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DESIGN'S OWN KNOWLEDGE

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“Doxa: from the Greek, opinion, way of thinking. According to Parmenides, the world of doxa was the world of the opinions of mortals. When substituted by “what is” for what seems to be, or when mortals concur to manipulate things, or understand themselves, it becomes a falsehood or an error. Husserl held that all expressions are a doxic act in their full sense, i.e. a certainty, a belief.”¹

Introduction

Ancient Greeks categorized thinking in two classes: one, the result of reflection, *episteme*; the other one, a result of daily living, *doxa*. Today the limits between doxa and episteme have become more confusing and intricate, less obvious. Pure sciences have developed into applied sciences and knowledge has become habitual, usable and practical. Ancient Greeks would be amazed to realize that doxa, daily-life thought or common sense, has become a science.

Scientific research, philosophizing and thinking are activities unique to the human being. Solving questions and, principally, asking them --even when lacking an answer-- is significant. The importance lies in inquiring and allowing time for reflection. By asking major and apparently simple questions, such as “Who am I?”, “What am I doing here?”, to most complex ones, such as the universe's own origin, we are encouraged to evoke through thinking everything that we are, everything we wish to be and achieve. This is the true significance of philosophy, the possibility we have to think about thinking, about ourselves and even about why we think, create and believe.

On the other hand, in science we find an attempt to set apart subjective human condition, and accumulate organized theoretical knowledge from our surrounding reality through the systematic and systemic processes of connecting concepts that will eventually lead to the construction of complex structural systems of models, projects,

theories and ideas. The historical development of human thought is closely related to scientific development. Science had already been instituted 400 years ago as a formal structure, chiefly due to its use of the scientific method, which allowed, among other things, a generalized view of science as a rational, monomethodical, logical and positivist activity. Nonetheless, this conception of science has encountered in recent years severe stumbling blocks when dealing with reality. Firstly, because of the reductionist and mechanistic nature of the theories proposed by this type of perspective.² And, secondly, because of the current awareness that the complexity of problems related to nature and humanity require several viewpoints, elicited from new tendencies and theories, such as the complexity theory, systems theory, self-organization theory, etc.³ This essay will focus on the second conception.

Unlike science, art involves a greater compromise to mirror social reality. *Techné*, as theoretical referent, had already been coined by the Greeks, to express their aesthetic sense of culture. Symbolic values that could be expressed by art were taken into account, and great historical synchrony was achieved in the quest for supreme artistic expressions, with strong institutional and ideological support. All artistic expressions, including architecture and craftsmanship, were encompassed in the Greek concept of *techné*. For instance, the construction of the Parthenon in the 5th century B.C., main legacy of how Greek art was perceived at the time, represents above all a strong ideological sense of liberty and democracy. Some authors have even set forth a theory of idiosyncratic change that is evidenced in some of the bas-reliefs and sculptures found within the Parthenon, such as the self-portrait of Fidiás and his protector Pericles on the shield held by the goddess Atheneá of Pathenos, or the portrait of Pericles by sculptor Cresiliás. These works seem to be additionally a more visible testimony of a change in mentality from the religious to ideological use of art. Since in the ideological circumstances related to the Republic's Athenian hegemony it was forbidden to create sculptures of human beings within temples, sculptural language to portray reality was born. This demonstrates that the evolutionary process of art expression is closely related to social changes of a time, with institutional aid.⁴ It is thus that art has been considered since ancient times an element of mythical and religious manifestation, as much as an instrument for social communication and the means to express the ideology or collective thinking of a certain era.

These philosophical, scientific and artistic processes, common and inherent to human beings and their critical appreciation of nature and their surrounding elements since ancient times, lead us to inquire about design theorization. Many authors deem the use of the word *discipline* adequate to define design (just as in other domains of

knowledge such as engineering, social sciences, technology, etc.). However, discipline as a term does not compromise and eliminates the need to deal with the philosophical exercise concerning the existence of a theory, science or philosophy of design. In the following paragraphs I will attempt to define the main conceptual principles in this regard.

The general structure of this article is directed to solving some fundamental questions. Before reading further on, the reader is invited to analyze some of these questions: 1) Which is the place of the meta-structure of design?; 2) Do design and its practice generate knowledge?; 3) How may a model of design knowledge be structured?, and 4) Does design have a knowledge of its own? 5) Which are the basic categories of design knowledge? and 6) Is design only knowledge? The development of some of the answers will allow us to define the epistemological foundations of design and the possible methodological guidelines that may be relevant to broaden design's conceptual and academic limits.

1. Which is the place of the meta-structure of design?

The meta-structure of design is the global and holistic conceptualization of the actions of design in culture. Several studies and research works are found at this level, specially by philosophers and anthropologists. These studies propose that the metaphysical viewpoint of design's global action lies in the foundations of current material production.

Ever since ancient times, human communities have attempted to impose reciprocal action on their surroundings with the purpose of humanizing nature and creating their own environment for the activities to be developed within a community. Included among the many unavoidable material conditions that define the development of that society in time are geographical and natural conditions, and production means attained by the community and through population growth. This continuous process, called *social dynamics*⁵, has resulted in two types of knowledge: the study of historical human activities and creations, and the study of social achievements and possibilities for the improvement of human life.

In general terms, this dynamic expression of society encompasses everything that is called culture. As dynamic expression, culture incorporates two processes: the material process, --which is also symbolic⁶--, constituted by artifacts, tools, and environments produced by human beings, and the non-material process, "an idealized cognitive system --a system of knowledge, beliefs, and values-- that exists in the minds of members of society".⁷ Nonetheless, both concepts are always interdependent; i.e. the presence of material culture relies on non-material culture, and vice versa.

It is therefore necessary to locate design and the studies it may originate within the space-time framework of MATERIAL CULTURE, i.e. the physical world and environment created by human beings and their social relations associated with, in turn, the abstract and conceptual relations that determine the generation of knowledge for the interpretation and externalization of the materiality of cultural products through their relation with objects. Finally, the application of this acquired knowledge has as main objective to improve the world; in the case of design by balancing the relations between society and industrial production governed by the rules derived from overwhelming technological developments.

Since the 1950's, design has mediated, promoted, catalyzed and regulated the diverse conflicts that have emerged between society and industry. How has this been achieved? Firstly, by its projectual activity of *humanizing environments*.⁸ In second place, by its reflexive and research activity, upholding a position on diverse conflicts while embarking on a proposal for design ethics --consequently, the ethics for human material activity. All these studies and reflections are part of what we call the conceptual meta-structure of design.

2. Do design and its activities generate knowledge?

When viewed from the outside, from its relation to cultural processes, we acquire a perspective of design that is part of its macrocosm. In contrast, if the trajectory is changed, we may find design's own study objectives within the conceptual microcosm of design. To this end it is necessary to analyze whether there is a field of knowledge which is the product of design activities, whether parallel to the generation of new knowledge we may discover research elements inherent to design--all of them indispensable for the definition of a theory of design.

The study object of many sciences, among them the physical and natural sciences, encompasses everything that is in turn their field of action whereas design, as it has been interpreted and particularly taught, reveals some differences. Ever since Bauhaus' theoretical foundation, design has been defined as a *mixture*⁹ of art and craftsmanship (*techné*)¹⁰ with technique, based on the study of the human being, specially human factors, made by some sciences. These essential elements have become in turn study objects in design as a career, with some modifications in regard to how much has been devoted to one or the other or the approach used in each school.

Nevertheless, art, technique and human factors are essential knowledge that all designers must acquire. Considering the relevance of these conceptual domains, they need to be contrasted with the *praxis* of design.¹¹ In design's current theoretical division there is a radical division between study object and field of action because the former encompasses isolated subjects, such as shape, function, technology, and social sciences while projectual development of ideas and products are included in its field of action.

When analyzing the university studies of designers, the main theoretical problem we encounter is lack of a general conceptualization related to design praxis, leading to disconnection and absence of a theory formulated through design proper. According to Dewey, in selecting a study domain "subject matter is then regarded as something complete in itself; it is just something to be learned or known, either by the voluntary application of mind to it or through the impressions it makes on mind".¹² It therefore becomes necessary to determine which elements may result in the designer's desirable willingness to intellectually and emotionally solve design problems that may also be consistent for all design problems encountered, "identical with all the objects, ideas, and principles which enter as resources or obstacles into the continuous intentional pursuit of a course of action."¹³

The study object of design should include all the decisive elements to master the "art of conceiving and planning products".¹⁴ Attaining this projective quality will allow designers to solve different design problems, regardless of their diversity and

complexity. Projective ability may in turn be developed by understanding the projective complexity and objectual complexity required to create a social context because “Isolation of subject matter from a social context is the chief obstruction in current practice to securing a general training of mind.”¹⁵ For these elements to become study objects in design we need firstly to generate specific knowledge and, in second place, to develop education and didactic strategies so that they may be effective within the classroom and in its application to society.

This knowledge may be achieved by studying the possible relations between human beings and objects,¹⁶ and between systems of objects¹⁷ and the objects and their components. This would result in more profound knowledge, sufficient to understand the totality of projectual and objectual complexity, with the possibility to present efficient projective proposals.¹⁸ Both classes of conceptual knowledge are combined in design; firstly, in design’s own field of knowledge, physically transferred to objectual reality (*noesis*) and, in second place, in the practical application of design--its projective ability (*poiesis*). This process cannot be reduced to a simple *mixture*.¹⁹ We may thus say that conceptual synergy is required in these fields. A brief discussion about each of these fields will now follow.

Noesis²⁰ of design: the science of thinking about design

Husserl²¹ makes a distinction between the material or hyletic level and the noethic level. The noethic level refers to the stage of the intentional being that shapes or forms materials into intentional experiences, giving sense, so to speak, to the flow of what has been experienced. Noesis is a configurative influence that becomes an internal conscience of reason and the passage of time. This term has been widely used to designate the science of thinking in general, and will be so used throughout this essay to indicate the elements that need be considered when discussing knowledge created by design thinking.

For those who are faced with design’s theoretical endeavor, the science of design thinking, as a reflective and propositional activity, is the activity that most effort, time and energy requires. These efforts may be due to the short and vertiginous time design has enjoyed as acknowledged profession, its differentially technological conceptual framework, its broad scope of development, the great number of views based on a productive context, and the industrial and technological developments that have been its driving force.

The main elements that have been part of this body of knowledge include the theory, critique and history of design activity, as well as the results of designers’ professional activities. The development of these theoretical, critical and historical

stances have required the use of disciplines equivalent to, chiefly, architecture and art, followed by technological studies. Likewise, disciplines such as semiotics, aesthetics or industrial sociology and the psychology of forms have also been used for its theoretical and historical analysis.

This demonstrates that design thinking is not an isolated activity from design itself but rather a group of fields of knowledge which study and analyze the current social phenomenon of material production. Efforts behind design thinking assemble knowledge from reflective and propositional action in design. Propositional actions, specially focused on a critical initiative of society to propose elements for its transformation (as will be later discussed) has undoubtedly played a very important role in design and, thus, in design research.

Poiesis²² of design or designing

The definition of poiesis, the process of achieving an idea, is comparatively similar to the design process. Designing is thus a poietic act.²³ This act as such can be defined as a scope of design thinking. In its structure, design thinking²⁴ blends intuitive, analytic, creative, imaginative thinking, as well the sensibility and expressiveness with regards to the human nature of the designer.

Design thinking is a holistic, synergetic and continuous whole shaped according to the designer's personality and social influence which also relies directly on the sensible, expressive or communicative abilities required to accomplish an idea. The material structure of this act is the design project. A design project is not only a plan or willingness to act; it is the action to project oneself, and it requires two fundamental aspects: understanding the design problem and the act of developing an idea, and defining "what needs to be done" with respect to social aspects.

In the 70's the mastery of the project through design methods was strongly emphasized. Studies on design method and methodology allowed the possibility to confront the complexity of design problems and their limited scope when adopted as strict and radical restraints.

Upon a deeper analyses of design as a poietic act, we need therefore to pause and find a summary of theoretical activity in design in the essential arguments implied in a poietic act. By combining design noesis with poiesis we must consider the following:

- Thinking about doing, which refers to the design process and project.
- Thinking about how to do, which refers to technological production problems and technique.
- Thinking about the dependence on doing, the financial and productive submission of design.

· And, finally, thinking about “what needs to be done” to achieve institutional and social change.

3. How would a model of design knowledge be structured?

“The business of every art is to bring something into existence, and the practice of an art involves the study of how to bring into existence something which is capable of having such an existence and has its efficient cause in the maker and not in itself.”²⁵

According to Aristotle, generated elements are brought forth by two means: technical means and theoretical considerations. Technical means, which make products possible, are materialized in the physical structure of industry and factories. In these terms, an industrial product is subjected to productive and economic forces. However, more important than this technical imposition is its being in turn subjected to the theoretical and ideological conditions of those who thought of it, conceived it and outlined it; in other words, society and design. This point needs to be emphasized because it depends directly on the designer or the community of designers. Habermas has said “It is not the informative content of theories but the formation of a reflexive and illustrated habit among theoreticians themselves that ultimately produces a scientific culture”.²⁶ [my translation].

It is consequently important to construct a model of design knowledge²⁷ as a structured system of the theoretical and conceptual elements preceding the activity of design, alluding to the historical and social responsibility that must be assumed by the designer to overcome ideological paradigms. Through objects, artifacts, equipment, and building design can also contribute to the outline of a non-material culture that will be more in accordance with principles pertaining to life quality and human well-being.

Jürgen Habermas has proposed that there are three fundamental categories in science research: the empirical-analytical sciences, the hermeneutical-historical sciences and the sociocritical sciences. The following comparative table analyzes the principal elements that define this categorization.

(TABLE 1)

The exact sciences and the physical or natural sciences are found within the empirical-analytical sciences whose approach to knowledge is based on dividing the systems that constitute the study object with the purpose of understanding the system by means of relations and transformations. Their aim is thus directed to the collection of knowledge for predicting and controlling nature and its phenomena. Their sense is analytical and their interest is theoretical. This type of science and its results have had an influence on design, specially when attempting to understand the processes related to the physical and biological constitution of the human being, as well as the technical and technological aspects for the production of design objects.

Historical knowledge of design involves the historical environment surrounding the birth of design, and the development and evolution of aesthetic trends, and those of industrial products. It may be classified as a historical-hermeneutical category. The procedure to approach knowledge consists in the holistic reconstruction of isolated pieces of facts where history is its axis and moments are interpreted. This type of knowledge is aimed at understanding and interpreting historical phenomena; its sense is synthetic and its interest practical.²⁸

Nonetheless, design is very closely related to an attitude of change, a high sense of transforming reality according to the conception of society's welfare or progress. The knowledge and results of design objects ideally consist in improving human condition. Habermas considers this kind of knowledge to be of a sociocritical nature, whose point of departure is based on the critique of social imbalance, while its approach to knowledge lies in disclosing alienating or manipulative situations. The pragmatic meaning of design belongs by origin and *autonomia* to this category of knowledge because it is part of design's profound origins. It also involves the theoretical elements to transform and act upon reality; ideally to improve it. Its meaning is thus transformed and its interest is emancipating. These sciences have the ability to distinguish how the foundations of social dependence relations have been ideologically established, yet also analyzing the means to change these relations. The legitimacy of its propositions is related to its ability for self-reflection, communication and transformation.

4. Does design have a knowledge of its own?

The results of design activities, the *poiesis* of design, comply with and are ruled by laws governing the physics of our surrounding world and human beings--physical circumstances that may not be altered such as gravity, atmospheric pressure, and matter density in the case of the environment; human dimensions, limitation of motor activities, the perception thresholds of the senses, the capacity for information storage, in the case of human physical limitations and constants; and the constants implied in the productive process in the case of technique. Designs and designers must act in response to these unfailingly strict laws. This invariable knowledge is found within the framework of the empirical-analytical sciences; i.e. the natural, biological and physical sciences. These are the domains of knowledge that designers must know and thoroughly understand when projecting.

Noesis of design, the most evident referent for design thinking, is derived from the social sciences that study human relations and the human being itself. Some of these sciences, such as anthropology, archeology, history, economics and, in general terms, the historical-hermeneutical sciences, study human beings in relation to their material culture.

Design produces material and non-material culture; while studying it, it proposes it. The parallel between undertaking a perceptive work related to the environment and making a proposal about this environment is analyzed in Fig. 1. This proposal also involves the elements that enable designers to mirror themselves, live, and present and project themselves. Broadly speaking it may be seen that culture as such accepts or rejects design proposals. To this extent, design is the result of *cultural phenomena*.²⁹ Nonetheless, this may seem odd to many designers, given their generalized tendency to believe that they design but that it is society which actually does it in accordance with its material, productive, sensible and cultural needs and hopes. We thus unravel the importance for designers to master the cultural phenomena of their times and be responsible for their proposals to change the fundamental structures of cultural phenomena.

Design research is therefore basically directed to establishing an organized conceptual structure of design's own knowledge whereas its foundations will rest on the immediate interpretation of material cultural by mediating between the diverse scientific and technological phenomena, and the material production of society. The use of this knowledge will contribute to building a society ideal and not only to the development of consumer goods by broadening its supply of products--the end to which design has been used.

Through the demonstrative exercise of contrasting design with archaeology we will find design's own guidelines. Archaeology is the study of the close relation between the physical manifestations of a people and its culture, with manifestations referring to objects representing the feelings of a community, such as art. When comparing design's interpretation of the world with archaeology, we find that their notion of time is different. Design sees the world almost at the same moment it is producing or creating, in a more immediate relation, whereas in archaeology the view of design proceeds from technological processes with social processes being cast into the background.

(FIG. 1)

Material production and its inferences from society are thus the foundations for design knowledge. Unlike other fields of knowledge, design retrieves³⁰ while creating, acts while it reflects. The constituent elements of this foundation include society with its cultural and material exchange; industry as the infrastructure currently in charge of material production; and human beings, particularly those who undertake activities and need this material production to achieve them.

The study of human beings is found in all human and social sciences. This knowledge is also used in design but with the purpose of learning about the

multidimensional essence of human beings in their relation to objects so that objects as such, as complex systemic structures, will be in constant interaction and dialogue with human beings. Objects have thus been referred to accordingly as artifacts (“from the Latin *art factus*, ...something characteristic of or resulting from a human institution or activity; ...a product of artificial character (as in a scientific test) due usu[ally] to extraneous (as human) agency.” or, according to Manzini, the “materialization of cultural contexts, of organizational forms, of technical systems, of economic interests and the will of projectionists and groups of designers, business people and the productive sectors.”³¹ [my translation] A graphic outline of these relations is found in Fig. 2.

(FIG. 2)

Design’s own knowledge is the result of this relation between human beings and objects; foremost from the observation of the world and the multiple perceptions generated by this observation. Next there is an approach to different fields of study, depending on the theoretical place of the problem to be studied. Lastly there would be an objectualized interpretation of this analysis--a new factual answer that will be presented to society, based on the projective ability of design. The experience produced by design is interrelated to the knowledge of social response.³²

The optics for design analysis is generally based on two directions. One draws on the access of material culture to technology, and the other deals with physical phenomena involved in the production proper of objects. There is thus no self-governing management in the field of design knowledge because of its reliance on a sociohistorical and articulated environment within a space and temporality, in addition to cultural change processes derived from the liberating interests of society.

Design knowledge is the intuitive knowledge of society, the “material intuition which is not only understanding relations but the understanding of a material reality, of a suprasensitive object or fact... this material intuition may be of different kinds. Its diversity is based on the deepest psychic structure of Man. The spiritual being of Man presents three fundamental forces: thinking, feelings and volition. Accordingly, we must distinguish a rational intuition, an emotional intuition and a volitional intuition... The same categorization may be reached from the structure of the object. All objects present three aspects or elements: essence, existence and value. Therefore we may speak of an intuition of essence, an intuition of existence and an intuition of value. The first one coincides with the rational, the second one with the volitional and the third one with the emotional.”³³

5. Which are the basic categories of design knowledge?

By basic categories I identify the fields of knowledge pertaining to design which enable the establishment of possible fields of research. They include:

Object

This conceptual model may in turn be applied to the classification of a series of studies based on the analysis of the object. The object is the tangible materialization of the poetic act of design because it reflects the emotional, volitional and cognitive interests of the designer. Furthermore, the material object is considered an object of knowledge for he who perceives it because it is cognizable, it is real; it has a sensitive and communicative existence that enables it to represent the constant dialectics³⁴ between the ideological condition and value condition of the designer and the user.

Studying the object of design may involve the following studies that assemble the realities of an object: the first one, its analysis as physical element, studied by methods that could be similar to those used by the physical and natural sciences; the second one, its research as a social and historical entity where the subject matter would be the social significance of the object; and the third form, with the object as social transformer, to examine the social and individual changes it generates in habits and social values. The three perspectives are explained in Table 2.

Design, as a projective and communicative structure, must have among its highest ideals the design and development of products capable of transforming social reality. These objects as such are directed to changing attitudes, values and habits that are affecting society adversely so that they will become positive attitudes, values and habits for humanity's quality of life.

(TABLE 2)

The Project

*"Design is related to the current situation of an era, to time, to the world. Today's world is characterized by being permanently in project. Modern civilization is something that men have made and, therefore, projected. Project quality is world quality."*³⁵

The project has not only been described above as a plan in as much as it is more than planning, arranging or projecting. Existentially, the project defines the action of projecting oneself, acting as a project in itself. The project depends directly on the experience of the individual who develops it and consequently relies on his knowledge and understanding of reality, jointly with the conception about possibilities of change. Knowledge derived from the project is of a poetic nature. Nonetheless, it may be defined in the following broad categories:

- Development and encouragement of projection and ideation abilities.
- The problem of expressing and communicating the project.
- The proprio-perception of the project and its documentation.

- Social, environmental and personal conditions for its development.

The Conceptual Meta-structure of Design

As initially analyzed, the meta-structure of design refers to a domain that is part of design knowledge. Although shared with other fields of knowledge, this domain encompasses all the studies of design objects and projects. Nonetheless, when attempting to define the course of design in forthcoming years there are essential categories that must be taken into account, such as:

- The social and institutional role of design
- The social changes produced by design, and, specially, those that need to be generated in the future to structure, in general terms, a theory of social change set forth by design
- The reliance of design on technical thought which needs to be changed by a global perspective involving cultural and social aspects
- Problems related to ethics and the changes generated by design.

6. Is design only knowledge?

It should be first pointed out that the observation and differentiation of the elements that produce design knowledge do not imply that design is only knowledge. The development of a design project or idea evidently requires more than knowledge. Within design thinking, definitions of clear limits between rational and irrational aspects, objective and subjective aspects and logical and creative aspects have been established. The fragmentation of the design process has prevented the understanding of both aspects, at times even with the tendency to adopt either one. This undoubtedly has led to undesirable extremes, as evidenced by an excess of logical, mathematical and rational thinking in design or, on the other hand, an extremely intuitive, instinctive or unreflecting approach.

The challenge in design teaching and practice therefore lies in balancing both aspects. All creative processes require profound previous knowledge of the phenomenon or product to be developed. Design thinking actually arises from incremental creativity rather than from improvised creativity. Incremental creativity³⁶ involves long standing and significant knowledge, ripened through self-reflection, experience and evaluation of the generated elements. The process of evaluating a product once it has been produced generates knowledge, whose accumulation results in the experience proper of design's daily activities.

In the 1993-1994 study, *Design and Method*³⁷, which took place in the Architecture School of the National University of Colombia, the authors compared creative and design development in first-year and last-year Architecture students. The results revealed no significant change in creative development throughout their formative years. However, it was found that aesthetic appreciation of the project and the

ability to create it was perfected during those years. The *appreciation of environmental aesthetics* ³⁸ is an ongoing process throughout the career in the multiple exercises to approach and evaluate aesthetic conditions in theory or in the practical observation itself of the constructed environment. On the other hand, *the ability to communicate* ideas is an activity that is developed, because of the need itself to communicate means of representation and expression through drawing.³⁹

Another aspect that should also be mentioned refers to what is called talent, as an element in itself and identifier of the style to conceive the world and design. The great designers of our times have required a special talent⁴⁰. By imprinting their *Weltanschauung* on their objects they have created their own unmistakable personal mark, in addition to circumstantial elements, such as the different historical moments they have lived, which facilitated or made this inventive or negotiating ability more evident.

7. By way of conclusion

"Through the unplanned sociocultural consequences of technological progress, the human species has challenged itself to learn not merely to effect its social destiny, but to control it. This challenge of technology cannot be met with technology alone... Only if we could elaborate this dialectic with political consciousness could we succeed in directing the mediation of technical progress and the conduct of social life, which until now has occurred as an extension of natural history; ... The redeeming power of reflection cannot be supplanted by the extension of technically exploitable knowledge."⁴¹

With the posited conceptual model it is now possible to build a process that will combine ideas and actions. The model may be applied to the academic, professional and research domains related to designing.

When approaching the design project, the materialization of the poetic act, we obviously encounter the projectual research required to embark on a dialogue between reality with its problems and the designers' proposals. This is the main difference between a confusing situation --reality as such and the way we encounter it--, and the definition of a design problem, which is already a conceptual elaboration where the designer adopts a position to face the problem and solve the plan of action initially materialized in the project and consequently in the object or product of this action. This type of research or acquisition of basic knowledge about the project is what I call primary projectual research. This is related to the subject matter of the design problem and may be documented so that it will become an element of knowledge compilation. The documentation process will in the long run enable practice and its two fundamental objectives: documenting topics about design problems, and assembling the required material to describe the evolution of the products and the history of its design solutions. With respect to the design project, proprioceptions or personal reflections about the project may also be documented during the project itself, according to the essential mental processes for product development.

In general terms, the model of design knowledge categories allows a conceptual classification for different research studies in design and the efficient use of the available methodological tools, in accordance with the research process categories proposed by Habermas. Different cognitive interests converge in design

--technical, practical and emancipating interests. This is the reason behind the broad range of research which may transcend the object, project or the conceptual meta-structure of design according to every interest.

Interrelating the fields of study with the cognitive interests results in Table 3 to have an overall view of the available fields of work in design research. This diagram shows that research design may transcend different social problems. These new studies will enable us to balance an excessively technical or productive approach in design. It is true that when research studies related to historical-hermeneutical or sociocritical approaches are made, there is a risk of embarking on a social study as opposed to a design study. To overcome this inconvenience, we rely on *reflexive experience*⁴¹ from the perspective of design which is undoubtedly the best point of reference.⁴³

(TABLE 3)

By way of conclusion it should be noted that there is a very important relation in research design, inspired by the theories of social action of philosophers John Dewey and Jürgen Habermas, both quoted in this essay. Their philosophical concepts are a free and comprehensive contribution for a conceptual framework of design. In addition, the application of their concepts to different classes of pedagogical theories will certainly be a part of future academic design programs in all school grades.

In the threshold of the 21st century, whether design is a science, as is the case of the human and social sciences is still under discussion. Therefore, rather than restricting the definition of science to the knowledge produced by design, it is of vital importance to assess, encourage and preserve these reflexive processes as a dialectical approach of design towards society.

NOTES

¹ Foulquie, Paul. *Diccionario del lenguaje filosófico*. Barcelona: Editorial Labor, 1962:42.

² For further discussion on the critic of Cartesian science, see Berman, Morris. *The Reenchantment of the World*. Ithaca, Corjell University Press, 1981.

³ A brief description of these three theories and their scientific application are found in: Morín, Edgar. *Introducción al pensamiento complejo* Barcelona: Editorial Gedisa, 1996: 39-84.

⁴ Support granted by social institutions to art also occurred in the Renaissance, according to the complete discussion in Csikszentmihalyi, Mihaly. *Creativity*. New York: Harper Collins Publishers, 1996:32-36

⁵ Méndez, José A.; Zorrilla, Santiago; and Monroy, Fidel. *Dinámica social de las organizaciones*, 3rd ed.: Mexico: McGraw Hill, 1993:9-10

⁶ As evidenced in “cultural products as public utterances, ritual clothing, music, etiquette, dance, prohibitions, etc. All these productions have three main characteristics: (1) Their particular features to a large extent unmotivated by immediate survival needs and often devoid of any practical purpose; (2) they seemingly involve a capacity to “reify” mental representations, so that certain communicative or memory effects can be achieved by producing material objects and observable events; (3) their features vary from one human group to another”. Pascal Boyer, “Cultural Symbolism” in *The MIT Encyclopedia of Cognitive Science*. Rob Wilson and Frank Keil, eds. <http://mitpress.mit.edu/MITECS/>, 1999.

⁷ Ronald Casson. “Cognitive Anthropology” in *The MIT Encyclopedia of Cognitive Science*. Rob Wilson and Frank Keil, eds. <http://mitpress.mit.edu/MITECS/>, 1999.

⁸ Since the 1850s, with Henry Cole and William Morris, and at the beginning of the 20th century, with Peter Behrens, Walter Gropius and their Bauhaus team. The problem of humanizing environments, including spaces and industrial objects, is and will be the fundamental problem in a theory of design. This conception of design is highly socialist --the prevailing ideology of the time--, as evidenced in the cited authors’ written works. See Morris, William. “Art and Society” in *Architecture, industry, and wealth: collected papers*. New York: Garland Publishers, 1978, and Gropius, Walter. *The Bauhaus Manifesto*.

⁹ From a philosophical perspective, the term *mixture* describes a chemical combination while questioning whether elements are really combined in as much as they preserve their own characteristics and individuality.

¹⁰ Because, for ancient Greeks, there was no difference between art and artisanship; both were considered equally. See Read, Herbert. *Art & Industry*. London: Faber and Faber, 1956:24.

¹¹ Praxis is by definition opposed to theory. Greeks determined the praxical character of all actions, transactions or human affairs. Nevertheless, Aristotle distinguished three classes of knowledge: theoretical knowledge, praxical knowledge, and poietic knowledge. The object of the first class is knowledge; the object of the second one is wisdom with respect to moral action (politics), and the third has productive action as its object. See Ferrater, J. *Diccionario de Filosofía*. Buenos Aires: Editorial Sudamericana, 1971: Vol. 2.

¹² Dewey, John. *Democracy and Education*. Institute for Learning Technologies. webmaster@ilt.columbia.edu Copyright © 1993-6 ILT-web. http://www.ilt.columbia.edu/academic/text/dewey/d_e/contents.html, chapter 10 (Dec. 5, 1997).

¹³ *Ibid.*

¹⁴ Buchanan, Richard. "Rhetoric, Humanism and Design" in *Rediscovering Design*. Chicago: The Chicago University Press, 1995:26.

¹⁵ Dewey, *ibid.* Chapter 5.

¹⁶ Object, as the visible and material result of design action. A design object has as characteristics of its own: exposition, the ability to demonstrate intentionality; an intentional content; a real physics; and a structure that is cognizable, recongnizable and subjected to judgments. All the possible relations between an object and human beings (planning, conception, realization and utilization) are found in the design object.

¹⁷ The relation between objects and objects is found in the theory of systems of objects posited by Jean Baudrillard in his book *Le Système des Objets*. Paris: Gallimard, 1968.

¹⁸ According to Herbert Simon, these are two sciences of the artificial: "[the] inventive sciences of design thinking" and "a science of existing humanmade products." Simon, Herbert. "Science of the Artificial" in Buchanan, Richard. "Wicked Problems in Design Thinking", *Design Issues* (Spring 1992):2:18-19.

¹⁹ According to the description in footnote 9.

²⁰ The Greek verb *noesis* means "discerning seeing". Therefore its usual meaning of thinking. For Greek philosophers, it was used to designate an "intangible seeing" or "thinking seeing".

²¹ In his article "Hilético", 87-102. Quoted by Ferrater, J. *Ibid*:291.

²² The infinitive form of this verb means "make", "form", "produce", and is used to define all disciplines aimed at making or producing. This expression is related to

creating or representing something. The word poetry comes from *poiesis* and has two essential characteristics: the notion of poetry as a doctrine of ideas that elevates it to the level of wisdom because it is the highest expression of language, and the notion of a wisdom representing sensitive aspects because it may “transparear” or “translucir” the unintelligible. See Ferrater, J. *Ibid*:441-442.

²³ The acts of *poiesis* are poetic acts. Nevertheless, since the terms “poetry” and “poetic” are very related colloquially in literary production, the term *poietic* will be used in this essay. It could be said that design is the poetry of matter. Interestingly, the transposition of this concept comes from Greek philosophy and is used by Herbert Simon when dealing with the science of the artificial, an activity considered as the “*inventive science of design thinking*” by Richard Buchanan in his article “Wicked Problems in Design Thinking”. *Ibid*:18-19.

²⁴ The term *design thinking* is being increasingly used and has proved to be very adequate to assemble all of the thinking processes that are involved in designing. The most consistent theoretical referents within design are Peter G. Rowe (*Design Thinking*. Cambridge: MIT Press, 1987) and Richard Buchanan, *Ibid*:5-21.

²⁵ Aristotle. *The Ethics of Aristotle*. Book Six, Chapter 4, “What is meant by Art?”. England: Penguin Books, 1971:175. Translated by J.A.K. Thompson.

²⁶ Habermas, Jürgen. *Ciencia y técnica como ideología* (original title *Technik und Wissenschaft als Ideologie*). Mexico: REI, S.A. de C.V., 1993:161.

²⁷ David Perkins discusses the formation of design concepts and new notions in his book *El conocimiento como diseño*. Bogota: Editorial Universidad Javeriana, 1989. (English edition: *Knowledge as Design*. New York: L. Erlbaum & Associates, 1986).

²⁸ “Practical action or experience through which man as subject tends to transform what is real.” Mardones, J.M and Ursua, N. *Ibid*:252.

²⁹ A culture phenomenon may be considered as the prevailing political ideology or the political will of the social, economic and industrial context. Papanek cites the well known case of the “Volkswagen” (people’s car), whose design was a result of the strong political ideology of the national socialist regime (see: Doblin, Jay. *One Hundred Great Product Designs*. New York: Van Nostrand Reinhold, 1970), while today “...in the United States, design is not overtly used in a political manner: rather it operated mainly as a marketing tool of big business”. (Papanek, Victor. *Design for the Real World: human ecology and social change*. London: Thames and Hudson, 1985:106-107.

³⁰ Retrieval of social values, attitudes and habits that enable social coexistence.

³¹ Quoted by Ezio Manzini, *Artefactos: hacia una ecología del ambiente artificial*. Madrid: Celeste Ediciones, 1992:91-92.

³² There are several perspectives and discussions about this. Personally, I agree that “Social Forces Determine the Shape of Technology”, as posited by Thomas Kuby, quoted by Pauline Madge, “Design, Ecology, Technology: A Historiographical Review” in *Journal of Design History*. 1993:6:3:158. Nonetheless, in design it must be analyzed how this technology influences society directly.

³³ Hessen, Johan. *Teoría del conocimiento*. Translated by José Gaos. Buenos Aires: Losada, S.A., 1997:103-104. Originally published in *Leitfäden der Philosophie*. Köln, 1925.

³⁴ From the Greek *dialogein*, converse, discuss. “Dialectics refers to statements discussed in a triadic dialogue: thesis-antithesis-synthesis. Dialectics in Hegel is the triadic succession or movement of thought (spirit). The last step (synthesis) acts as thesis for a new step, and so on. Marxist dialectics, derived from Hegel’s philosophy, considers dialectics as the doctrine of universal concatenation or connection of all the most general laws ruling and governing the development of nature, human society, and thinking.” J.M. Mardones and N. Ursúa. *Ibid*:248-249. [my translation]

³⁵ From the introduction by Wolfgang Jean Stock in Aicher, Otl. *El mundo como proyecto*. Mexico: Ediciones Gustavo Gilli, S.A., 1994:12. (English edition: *The World as Design*. Axel Menges, ed. Michael Robinson, trans. Berlin: Ernst & Sohn, 1994).

³⁶ Incremental creativity is opposed to AHA!-creativity. R.W. Weisberg *Creativity: genius and other myths*. (New York: Freeman, 1986), is the author of the incremental activity theory.

³⁷ Study by Miguel Angel Aguilar (Master’s Degree in Architecture) and Luz María Jiménez N. (Industrial Designer); Research Center of the National University of Colombia at Manizales. See the final research report “Diseño & Método”, and the introductory manual “Camino al diseño” (1995).

³⁸ Sensitivity towards aesthetic and social phenomena must be a part of designers’ studies. With time this sensitivity will become an aesthetic experience. Designers discern objects differently from other people. When looking at them, they observe them. This is the exercise I am referring to here.

³⁹ Problems about visual thinking and expression are occasionally solved by teaching drawing as a formula. Nonetheless, the use of graphic expression in design adds up to transforming it in a tool for design thinking. For further information on this subject see Rudolf Arnheim, “Sketching and Psychology of Design” in *Design Issues* (Spring, 1993):9:2:15-19.

⁴⁰ This talent ranges from artistic aspects to administrative or business aspects. The analysis by Richard Buchanan in “Myth and Maturity. Toward a New Order in the Decade of Design” is interesting in this regard because he underscores that mythical

figures in design “gained access to the highest levels of business decision making by displaying natural talents: common sense, an ability to identify opportunities for innovation in practice and production, and intuitive skill in persuasive communication... they had the instincts of great salesmen.” (*The Idea of Design*, Victor Margolin and Richard Buchanan, eds. Cambridge: The MIT Press, 1996:80.

⁴¹ Jürgen Habermas, "Technical progress and the social life-world" in *Toward a rational society: Student Protest, Science, and Politics*. Boston: Beacon Press, 1971. Pag: 61.

⁴² According to Dewey, reflexive expression is found “in discovery of the detailed connections of our activities and what happen in consequence... The deliberate cultivation of this phase of thought constitutes thinking as distinctive experience.” (*Democracy and Education. Ibid: chapter 7*).

⁴³ This is a problem I have had to deal with in my own experience when doing research about creativity in design, so that it would not result in a psychology study. Although the theoretical referents came from the cognitive sciences, I managed to overcome the problem when I focused the problems from design experiences. This undoubtedly achieved a distinctly clear approach of its own, with new elements.

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