Design Predicts the Future When It Anticipates Experience

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Design is an activity that, in a complex, computerized society such as the one that we are entering now, calls for appropriate technical skills, creativity, and an attentive eye for aesthetic values, but also a marked ability to ponder the relationship between humanism and the world.
This is the new human frontier: designing complexity.

Design means the competent, aware, and creative conception of the goods and services that constitute what we call the "material culture":

- *Competent* because (and this is more than obvious) today, more than in the past, the limitations and opportunities for design are numerous, interconnected, and multidisciplinary: the materials, the process and product technologies, the markets, and the final recipients of the goods that are designed are changing rapidly and profoundly, calling for sweeping, in-depth knowledge that is constantly updated;
- *Aware* because the specific and overall advantages to be gained from an appropriate design, and the direct and indirect harm that can be caused by a design that does not pay attention to its context, are or can be / become potentially incalculable: an awareness of the impact of design on the environment encourages (good) designers to go one step further than their immediate responsibility—which often is limited to complying with set standards—to introduce the notion of "competent conjecture," in other words, a sense of responsibility towards the future;
- *Creative* because diversity is a value in itself, both in the sense that, when it introduces advantageous qualities, its principles are easily adopted by many; and in the sense that the resistance of diversity enables diverse cultures to be recognized and to coexist freely in the world; in other words, it respects the principles of the freedom of choice and of competition.

Design is, therefore, on the one hand, the main factor whereby technologies are humanized and, on the other, the main factor of diversity between cultures; also and above all in a "globalized" world. It is, thus, a form of research *complementary* to but *not dependent* upon technological research: *complementary,* because no technology on its

own is capable of determining complete innovations for the individual and/or for society, even though the interpretation of technologies tends, with their "maturity," towards banalization; *not dependent*, both because the same technology can be interpreted in different forms and configurations, and because design increasingly often stimulates new technological research and solutions.

Design also is an activity on the borderline between the production of objective utility (or function) and the production of subjective utility (or *ophelimity*) which, together, constitute the "value of goods" and determine the "quality of wealth" produced. In effect, design induces: objective utilities, such as functionalism, ergonomics, adaptation to the yardstick system, and even solutions that adapt this latter to new goods and technologies; subjective utilities, when it imbues goods with meaning and symbolic and psychological values, in other words, giving a sense to the vector of cultural development in the form of semantics, of syntactics, and of pragmatics; [1] and even that particular subjective and synthetic interpretation of resolved complexity that is aesthetics.[2]

In terms of supply and demand, design thus can be defined as that conceptual activity that does not so much search for what the individual and/or social user wants—or seems to want—as that activity that knows how to find what the user might want.[3] Hence, among other things, the need to reconsider the meaning and redimension the value of trends.

In particular, trends should not be confused with fashions; since there is no dynamic *per se* in a fashion, while there is in a trend—by definition. There could be such a thing as a fashion of trends, however. When a fashion is born, it seems to take the form of an anti-trend *par excellence*, breaking an evolutionary continuity, taking a stand as a mutation, and, finally, dominating "its" time until it is replaced by another fashion. A trend is (or ought to be) in itself, by definition, the decodification of a flow from one time to another, of the succession (as we used to say) of different conditions.

Fashion is, in a certain sense, closed within its own time (synchronic); a trend obviously is open to different, contiguous and successive times (diachronic). And this remains true whether fashions (and trends) change slowly or quickly.

In addition to its meaning and cultural value, the diversity induced by design also affects the economic decisions made by enterprise, local administrations, governments, and the various supernational structures—especially if they also were set up for the purpose of economic development—in the various areas of the world: enterprise (and the entrepreneurial system in general) adopts diversity (often developed on the basis of common technologies and diffused in analogous markets) as a factor of imperfect competition—i.e., not depending essentially on the price—hence its tendency to consider, albeit improperly, design as an added value; local administrations adopt diversity (or could do so) as a factor in

1 In 1938, Charles Morris introduced the tripartite division of semiology into *semantics* (which concerns the relationship between signs and their denotations), *syntactics* (which also concerns the relationship between signs, regardless of their meanings), and *pragmatics* (which deals with the relationships between signs and their users). The significance of this classification is patently evident in the development of material culture.

2 The reference is to an interpretation of aesthetics as an expressed, convincing perception of complexity, before its rationalization that deprives it of emotion. (See A. Morello, *Stileindustria*, December 1995.)

3 See A. Morello, *Stileindustria* (May 1995).

4 In the well-known European Union Green Paper on innovation, this is rigorously limited to technologies; the term design is only mentioned once in the entire text.

achieving local affirmation and/or as a cause of consensus among those whom they administer (the design of public/community goods), if not as one leading to the birth or development of enterprise and job creation; governments and supernational structures adopt diversity increasingly frequently for the same ends (although more extensive in scope) as local administrations, developing training, information, research, and promotion plans, and the European Union is a clear example.[4]

As a distinct form of research, design and its development require pre- and/or meta-design places and chances; for the purposes of technological and sociological information; for studying, criticizing, and comparing, i.e., developing, design methods; for studying configurations and expressive languages; for studying the behavior of organizations at the moment of innovation and of its diffusion; for developing and spreading the necessary professional skills and capacities among the creatives involved (designers and other contiguous professions); and, lastly, for verifying and interpreting the results. But the situation now, as we face new complexities, is one of dangerous cultural shortfalls; these were accentuated in the second half of the seventies with the appearance of:

(a) Theses that seemed to question whether it was even at all possible to design in the face of increasing complexity, of the unpredictability that ensues and of the plurality of possible choices; [5]

(b) Increasingly frequent formalist (and often provincial) tendencies, diffused and encouraged by end distribution interested in innovation for innovation's sake, that induced undeniable average decay in design quality, dominated by a form of marketing that, only now, and, paradoxically, before anyone else, feels the need to review—such as in the practice of customer satisfaction—the logic of the relationships between enterprise and users, especially end-users.[6]

There now is, notoriously, a plethora of new themes: from sustainable development to saving physical resources; from recycling to dismantling and environmental protection; from the problem of local versus global to designing (private and community) services, taking the socioeconomic and cultural impact of teleinformatic technologies into account, from disability (or rather inclusive design)[7] to the multiple requirements of the multiethnic society [8] that now is developing: a society that also will prove to set a hard test indeed for the conventional techniques used to divide users into segments.

All this will lead to a form of design tailored more towards identifying new product configurations than to merely attributing new forms or new aesthetics to them. Rather, it will give them new, appropriate meanings through semiologies of products conceived to suggest new languages of expression to designers and enterprise alike.

5 Weak thought, post-modernism and irrationalist impulses certainly are not the most favorable combination of elements for an innovation that knows how to distinguish between complexity and complication.

6 The new movement in American marketing, which was to have important effects later on, can be said to have been inaugurated by a notable book: A.F. Firat, N. Dholakia, and R.P. Bagozzi eds., *Philosophical and Radical Thought in Marketing,* (Lexington, MA: Lexington Books, 1987). Significantly, Philip Kotler also agreed to contribute to this book which departed from his previous stance. See also A. Morello, "Discovering Design Means [Re-]Discovering Project and User" contribution to the conference "Discovering Design: Explorations in Design Studies," held at the University of Illinois, Chicago, in November 1990; (Ill.),and later published in V. Margolin, and R. Buchanan, eds., *Discovering Design* (Chicago: University of Chicago Press, 1990); and lectures at the Virginia Polytechnic Institute and State University, Blacksburg, Virginia, November 1990.

7 The notion of "disability" is extremely restrictive and, quite often, is perceived as discriminating against disabled people; it often is replaced now by "inclusiveness," in the sense that products should be equipped with features that can be enjoyed by everyone. This corresponds to a definition of "humanity" that is couched in such a way as to include everybody, regardless of disabilities. The European Institute for Design and Disability, based in Dublin, is represented in Italy by the Italian Institute for Design and Disability, a thematic delegation of the Italian Association for Industrial Design, Milan.

8 The Helsinki office of the International Council of Societies of Industrial Design (ICSID), with 154 member organizations in fifty-one countries, has established a "Mediterranean portfolio" with which it intends to study the developments in design and material culture in exchanges with emerging countries and in the multiethnic societies that are inevitably forming.

Designing is destined, increasingly, to mean taking note of limitations and standards (whether imposed from outside or self-imposed) even before tackling the challenge in hand, rather than merely verifying overall suitability after the event.[9]

As we know, this practice has a significant fallout effect on the time to market, in other words, on the time lapse between the decision being made to tackle a new product and the moment when it is launched on the market. Automobile manufacturers, for example, have cut it from fifty-four to twenty months in a handful of years, introducing and contributing to the diffusion of the method of concurrent engineering that provides for parallel rather than sequential collaboration between the various main actors in the design process. This calls for a much broader scope of knowledge on the part of all those who contribute to the design process while, at the same time, generating new organizational solutions both within and outside enterprises.

Faced with this (and other) perspectives of change (many of which are already taking place), everyone—designers, enterprise, and even consumers—acknowledge that there is an evident loss of experience,[10] in the sense that the past no longer seems to have much to teach the future, and that, on the contrary, it appears to be an increasingly frequent cause of errors—sometimes serious errors—which only are detected with the wisdom of hindsight, when it is too late to do anything to correct them. There is, therefore, a need to make a move as soon as possible, to start thinking and encouraging others to think about the diverse conditions around us, about how to act to accelerate the accumulation of new experience—which, at least in part, corresponds to the description of possible new scenarios—and about how to monitor the signs of change and the responses given step by step by the system and by its active and passive protagonists (if there are any of them left).

It is worth remembering that the best explanations for the loss of experience, at least for the moment, seem to be found in the thesis of the existence of "long cycles": those cycles that, identified using a variety of techniques and interpretations, tend to connect all the phenomena of growth and development (which are not actually the same thing) through a curve of experience that is exhausted in something over fifty years.[11]

Thus, the last cycle would have taken place between the outbreak of the Second World War (the second part of the first) and 1994; hence a predictable new cycle lasting until 2048. The first quarter of the future cycle therefore should be complete before 2010, by which time the cycle will have identified its order, while the halfway stage (the moment of maximum growth) should be situated before 2025. This would leave us with a decade of great maneuvers, whose result would be favorable only to those who are ready when the time comes, having acquired the necessary experience (and the

9 The technical standards that are frequently expressed by such supernational bodies as the European Union oblige the design process to take them into account not only as limitations, but also as opportunities. In the future, it will be impossible to verify that they have been complied with after the creative design process: creativity itself will have to be aware of them in advance, not the least because this approach reduces the time to market.

10 A. Morello, *Introduction to the Milan Dialogues*, ADI-Cosmit, 1994.

11 The idea of long cycles can be attributed to Nikolai Kondratieff (1917), whose "major economic cycles" were edited by Giorgio Gattei for publication in Italy with the title of *I cicli economici maggiori,* (Bologna, 1981). This idea was developed (1972–78) by Cesare Marchetti of the International Institute for Applied Systems Analysis (IIASA, Luxenborg, Vienna), who expounded on it at a congress of the Italian Marketing Studies Association (1978), hence the IIASA paper, "Society as a Learning System" (1982). The fundamental inventions and innovations to have been introduced over the last three-hundred years appear to have come in waves, with a substantially isomorphic, precise configuration and frequency, and with a contraction of the timescale by a factor of approximately two every centuries. Moreover, the introduction of new primary sources of energy, their appearance on the market, and their prices seem to be linked rigidly to these cycles, adding a further dimension to the forecast in the field of energy systems. The concept of a society that learns, with all its implications on the ecological equation of Volterra, constitutes a potent tool for organizing social behavior, and hints at the possibility of a unified theory of genetic evolution, of ecology, of sociology, and of economics. In the cycle that now has come to an end, material culture, both in theory and in practice, has experienced an epiphany that it is not possible to describe in detail here. Nevertheless, some of the names that marked the cycle are worth recalling, starting with Sigfried Giedion (*Space, Time, and Architecture* at the beginning of the cycle in 1941) and those of the first

necessary excellence). For the others, the only alternative might be to abandon the market.

If we accept the premise that industrialization has made us aware of the importance of invention, the thesis of cycles maintains that the inventions (and the decisive resources) that appeared in the previous cycle are translated into innovations (and into new typical resources) with effect from the initial phases of the next cycle—and with a sequence dominated by the principle of *first-in/first-out.* Nor is this of secondary importance, such as to render it superfluous to mention it here, since the greatest invention of the last cycle was information technology in general (and we have only seen its first stumbling innovations so far), with a series of evident consequences. The first of these unquestionably can be recognized as the adoption of it as a system-related innovation, rather than one prevalently related to specific products: the latter are more correlated to the former than vice-versa.

We shall no longer see any particular goods starring on the scene in the traditional sense (in the last cycle, these were certain materials, such as plastics, and the automobile, for example), but the starring good may be information itself, especially in its systemic applications. This certainly does not mean that individual products will not feel its influence, sometimes quite profoundly: computerization, in the broad sense, will be responsible for thorough upheavals in the structure and performance of goods—we need go no further than to quote today's widespread appearance of control functions (and especially of self-control) in goods—but such functions are destined to be increasingly not only possible, but necessary for the network system to be fully economical, as we have already seen in the application of satellite links for means of individual and collective transport.

Moreover, such users are beginning to perceive product job enrichments as values of which the products, themselves, are only vectors, thus continuing the march towards *tertiarization* that is making software into the starring good, reducing products to servants of services (and also giving the illusion of an improbable dematerialization). And it should be noted that, if there is any one thing that denotes "*ophelimity*" [12] with respect to objective utility, it is the exquisitely subjective nature of services: some even are afraid of this; nor should we forget one of Camus's rare verses: *Ici vit un homme libre, personne ne le ser* ("Here lives a free man, nobody serves him").

This Heraclitean/neo-Darwinian evolutionary process is well known now.

The graduation thesis of a French engineer, Gilbert Simondon,[13] already contains two valuable concepts that are worth quoting here. The first is that the passage of time and repeated design processes make technical objects undergo successive modifications that develop them from a more abstract to a more concrete state, in

Footnote 11 continued
phase until 1955 (Murdoch, Leroi-Gourhan, and K. Polanyi), while the mastery of Fernand Braudel (1902–86), which made its appearance between two successive cycles, reached maturity exactly half way through the last one (1967), with the subsequent contribution of the Polish school. For the second phase, it is worth mentioning—outside the specific ethno-anthropological context, but within the bounds of studies of design—Gilbert Simondon, Lewis Mumford, Lynn White Jr. and Tomás Maldonado, to name but a few. Since the beginning of the last cycle, material culture has tended, on the one hand, to specialize, while, on the other, to translate into a critique of everyday life also (and often primarily) through the practice and critique of industrial design; although some authors (such as La Cecla, Rome, 1998) recently have asserted that the notion of material culture tends to lose its relevance as a result of the "dematerialization" related to teleinformatics, which will end up bringing it full circle to the more general idea of "culture."

12 This term was used by the Italian economist V. Pareto to identify an aspect of utility, specifically the value of a thing as determined by the feeling, impression or sensation that an individual associates with its use. It permits, therefore, a discussion of the subjective as well as the objective aspect of utility.

13 Gilbert Simondon, *Du mode d'existence des objets techniques,* (1958), edited by John Hart and Yves Deforge (Paris: Aubier, 1989).

other words, from a performance structure that could be described as self-referential—disconnected from the context—to one that is hetero-referential—gradually more contextualized in a process of reciprocal adaptation. Nothing could be closer to the truth in the case of the automobile, as Simondon himself demonstrates with specific examples such as how the various cooling techniques affect the structure of the motor, or the inclusion of the self-starter after the power circuitry had been added so that the vehicle could light its own way in the dark.

Through this "way of existing," technical objects behave like biological species, in other words a *philogenesis* takes place; and this, while justifying our use of the terms *genotype* and *phenotype* outside of the strict bounds of biology, has relevant implications in the conception of the development of the objects of material culture. This is because that conception not only hypothesizes that man equips the world with a second "nature" parallel to the mineral and biological one, but—as a result of the interconnection between objects and the context—also that the two "natures" (the natural one and the artificial one), while distinguishable, cannot remain reciprocally estranged: the "ecological" implications are, therefore, quite relevant, also in principle. On the pragmatic plane, the idea of the continuity of development (which does not mean that it must necessarily be linear or deductive) institutes a close analogy between innovations and the biological mutations that originate genuses, species, and families of individuals, such that they are subject to the same processes of competition and replacement that affect "artificial" goods.

The second concept, which is related to the first, concerns the fact that the process involved in designing goods develops along a route that leads towards the more complex; that, in substance, the solution of complexity is a philogenetic aim, as the examples quoted for the automobile demonstrate.

Nevertheless, the complexity that has been explored in recent years is not an unequivocal concept, but one that scholars and schools of design interpret differently: it is quite evidently an abstract and universal concept that tends to escape closed definitions in each of the many disciplines that concern it, often meaning different things, for example, for an engineer or an artist; and even, in the case of an artist-engineer, according to the point of view he chooses (differences also could be found vis-à-vis an engineer-artist).

If complexity is correlated for both of these with something whose components must be "made to stay together," the engineer will be more interested in the selective analysis of the objective facts that he or she considers are connected to the problem to be solved, with a view to an innovative, economic reconstruction (design), while the artist will be more interested in giving complexity the meaning of meta-complexity, i.e., in representing the many com-

plexities that the recipient (the "user") can recognize in it and, in point of fact, often several more. For the engineer, the design project thus tends to be more concrete, interpreting the "solution" of complexity as something that gives nothing more than what is or seems to be necessary; while the artist will tend towards abstraction and interpret the solution of complexity as something that gives nothing less but, on the contrary, opens the recipient to broader complexities. Of course, complexity is not the opposite of "simplicity"—they are connected to each other as simplex and complex—while both are antitheses of complication: that which is complicated can be simplified, but it is not simple.

The representation of something very complex actually may turn out to be simple, on the other hand, as can be verified by attempting to define something considered simple, or when products with a high design quality also are "enjoyed" aesthetically. In this sense, the aesthetic quality is the perception of a complexity that has been resolved. It can be said that that which is complicated only admits to addition, while that which is complex admits at least to multiplication: complexity and its relations multiply among themselves the effects of the simultaneous presence of parts (synergies) and configure the system as *Gestalt*, so that the sum of the parts is different from the whole: only when there is truly synergy is the sum of the parts less than the whole; and if the system is not coherent and the object of the study breaks down into several parts.

This notion of complexity enables suitable subsystems to be isolated within any system, a matter that concerns both the design process and relationships with the suppliers of sub-systems: if a system has one or more elements with a lesser number of relationships with the others, it can be identified with one of the borderlines of a subsystem that can be treated as a "black box"; in other words, it can be treated, without running the risk of making any great mistakes, as a single element of the overall system.

At the Hochschule für Gestaltung in Ulm—not by chance the most important school of design of our age, which functioned from 1954 to 1967—Abraham A. Moles, who passed away several years ago, drew a distinction between functional complexity (whose elements are actions) and structural complexity (whose elements are physical parts), using the same unit of measurement, Wiener-Shannon's *nega-entropy:*

$$S = \sum p_i \log_2 p_i$$

where p_i is the frequency of the element i (when $0 < i < n$), i.e., the number n of the elements of one type expressed as a ratio of the total of those in the system. This resulted in the construction of the *Chart of machines* (1961), in which the two forms of complexity (structural on the x-axis and functional on the y-axis) placed prod-

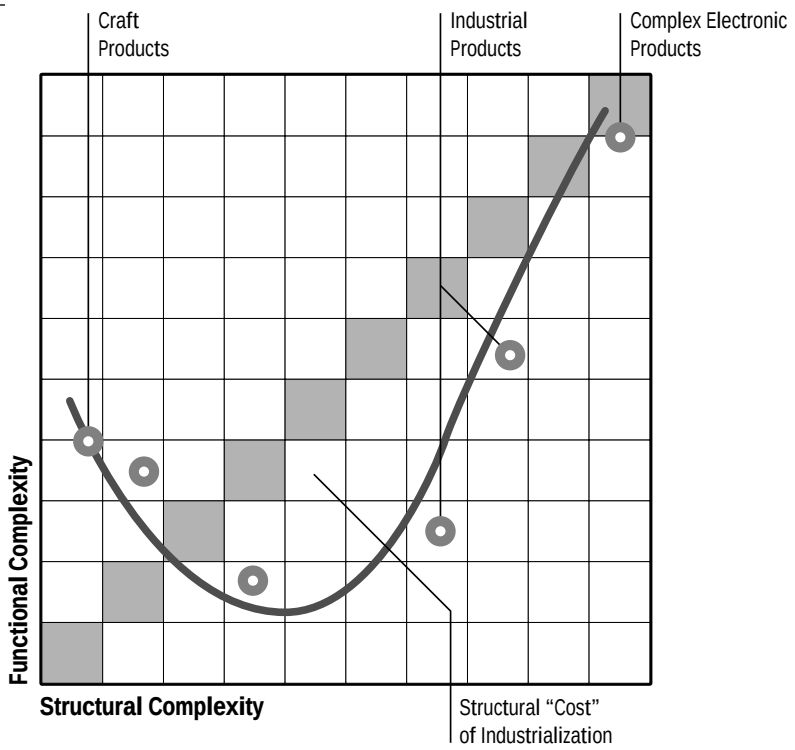

Figure 1
Chart of Machines.
Abraham A. Moles, 1961.
Elabor A. Morello, 1984.

ucts either above or below the diagonal the marked the prevalence of the one or the other.

Moles himself pointed out that various products would be plotted also quite far from the diagonal, but that, as their complexity increased (as in missiles and calculators), they tended to come back into balance.

Later on (1980–84), the undersigned pointed out that craft products could more often be found in the area above the diagonal, and industrial products in that below; hence an "air-pocket" that could be interpreted as a structural cost of industrialization, which now is being reduced drastically, in particular, as a consequence of the application of electronic technologies.

And so we are now very close. But the "technological landscape" is not just computerization, although it obviously is included everywhere: it also consists of intelligent materials (among many others), of lasers, of prospects for new sources of energy, and of many other headings, not least of which—although it is not imminent with its extraordinary and so disquieting developments—is that of biotechnologies and genetic engineering.

Names that crowded the vocabulary of the mechanical technician—such as pincers and hammers—undergo mutation as they are adopted by laser techniques in their micro- and nano-applications; a host of slave robots at the service of humanity—ever more

reluctant to do repetitive work—looks like a widespread possibility in the near future; while, among process/product technologies, fuzzy logic is starting to make its appearance, with its practices that abandon the principle of "three is a crowd," giving products the ability to adapt to the user's personal inclinations and even to progressive learning. And we also can expect even the most everyday products to adopt the same criteria quite soon.

The technology push cannot fail to exert impressive effects on the society pull, which, in our world, passes and will continue to pass necessarily through the market pull. But these latter also will have effects on the former, as can already be glimpsed in the form of the enormous tension that is building up between the quest for what is objectively new and the requirements of unprecedented *ophelimity*.

Meanwhile, in a world in which space is (as it were) rendered null and void by the speed of communications, time—time as a flow and time as duration—is becoming increasingly important. The length of a product's life cycle curve—which looked as though it was getting gradually shorter, only to increase again during the period of the recent crisis (in fact, generating a critical situation for those enterprises that were hit hard by a drop in demand for replacing phenotypes)—could start getting shorter again: but this time not through the conventional channel of buying and replacing, but through that of hiring, renting, and leasing. From an economy (and sociology) of property, we may be on the threshold of one of possession and temporariness, with consequences whose description are beyond the scope of this essay, but which would have major fallout effects on the humanized configuration of the products themselves, i.e., on their semiology and symbology, which are different when the object is possessed temporarily then when it is permanent property and, above all, a stimulus to our memory of our past. But it also will no longer be possible to elude the criticism of the "ugliness" of our surroundings that is heard from many sides—and generally with good reason. In effect, the cycle that recently came to a close was marked by the specific attention that was paid to objects, to the extent that, even when they are quite admirable in themselves, they have brought about, when all combined together, a context that borders on the unbearable, not only for environmental, but also for semantic-aesthetic reasons.

Is there hope, therefore, that we shall be able to witness the passage from the semantic of objects to the syntax of the context? In order to achieve this result, the forms of competition would have to change profoundly, so as to give society back a habitat with such a level of coherence that a form can be attributed to it; although it does not look as though the competitive opposition between individual proposals makes any provision for this. All the more because of the permeability of markets, their closeness in time, and their real and virtual accessibility, which enable them to be invaded by even

more mutually incoherent and estranged goods and services. In this case, we would be heading towards an increase in the cultural contaminations of which Far Eastern societies already are victims, because of the schizo-cultures induced by a production system oriented primarily towards global markets, but reflecting fatally on domestic markets; or certain societies in Latin America, which defend local cultures so strenuously that they have been refusing to admit any non-local technologies for years, producing cultures that could be defined as paranoid.[14] It could be said that the tendency to make culture dependent on the economy is the main cause.

What is the solution? In our opinion, the time has come to reflect on the paradox that, in a world dominated by consumerism, where the distinguishing trait is the ease of communications, nobody really bothers about training consumers. Those same consumers who, if they were to receive adequate training, would know not only how to evaluate what they buy and consume, but also how to carry out those "new" activities that, at present, escape them because they lack the necessary culture, and that make all of us stand in fear of the disappearance of our jobs. And the two things, as Keynes knew only too well, go together.

14 A. Morello, report on Design and the UN Index of Human Development, ICSID Congress, Toronto, 1997. Publication under preparation.