which the emergence of the environmental problematic imposes, it will not only be possible to arrive at a system of consumer production more favorable to the environment but also to propose new values and deeper conceptions of quality.

Making the world habitable

Considered as an operator acting in relation to the daily environment, the designer's ultimate responsibility can only be

to contribute to the production of a habitable world, a world in which human beings not merely survive but also express and expand their cultural and spiritual possibilities. The term *habitable*, referring to the environment, indicates a complex existential condition that cannot be reduced to its functional component. It is a condition arising from the intersection of a multiplicity of questions rooted in the anthropological and social nature of the human race. Some questions can be grouped according to different temporal situations: They can present great stability across time; they can vary gradually over long periods of history; or they can evolve rapidly in connection with abrupt social, cultural, and environmental changes.

It is just this complexity of the term *to inhabit* in its intermingling of permanence and change that causes design culture* to have difficulties in defining its goals; if the final objective is clear, the means of realizing it in a given historical situation are not. This is particularly true in the present phase, in which the rapidity of change in the environment has exploded the previous cultural stratifications associated with the meaning of the term *to inhabit*. Does *inhabiting* mean living in an environment in which, in the past few decades, the impact of technological innovation has acted so extensively and intensively as to force a crisis with all the cultural instruments that we've consulted traditionally and in many of the operative instruments with which we intervene? To avoid vagueness in these questions it is useful to briefly summarize some of the characteristic aspects of the contemporary environment and how it presents itself to social and subjective experience.

The postindustrial metropolis

The world that we intend to make habitable is the postindustrial metropolis: the "global village" extended across the planet, whose characteristics are conspicuously marked by the diffuse and profound impact of new technologies. To say that this is the world in which we must intervene does not mean accepting it as it is. It means understanding how it appears, how it is made up, and the problems that threaten it; regardless of what we want to achieve, this is the "material" with which we must work.

A first observation can examine its very physicality, the metamorphoses of the matter from which it is made, the times and the modes of its transformations³. In the contemporary world, matter — which is always considered the solid, stable, inert counterpart of ideas — seems to have become pliable and capable of being moulded any possible form. The integration of science and technique, penetrating the daily environment with its own results, has eliminated many of the traditional technical barriers, thus enormously enlarging the field of possibilities; forms and functions that were inconceivable as recently as yesterday are possible today.

On the other hand, commercial competition has pushed for-

* The Italian "cultura del Progetto," literally "culture of the project," refers to all those involved in the act of planning or projecting—not only designers but everyone engaged in bringing an idea to fruition. The term is unique to Italy and denotes a more cooperative activity than one in which the designer acts as a lone individual [Ed. note].

3) This phenomenon of change is treated by numerous scholars who concentrate on different aspects. Among the first authors who described it was Alvin Toffler. See Toffler, *Future Shock* (London: Pan Books, 1970) and *The Third Wave* (London: Pan Books, 1981). Another author of particular interest is Paul Virilio. See his *Vitesse et politique* (Paris: Editions Galilée, 1977) and *L'espace critique* (Paris: Christian Bourgois Editeur, 1984); *La machine de vision* (Paris: Edition Galilée, 1988); see also Ezio Manzini, *La materia dell'invenzione* (Milan: Arcadia, 1986); Manzini, op. cit., 1990.

4) The theme of “superficialization” and “dematerialization” in the experience of objects has been treated from different points of view. See Virilio, *Vitesse et politique*, 1977; 1984; 1988; Jean Baudrillard, *L'autre par lui-même* (Paris: Galilee, 1987); Fredric Jameson, *Postmodernism or the Cultural Logic of Late Capitalism* (New Left Review, 1984); “Machines Virtuelles,” *Traverses* 44-45, 1988; *Les chemins du virtuel* (special number of *Cahiers du CCI*, 1989). More general philosophical aspects of this theme were central to the exhibition “Les Immateriaux,” which was held at the Centre Georges Pompidou in Paris in 1985. See also: F. Carmagnola, *La visibilità* (Milan: Guerini, 1989).

5) For example, in regard to the problem of the reduction of waste products, one must introduce some considerations of recyclability into the very first design phases and follow not only the strategies of “design for assembly,” but also those of “design for dis-assembling.”

6) Ugo Volli recently proposed the concept of “semiotic ecology,” a semiotic space that is relatively enclosed, in which messages, texts, and codes cooperate and compete at the same time. “We’re condemned to live in the midst of our own messages, texts, codes, our semiotic waste, and we aren’t free to reestablish them, to give them the meaning that they have lost without paying a price for this in further increasing entropy.” Ugo Volli, *Contro la moda* (Milan: Feltrinelli, 1988), 149.

7) In other words, the multiplication and continuous transformation of forms, colors, and textures of objects can lead to the impossibility of “reading” any real difference and any real meaning in them. So it can follow that all these colorations and extravagances form a complex image that is confused, gray, and flat. This difficulty in decoding the language of things is a fundamental aspect of what we may define as “semiotic pollution.” This is precisely what is happening today: The multiplication and change in products are going forward at a rate that far exceeds the subjective capacity to develop codes that permit “reading” their possible significance. The problem is not simply in the object itself (and the meaning that the designer tried to give it) but in the knowledge that the object relates to other objects, with the semiotic environment in its totality.

ward the most rapid employment of these possibilities, leading to the multiplication of images and services offered and to the accelerated introduction of the “new.” At the same time, the lack of a design culture capable of confronting these new technological possibilities has resulted in the dissemination of worthless products. So the potential of the old technology is distributed in the banal forms of gadgets, disposable products, and ephemeral objects lacking any cultural significance. A feeling of generalized transience, an impoverishment of sensory experience, of superficiality and the loss of relationships with objects derives from this; we tend to perceive a disposable world: a world of objects without depth that leaves no trace in our memories,⁴ but does leave a growing mountain of refuse.

As we’ve already seen, in the very moment in which technological innovation affects the loss of many limits to our possibilities, society has begun to realize that other limits we had not previously recognized exist. The “discovery” of environmental limitations and their implications is certainly another aspect that characterizes the current historical phase and requires a profound reconsideration of the meaning that we have thus far given to the verbs *design* and *produce*.

The discovery of limits

The physical limits of the environment attests that conceiving of a single design activity is no longer possible without relating it to the wider network of relationships that the product will have with the environment in its complete life cycle (production, use, disposal). Recognizing these relationships, in turn, allows for an extraordinary growth in the complexity of the system with which the designer and producer must interact.

But the discovery of environmental limits does not refer merely to the physical limits of the biosphere. We are in the process of discovering another type of limit: the limit of our capacity to deal with the increasing mass of information. In short, we find that our “semiotic environment” (that is, our semiosphere) is limited. Immersing ourselves in an uncontrolled number of signs is impossible because doing so results in a new kind of pollution: “semiotic pollution,” caused by the confusion, loss, and distortion of meaning and by the generalized production of semiotic refuse.⁶ So we find that the result of the “liberalization of forms and of services” permitted by technology can also be the production of a big “noise,” which is precisely the opposite of what that increase in information meant to add.⁷

Recognizing environmental limits then necessitates connecting products to their environment not only in terms of their physical relationships with the biosphere, which has already been stated, but also in terms of their relationships to the semiosphere. It means that it is necessary not just to produce new images but to construct

stable and lasting identities that can be placed in a recognizable manner in the cultural space in which we are immersed. The problem is that going in this direction requires the development of a new product culture, a culture that radically questions how the existing culture fits into our environment and how it relates to the fruitful subject.

Given the present-day system of production that is strongly geared to the ever accelerating production of worthless goods, the ideas expressed above could seem beyond the range of possibility. But perhaps not: Something is moving, whether in the direction of a demand or an offer. (A demand for a new quality, of which *green consumerism* is just one aspect — though the most obvious and significant — is beginning to be felt.) Some businesses are beginning to understand that the environmental question is now an ineluctable fact of the system in which they operate, and that this realization is a necessary step if they are to continue to exist and be successful in a physical environment saturated with products and a semiotic environment saturated with signs.

This countertendency within the system of production and consumption is, in my opinion, the determining aspect of the definition of a terrain on which the designer can act, seeking coherence between ethical and cultural options and design practices: Without this broader sociocultural phenomenon, the designer could only think of suitable things, not realize them. On the other hand, operating in relation to this counter tendency and not to 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 relationship 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 relationship 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 common sense 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 an 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 “dominate nature” goal 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 ver-

ified 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 only be judged 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 eco-technological 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

8) Gregory Bateson, *Steps to an Ecology of Mind* (New York: Ballantine Books, 1972).

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

9) Bateson, *Steps to an Ecology of Mind*, 433–34.

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

10) Bateson, *Steps to an Ecology of Mind*, 434.

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.

If, as Bateson writes, “cybernetic nature of self and the world tends to be imperceptible to consciousness, insofar as the contents of the ‘screen’ of consciousness are determined by considerations of purpose,”¹¹ the pragmatic content of modern design may be seen as a further distancing of the systemic character of human beings and of their environment, as a further contracting of the screen of consciousness. This very radical simplification of models for comprehending existence is what first science and then technology have reached in their results. The extraordinary “invention” of modern thought consists of simplifying reality to simple and even easily attained goals. The technological performance of modern thought is completely internal at the stage in which the purposive consciousness learns to work with simplified models.

11) Bateson, *Steps to an Ecology of Mind*, 444.

But this way of thinking and operating, which has shown its efficacy over a long period of time, is now beginning to look simplistic and myopic. The continuous fracture of circular and

cybernetic structures and their substitution by linear sequences cannot continue forever. The links that have been neglected are reappearing as problems. The grand project of the simplification of reality is showing its limitations. The systemic complexity that was thrown out the window is entering now through the front door. To confront it, to find a type of behavior that can bring up to date our Western idea of “doing,” we must first develop new models with which to comprehend reality. We need models that will let us understand reality without losing what we have discovered about its irreducible complexity.

The working hypothesis that I propose is to apply to the artificial environment the interpretive models that ecology has developed for the natural environment. In my opinion, the best ground on which to develop this concept is once again found in Gregory Bateson’s thought.

The ecology of the artificial

“The social scene,” writes Bateson, “is nowadays characterized by the existence of a large number of self-maximizing entities which in law have something like the status of persons’ trusts, companies, political parties, unions, commercial and financial agencies, nations, and the like.”¹²

For Bateson, then, the artificial environment may be read with an ecological model, viewing it as the place of competition among the self-maximizing entities and as the sedimentation of the artifacts produced as the outcome of the activities of these entities. We can understand by the expression “ecology of the artificial” the dynamic equilibrium that is determined among these entities from moment to moment. Coherent with this definition is the view that the search for new environmental qualities can be regarded as the search for a new equilibrium, for a “new ecology of the artificial environment.”

To speak of “the ecology of the artificial” then refers to a mode of reading contemporary artificiality as a stream of material and immaterial artifacts, which we call “the system of artifacts,” that relates and competes with each other within a limited environment.¹³

The possibility of applying the ecological metaphor to these entities and to the relationships among them is established by the fact that, as we’ve said, they appear as “self-maximizing entities,” which means that they are endowed, like living creatures, with an impulse toward expanded reproductions of themselves (or better, of the informational programs that characterize them). Obviously, we need to be aware of the differences as well as the similarities between the elements in this comparison, differences that can be attributed to the nonpurposive character of natural evolution as opposed to the purposive character of cultural change and the organization of artificial societies.

With that premise, we must define the adoption of this model and of this terminology in a way that fits reality better than other

12) Bateson, *Steps to an Ecology of Mind*, 446. Other authors have considered the theme of the artificial using ecological models. See P. Degli Espinosa, “Può la società umana produrre l’equivalente di una barriera di Weissmann?” in *Oikos* no. 1, 1990, 193 and following; Manzini, *La materia dell’invenzione*, 1990, 76 and following. Close to this attitude are product analyses in terms of “populations.” One may speak of their demography and sociology. See Abraham Moles, “Objet et communication” in *Communications* no. 13, 1968, 10 and following; Maldonado, *La speranza progettuale*, 1970, 68 and following.

13) Some clear definitions of the formulation just introduced are in order. Whenever we consider reality in systemic form, the problem arises of the definition of limits, of the frontiers of the system itself and of those that constitute its “evolutionary unity.” (This is certainly true of the elementary entities whose survival is being considered.) In our case, the frontiers of the system considered are set by the environment, which has been transformed by the technocultural activities of human beings; among these are physical artifacts (objects) but also immaterial artifacts such as services, language, and ideas. Let us consider “artifacts” in terms of “evolutionary unity.” In speaking of artifacts and their competition for sur

vival, we see that this really means referring in a synthetic form to their sociocultural entities and to their competition for survival. The artifacts that we can consider from time to time are really a kind of “materialization” of cultural contexts, organizing forms, technological systems, economic systems and of the will of designers, groups of designers, contractors, and the manufacturing sector.

14) “Any species that does not potentially produce more young than the number of the population of the parental generation is out. . . . But, if every species has potential gain, it is then quite a trick to achieve equilibrium. All sorts of interactive balances and dependencies come into play. The Malthusian curve is exponential. It is not inappropriate to call this the population *explosion*. On the other hand, in a balanced ecological system whose underpinnings are of this nature, it is very clear that any monkeying with the system is likely to disrupt the equilibrium. Then the exponential curves will start to appear. Some plants will become weeds, some creatures will be exterminated; and the system as a balanced system is likely to fall to pieces. In society, the same is true. I think you have to assume that all important physiological or social change is in some degree a slipping of the system at some point along an exponential curve. The slippage may not go far or it may go to disaster.” Bateson, *Steps to an Ecology of Mind*, 430-31.

15) As we’ve seen, this means not only dynamics in the immaterial semiosphere of printed or broadcast communications but also in that part of the semiosphere in which communication is supported by physical artifacts, the relation of collaboration or competition that is established between objects in so far as they are themselves media for communication.

models already proposed. The first, and perhaps most important contribution, is the consideration of how to make the artificial environment into a complex phenomenon, in which the roles of subjects are recognized and carry weight without allowing an idea of subjectivity to dominate the entire system. This combination of planning, subjective purposiveness, and systemic relationships (determined, to be sure, by more than subjective laws) is the way to look at the production of the artificial environment, which is emerging from the paralyzing grasp of the idea that the artificial human product is a unitary project. This unitary project gives rise to a delirium for power by the designer-demiurge, who designs and produces a total environment, from a spoon to a whole city. It also supports the view of the artificial that creates itself autonomously, according to laws that have nothing to do with our conscious choice (the weak designer, who goes by the rules of the system in which he or she happens to operate, regardless of what they are, or vice versa, and withdraws into marginal areas of minority criticism and rules). Each artifact, each image, each idea contains something of the rationality, values, and sensibility of the designer, but each is part of a broader and more complex dynamic system — a system in which equilibria and disequilibria, and thus their final quality, depend on conflicts and power relationships generated between subsystems and constituent parts, which are vying to guarantee their own existence within set limits.

The second cultural contribution that this ecological model makes concerns the idea of the equilibria and disequilibria of the system, beginning with the impulse of the elements composing it toward an enlarged version of itself.¹⁴ This adversarial vision of equilibrium and the interpretation of the displacement of the preceding equilibrium might be compared to the slippage of a variable in an exponential curve made possible by the slack handling of one of the “control variables.” It permits, in my opinion, an interesting reading of many phenomena that characterize the production of the artificial environment.

Finally, an awareness of limits is the third important aspect that characterizes an ecological reading of the artificial. We must now pass from a culture that considers itself to be a part of a dynamics of unlimited development to a culture capable of thinking for itself and of possible changes caused by limitations. We’ve already considered some physical limitations (of resources, energy, space) even though we do not yet have in place cultural instruments and operational practices adequate for this new awareness. The concept of limitations, however, emerges in other areas of production and material and immaterial consumption: We’ve already stated that one of the aspects characterizing our current phase is just this very appearance of limits in our semiotic environment.¹⁵ Given the complex nature of artifacts as physical entities, functional operatives, and communication media, the ecological reading of the system in

which they are united cannot neglect an analysis of the way to integrate these diverse aspects in the environmental problematic.

An ecological reading of the artificial environment

The ecological reading of the artificial environment is the arena for a close competition between products (which really means producers) in the presence of limitations: limitations endogenous to systems of production and consumption (limitations of physical saturation with respect to quantity, time limitations with respect to their usefulness, economic limitations with respect to their acquisition, cognitive limitations with respect to their intelligibility) and exogenous limitations that arise from the interaction between a system of artifacts and the natural substrate on which it is based.

This type of reading is still in the early stages of development. Nonetheless, we can already observe how, in the presence of the limitations endogenous to the system of artifacts and under pressure of environmental changes due to technological innovations, the strategies for the survival of present “artificial species” make up a series of synthesized changes along certain fundamental lines. We will consider, for instance, three important evolutionary tendencies that are currently at work: (1) the increasing speed of the processes of production and consumption that result in built-in obsolescence and the throw-away nature of many products; (2) the increased sophistication of services that lead to the appearance of “mutable products,” which entail diverse and complex services; and (3) the multiplication of linguistic codes in the definition of form that leads to a formal specification of products in relation to precise and limited user groups. The totality of these evolutionary tendencies may be seen as the result of the competition among artifacts in an environment — the industrialized world — in which is manifested, on the one hand, the saturation of more immediate needs, such as the appearance of a physical limitation, and, on the other, the increase in wealth and thus in the availability of objects to purchase.

In evolving along this path, however, the system of artifacts collides with limitations that we have defined as exogenous. On one hand, there are the traditional ecological limitations based on scarcity of resources and the increasing quantity of environmental wastes (physical pollution). These limitations lead to, or could lead to, a curb especially on the first evolutionary tendency defined above: The acceleration of the processes of production and consumption runs up against limitations set by the lack of resources and the need to eliminate waste products. On the other hand, there are biological and cultural limitations of the subject whose biological nature is poorly adapted to the progressive dematerialization of the objects that it confronts (sensorial pollution) and whose cognitive processes and cultural structures cannot manage the accelerated flood of messages that it is called upon to decipher (semiotic pollution).

The appearance of these limitations induces curbs upon the second and third evolutionary tendencies and will do so to a greater

extent in the future; the object can increase its functions but not beyond the point of intelligibility; the object can change form but not beyond limits set by the semiotic codes that make it recognizable.

The ecology of the artificial environment and subjectivity

Within the conceptual framework just proposed, we may ask why the current artificial environment is so uncontrollable along evolutionary lines. "In biological fact," answers Bateson, "these entities are precisely *not* persons and are not even aggregates of whole persons. They are aggregates of *parts* of persons. When Mr. Smith enters the board room of his company, he is expected to limit his thinking narrowly to the specific purposes of the company or to those of that part of the company which he represents."¹⁶ In other words, the logic of self-maximizing entities is not human because the subjects in which it operates are dehumanized; "Ideally, Mr. Smith is expected to act as a pure, uncorrected consciousness — a dehumanized creature. Merciully it is not entirely possible, and some company decisions are influenced by considerations which spring from wider and wiser parts of the mind."¹⁷ In this possibility of amplifying the role of "wider and wiser parts of the mind" is found the hope for modifying the behavior of self-maximizing entities, of pursuing new qualities, of definitively producing a "new ecology of the artificial environment."

But what possibility is there that this will happen? The possibilities, in my opinion, are exclusively connected with systemic changes that "the discovery of limitations" necessarily makes the order of the day. Encountering the limitations of the external environment, on the one hand, and those of the "internal environment," on the other, Western thought, as we have said, is forced to discover complexity, to discover something that was always there, to be sure, but that the finalizing consciousness, caught by the hybris of its technological success, did not want to see, the circularity of systems. This is the point in time in which we are now. It is a matter of seeing the paths that lie ahead of us. But first we will make two observations that are perhaps obvious but necessary.

The first is that the purposive character of human consciousness is a specific fact (in the literal sense, a fact about our species) and thus is essentially and basically impossible to eliminate. The thinking ego can also imagine the systemic character of the world. It cannot think and act without self-referentiality, without breaking the connections with the environment and thinking of itself as a separate entity, without in some way finalizing its own ideas and intentions.

The second observation is that history is irreversible, and this is also true for the history of technology. For this reason, even if we do not precisely know how the technological system may evolve, we cannot ignore the historical point at which it has arrived. The technological system of the future can be something other than what it already is. In other words, nostalgia for the past can give

16) Bateson, *Steps to an Ecology of Mind*, 446.

17) Bateson, *Steps to an Ecology of Mind*, 446.

18) This position is the most widespread within contemporary technico-economic propaganda and corresponds to the position technocratic structures tend to espouse when it is no longer possible to ignore the reality and gravity of environmental problems.

19) The "discovery of complexity" has constituted one of the central themes of the philosophical and scientific debate of the past few years. Since it is impossible to cite all the literature on this theme, I'll mention in particular a book that has been a starting point for discussion in Italy: Germano Bocchi and Marco Cerruti, eds., *La sfida della complessità* (Milan: Feltrinelli, 1985). The following are also particularly interesting: Marco Cerruti and E. Laszlo, eds., *Physis: abitare la terra* (Milan: Feltrinelli, 1988); and Cerruti, *Il vincolo e la possibilità* (Milan: Feltrinelli, 1986).

20) The theme of ethical responsibility has been dealt with by several authors. See, for instance, Salvatore Veca, *Una filosofia pubblica* (Milan: Feltrinelli, 1986); Veca, "La nozione di progresso in etica" in Cerruti and Laszlo, *Physis*, 1988; Ruffolo, Giorgio, *Potenza e potere: La fluttuazione gigante dell'Occidente* (Bari: Laterza, 1988).

21) The theme of responsibility for future generations has become fundamental because the potential of our present technological system is such that today's choices may determine tomorrow's global environmental system in the sense that their results can have irreversible consequences for the planet.

rise to different futures but it cannot bring back all the conditions of the past. These two observations, while leaving an infinite range of possibilities, limit the spectrum of theoretical options. At the extremes of possibility are the continuous-technocratic solution,¹⁸ on the one hand, and the development of a culture of limits and complexity, on the other.¹⁹ The first solution consists of not making any important changes. It assumes that new environmental problems can be resolved within the given functionalistic cultural framework by introducing new purposes and goals within the cultural and technological framework that proceeds without any decisive solutions. This, in my opinion, is a pseudo-solution because the same considerations are involved and the same experiences produce as many new problems as they solve and thus increase the web of problems that sooner or later come to light.

The second solution is also basically a pseudo-solution insofar as human consciousness cannot escape teleology and the rupture of systemic bonds between the individual mind and the environment. Nonetheless, searching to understand the complexity and to act within one's limits can be seen as an asymptotic tendency toward a goal that can never be attained but always seems close at hand. Adopting this cultural position requires a profound change in the basis on which design culture is founded and, more generally, in the ethical references of "doing."

An ethics of "doing"

The concept of "doing" in the West — given the vast simplifications of which we have spoken regarding a schematic framework — is sustained by two fundamental convictions: that objectives can be clear and can be generalized (progress as historical destiny and the unambiguity of humanity), and that technology can be the material instrument to obtain it. All efforts in this system of certitudes converge toward an unambiguous logical scheme (the realized industrial society) with results that are optimal (being products of objective rationality) and definitive (as advances along the road of progress).

Such was the designer's ethical conduct due to trying to operate coherently within this system of convictions. Today the totality of social and cultural transformations that we have synthesized in the expression "discovery of complexity" has caused a crisis for this system and is giving rise to new frames of reference that are, in many respects, symmetrical to previous values. The central point, in a sense the axis of the new construction, is a new concept of ethics. This ethics does not predicate universal and unquestionable values but refers to a system of values exhibiting the consciousness of relativity, in the context of a general attitude built on the principles of responsibility and solidarity.²⁰ Responsibility and solidarity are directed toward not only present generations but with future ones:²¹ the responsibility of leaving them an inhab-

itable world endowed with a range of alternative possibilities analogous to what we have today.

Certainly this implies pursuing the variety and multiplicity of alternatives and logical considerations from which the artificial environment is constructed.²² It requires, given the difficulty of being sure of the validity of one's own objectives (and particularly their future validity), the search for choices that present a strong element of reversibility.²³ It furthermore requires more than the search for the optimal, error-free result, the search for "error friendly"²⁴ solutions that are able to coexist with the human tendency to make mistakes. Finally, it requires bringing the meaning of the opposition "innovation-conservation" back into the discussion: "We must tie the new idea of revolution to the idea of conservation, which we must also purify and diversify. We must conserve nature, conserve cultures that we want to survive the human patrimony of the past because it holds the seeds of the future. At the same time, we must revolutionize this method in order to conserve it. We must conserve the idea of revolution by revolutionizing the idea of conservation."²⁵

The problem at hand is in presenting these general signs in such a way that they can constitute a guide for action, not only for big strategic choices but also for small daily choices, choices by which people (particularly designers) habitually act. In terms of degrees of diffuse intervention in the environment, the general features of the new ethical context in which human "doing" may be arranged, the continuum can be synthesized in the following way: One passes from a "culture of doing as production" to one of "doing as re-production." It concerns moving toward a production culture in which human activity has as its primary objective the re-generation of conditions that permit, and will continue that permit, the continuation of existence, a culture that assumes as its principle ethical foundation leaving an inhabitable planet, rich in possibilities, to all the generations after ours. This will be translated into quotidian practice in the way in which the processes of production and consumption occur on a wide scale.

Doing as re-producing

The culture of "doing as producing" is developed through the use of linear processes: Production and consumption are linked together in a long chain with natural resources on the one end and waste products at the opposite. Thus, it is a product culture that is founded on a simple system in which relatively few variables operate, the variables influencing the economy of production and those connected to product function in relation to the end user. The culture of "doing as reproduction," on the other hand, presupposes a system that is intrinsically more complex because the line of material transformations tends to close in upon itself, forming a circle: What we start off with always gives us what we end up with and should,

22) Bocchi, Cerruti, and Morin describe a "design ecology" in this way: "It is not necessary that a global project be dependent on a central concern; in many cases, the net of various local projects, whose heterogeneity of nature and of scale is not eliminated, but, on the contrary, employed to full advantage, becomes the fundamental reason for the proper functioning of a global system which means taking the phenomenological complexity of human existence seriously." Bocchi, Cerruti, Edgar Morin, *Turabare il futuro* (Milan: Moretti & Vitali, 1990), 81. The theme of the articulation of the logical principles on which the artificial environment is built is discussed in many essays by Andrea Branzi. See especially Branzi, *Pomeriggi alla media industria* (Milan: Idea Books, 1988).

23) At a time in which the relativity of values and the subjectivity of points of view are coming to the fore, a positive criterion for the orientation of design choices that will impinge on the future (see note 21) is one that will allow successive generations to change their ideas and to select other solutions.

24) In this light, the design criterion is not so much one that claims to set right possibilities arising from error but one that, admitting the impossibility of setting them right, proposes "resilient" solutions that can adapt themselves to inevitable errors. On this topic see Ernst and Carl von Weizsacker, "Come vivere con gli errori? Il valore evolutivo degli errori" in Cerruti and Laszlo, *Physis*, 1988.

25) Bocchi, Cerruti, Morin, *Turabare il futuro*, 267.

in turn, foretell what will be done (in as far as it becomes a “resource” for a successive cycle). This requires the recognition of a greater number of variables (the feedback arising from various phases of the product’s life cycle) and demands greater attention, care, and participation on the part of all concerned, not just the designers and producers but the consumers, as well. It also demands a new esthetics that attributes worth to materials and products that in some way are able to embody vestiges of their earlier existences.

26) A total picture of the sociocultural innovation of the 1980s and 1990s is found in Francesco Morace, *Controtendenze* (Milan: Edizioni Domus Academy, 1990).

Our present culture is certainly a long way from all this. There are some positive indications²⁶ but we lack a broader vision in which these weak signals can be collected and strengthened, a vision that tries to conceive of basic motivations and possible outlets for a new culture and for the new social practices that it necessitates. What is lacking, moreover, is this very capacity to visualize the socio-environmental schemes that the culture of reproduction could generate. Thinking of the way in which today we speak of the environmental thematic, one perceives that present-day language is still linked to expressions such as “environmental emergency” and “resource crises.” These expressions are descriptive of the stupefaction of discovering unforeseen barriers and the uneasiness created by the prospect of renouncing some hypothetical future Land of Cockaigne where the culture of doing as producing had been foretold. Today we know that this Land of Cockaigne is an illusion — no technological discovery, not even the most optimistic hypotheses of new “limitless” availability, will ever produce a world without limitations.

But the idea of a limited world does not necessarily mean a world of privations. Privation does not refer to absolute values, to not reaching a qualitative “objective” standard. Rather, it refers to the lack of something in relation to a conventional model that is historically and culturally defined. A society that lives within its limits, then, needs a culture that proposes models of quality that are compatible with given limitations, a culture in which the theme of quantity is integrated with that of quality, and the criterion of beauty includes respect for the environment. It is in such a frame that the practices of re-producing and re-generating can be assumed as the highest and most mature expression of human endeavor. Making this “visible,” producing new scenarios for quality, can be a specific task for designers. In my opinion, it is really their most specific task.

Visions of possible worlds

The designer’s ecological attitude, the attempt to translate personal values into design activities, can take place on diverse levels: from the selection of material that is nonpoisonous and recyclable, to the proposal of new products endowed with the best environmental qualities, to the proposal of new schemes for quality. If it is true that there is a lot to do at each of these levels, it seems to me, however, that especially in relation to the proposal of new schemes the designer’s task may be as fundamental as it is somewhat impractical.

At this level of activity, the designer is not so much a professional capable of solving given problems but is a cultural figure in the process of creatively linking the possible with the hoped-for in visible form. To take a specific example, the designer provides scenarios that visualize some aspects of how the world could be and, at the same time, presents it with such characteristics that can be supported by complex ecological equilibria, which are acceptable socially and attractive culturally.

This is the great challenge that design culture must be able to meet: If science and technology march under the banner of “everything is possible,” design culture must know how to point out a path for these potential possibilities, a path that can be completely opposed to that which technological-scientific development has followed up to now, a path whose scenarios prefigure results.

The question is complex and “slippery;” the danger is in falling into the demiurgic delirium (so typical of modern thought) of redesigning the world. Thus, to better explain my proposal and to synthesize some passages that I’ve espoused above, I’ll make the following points, beginning with the presuppositions on which they’re based:

1. The strategic solution to the environmental problematic is the intervention “from above” in the production and consumption system and in redesigning the system based on new values.

2. The more “from above” this intervention is, the more it calls into question sociocultural aspects, the more it associates them with ideas and anticipated structures of the social imagination.

3. The “ecological reorientation” of the social imagination and the successive reorganization of the processes of production and consumption can occur either through the force of fear or by the attraction of new possibilities. In the latter case, which is obviously the more desirable, change is produced by attraction that can act upon new proposals of quality and is thus based on the image of new lifestyles that are socially and culturally appreciable.

4. A weakness of ecological culture and of contemporary design culture is the difficulty in developing images (or fragments of images) that can set forth the “poles of attraction,” cited in the preceding point. Certainly, possible motive forces for a transformation aimed at systems of production and consumption can be established, based on new criteria of quality.

5. The social imaginary, such as it is, cannot be the object of design; it emerges from dynamic complexes of sociocultural innovation in which a plurality of actors play a part. In this framework, however, designers have an important role in as far as they are — or can be — culturally equipped to gather, interpret, and propose, in a clearer and more stimulating form “into the circle” ideas that are produced in society and to re-admit them.

6. The processes in the formation of the social imaginary are intrinsically involved with the historical phases in which they occur. The current age may be characterized as that in which industry

has reached its maturity, modern thought has lived through its crisis, and a new culture has come into being, a culture capable of considering the complexity of the system and of facing limitations. No possible hypothesis of a new “environmental scheme” can ignore this framework and the ways in which ideas and visions of the world are generated and propagated internally.

7. New environmental schemes cannot be proposed in terms of unitary representations, as likenesses of closed worlds. Instead, one must find guiding ideas that constitute exemplars of quality and that are potential generators of an extensive totality of solutions that are diverse but coherently organized in certain respects.

It is desirable that design culture advance a plurality of possibilities, diverse “socio-environmental schemes.” For my part, I want to finish by presenting one that seems particularly suggestive to me: To think of objects not as instruments for our use, but as entities that are effectively linked and that need care — to think of objects as plants in our garden.

A garden of objects

Today we live in a world of objects designed for rapid consumption, objects requiring a minimum of effort and attention to use them, but also objects that leave no lasting impression on our memories — a throw-away world that requires no effort but, at the same time, produces no real quality.

Now imagine a garden with flowers and fruit trees. Think of the attention, time, and energy required and think of the results: flowers and fruit. For those who have grown them, value cannot be measured in banally economic terms. Of course, a garden should produce flowers and fruit, but the person tending it does so for a more general reason — love of the plants. Now try to imagine an analogous relationship between objects. Think of objects that are beautiful and useful as trees in your own garden, objects that endure and have lives of their own, objects that perform services and require care.

If the more general role of design is to produce images of an inhabitable world, one way is to propose criteria of quality that have as reference points the garden and the care that it requires. I am thinking of criteria for quality that lead to a system of objects that have the variety, complexity, life, and blend of beauty and utility of a garden but, at the same time, are a product of the real world, a world extensively and intensively artificial.

It isn't simple; following this indication implies overturning the way design traditionally is more highly regarded than production. It implies an inversion of the relationship between subjects and objects. It implies a purposive consciousness that profoundly redefines the sense of its goals. It implies a new ecological sensibility — caring for objects can be a way of caring for that larger object that is our planet.

Translated from the Italian by John Cullars.