

TRANFERRING NEW KNOWLEDGE FROM THE FIELD OF NEUROSCIENCE TO PRODUCT DESIGN EDUCATION

Silvia D. Ferraris PhD¹

¹Unità di Ricerca ProgettoProdotto, Dipartimento INDACO, Politecnico di Milano

ABSTRACT

This paper aims to investigate the current results in the field of Neurosciences that applied to the study of Arts in order to look for interesting link to the Industrial Design discipline, in particular to the education of product design. The paper will set the path for a study meant to identify any findings that could be interesting for the discipline, especially the possibility of translating such theoretical knowledge into practical and useful notions by structuring new Basic Design exercises. The fundamental idea is that some findings can most probably be successfully implemented into the design activity through design education.

Indeed some peculiar human skills (sense, perception and interpretation) are emphasised in the performance (of shape forming) of designers and artists' activity.

Thus, the whole of new findings in neurosciences that apply to art may also be interesting to the design discipline. This would be as much interesting as it could be possible to translate theoretical findings into practical notions. It would be interesting to find out if there are findings that can be usefully implemented into the design of products. This implementation could be effected by an accurate elaboration of new design exercises.

Aim of this paper is to investigate the opportunity of a study dedicated to the research issue above mentioned, illustrating possible goals, tools, action and results of the research. Such a study is now under evaluation for funding for the "Art and Neurosciences Project of the Italian Academy for Advanced Studies in America at Columbia University.

Keywords: Neurosciences applied to arts, Basic Design, art and design, product design education.

1 INTRODUCTION

The study of Art under a neurological point of view was largely developing in the last decade and counts already some fundamental works from some neuroscientists such as Semir Zeki, who wrote a *Vision of the Brain* (1993) and *Inner Vision: an exploration of art and the brain* (1999) and founded the new field of research called neuroaesthetics, and from Vilayanur Ramachandran who recently wrote with William Hirstein the paper *The Science of Art* [1] in which he enounced the *Ten Principles of Art* in "the attempt to discover universals in art based on our knowledge of neuroscience, and visual neuroscience in particular." [2]

This basis are fundamental for the developing of a specific research on Neurosciences applied to product design, thanks to the fact that Industrial Design discipline is indeed characterised by a dual and inseparable nature: artistic and technical.

2 ART AND DESIGN CONNECTION

2.1 When design coincides with art

In the history of its complex definition there is a traceable effort to differentiate design from art empathizing its (practical) functional aspects. Tomàs Maldonado defined it as the activity “considered, as a rule, like the design of objects industrially made, that is by machines and by mass-production”[3]. Still he stated that it is not enough to describe it. Indeed, compared to arts, its task is to design the shape of product, so that shape is not aprioristically based on aesthetical values but it originates from an activity meant to “coordinate, integrate and articulate all those factors that, one way or another, take part in the constitutive process of product shape. And, more precisely, those factors that relate to use, fruition and individual or social consumption (functional, social and cultural factors) so as those that relate to production (techno-economic, techno-constructive, techno-systemic, techno-productive and techno-distributive factors).” [4] Speaking of similitudes and differences, in a neat way Joseph Albers stated that art and design are something adjoining but different, different because design is an activity *aimed at something*, adjoining because the contact zone is that of formal issue [5].

Designers and artists assign to the shape of their objects the communication of their intentions. If the former do it for a functional purpose they still have to responsibly consider the final shape under an aesthetical perspective too. Indeed “a fundamental characteristic of designer’s work is to express, invent, make intelligible the language of contemporaneity, the same task of artists...an aesthetical value of (product) form exists”[6].

So it is largely agreed that the unavoidable relation between art and design is based on their type of activity by which material takes shape. The study proposed is based on this fundamental connection.

Indeed, after a historical period dominated by a functionalist approach, the communicational functions of design raised to attention: “the concept of product language in the 1980s implied that design is concerned chiefly with human-object relations. This means that design knowledge focuses on the relationship between users and objects. Of particular importance here are the functions imparted by perception (i.e. those which are perceived through the human senses).”[7]

Indeed some peculiar human skills (sense, perception and interpretation) are emphasised in the performance (of shape forming) of designers and artists’ activity.

2.2 From theory to practice

Following these considerations, it is thinkable that the new findings in neurosciences that apply to art may also be interesting to the design discipline. This would be as much interesting as it could be possible to translate theoretical findings into practical notions. Indeed these practical notions could be even more significant for industrial design rather than art since, as it was mention, design is an applied activity that could benefit from any increase in effective notions. It would be extremely interesting to find out if there are findings that can be usefully implemented into the design of products. This implementation could be probably effected by an accurate elaboration of new design exercises.

The essence of this reasoning is represented in Figure 1.

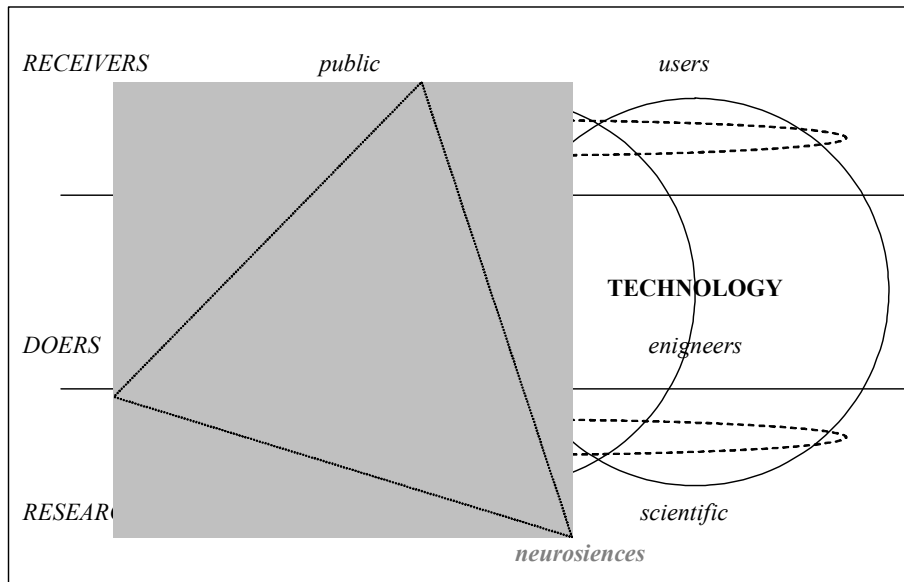


Figure 1 – Relation of disciplines and roles, with neuroscience point of view.

Design is a discipline and activity made of two hemispheres (art and technology). Figure 1. shows three levels with three type of actors involved: researchers, doers and receivers. The relation among these three actors often is mediated by the activity of teachers, that translate knowledge to students, and from producers, who make designs into products. Looking at neuroscience study on art it is suggested that it includes design too, and that the knowledge could pass by teaching activity. Indeed sometimes large amount of knowledge needs to be synthesised for students and, especially in practical subjects, it can be very successfully transferred directly into practical knowledge by mean of exercises elaborated to that purpose.

3 BRAIN AND DESIGN EDUCATION

3.1 When Gestalt Psychology and Basic Design met

As it was introduced the proposed study focuses on the connection between art and industrial design under the formal perspective. In particular the attention is oriented to the educational aspects of “shaping objects”, that is how to teach students how to form shapes. There are different traditions in design teaching, but certainly the most structured and dedicated to the formal issue is Basic Design. Originated at Bauhaus, later spread in US and developed at Ulm, in Italy finds most of its legacy in the teaching activity of professor Giovanni Anceschi who explains: “in Basic (Design) it is the didactic activity that transmits and contemporaneously generates the corpus of knowledge. The corpus of knowledge is distilled in the exercises. The exercises are literally paradigmatic, exemplary. They are the generalization, the simplification of a recurring design problem.”[8] Therefore Basic Design represents and builds the fundamental knowledge for design activity. According to this view, at the time of Basic Design origins, several different design problems were analysed and translated into exercises. “As at the Bauhaus, the foundation course was taken very seriously at Ulm. Its goal was to teach the general fundamentals of design, theoretical and scientific knowledge, and to introduce students to the practical work of design. Here too, the

teaching method aimed to sensitize the faculties of perception through experimentation with the elementary tools of design (colours, forms, Gestalt laws, materials, surfaces).” [9] The distinguishing characteristic of these exercises (developed with most accuracy at Ulm) is the selection of a single problem to develop, for instance how to obtain and handle “colour balance”, “symmetry” and “contrasts”.

Among these exercises some concerned perception problems and they were generated in connection to the findings of the gestalt psychology that was being developed in ‘20ties “by three German psychologists, Max Wertheimer, Kurt Koffka and Wolfgang Köhler. None of the gestalt psychologists were artists, much less designers, but early on there were signs of a mutual interest between the two disciplines. The painter Paul Klee, who had known about Wertheimer's research as early as 1925 and other Bauhaus artists were also interested, including Wassily Kandinsky and Josef Albers. Albers's curiosity about gestalt theory may be significant because he is now commonly credited with a resurgence of interest in "simultaneous contrast," which von Dürckheim discussed in his lectures.” [10] While concerning Kandinsky “it is enough to point out that his artistic oeuvre during the Bauhaus period and the text and illustrations in the book *Point and Line to Plane* frequently revealed a remarkable proximity to these gestalt principles. It is unimportant whether a direct influence of gestalt psychology exists here or whether it might be an example of simultaneity of events; the fact remains that in his search for a figured bass of painting Kandinsky began to formulate at the Bauhaus a design language whose claim to validity could be supported and legitimated by the research of gestalt psychology.”[11]

Anyhow, what is important to mention in this occasion is that, even if criticised for being extremely formalist by contemporary and succeeding artistic movements, such an approach gave birth to basic exercises relevant and useful to educational purpose of design teaching, especially of communication design, since most of the findings apply to visual perception.

3.2 When product design education meets Neurosciences

Following this trace it is very likely to suppose that new understating of brain activity and structure may lead to new knowledge that should be translated into useful information for designers and that could be transferred to them by new basic exercises.

At the Politecnico di Milano professor Marco Maiocchi [12] made a first reading of the Ramachandran's ten *Principles of Art* from a design point of view, especially from the communication aspects. His main idea is to look for structural rules and elements that would be useful for an “aesthetic translation”, for example to translate a picture into a poem, or a painting into a design product, that is translating the emotion from one mean of expression to the other. This kind of approach was used by the teacher for the formalization of an exercise though to develop design students' creativity especially from a communication design point of view: student were ask to translate a famous painting into a sofa by analysing the painting characteristics and transferring them into the product shape. This exercise is too complex to be considered as a Basic Design exercise, still it is an interesting experiment of making neuroscience accessible and possible to implemment by designers.

How could be possible to transfer new understanding of brain activity into Basic Design exercises? Let's take one of Ramachandran's ten *Principles of Art* and see.

The first principle discussed in “The Science of Art” is called Peak shift. “Ramachandran and Hirstein compare the peak shift effect to the Sanskrit word "rasa," which is loosely translated as "essence." The peak shift involves the extraction of the

"rasa" of a particular shape, color, etc. For example, consider the Hindu sculpture below. They argue that the artist has abstracted the female body shape, and exaggerated it in a direction that takes it away from the male body shape, thus making the sculpture more aesthetically pleasing.”[13]



Figure 2 The Goddess Parvati – Saab 92 – OXO peeler and Meat Pounder

This principle has been used by artists of all cultures and times and it is now explained and consolidated by science. It is now unimportant to know that it was consciously used or not, what is interesting is the possibility to transfer this to product design education. It is imaginable to translate this rule into Basic Design exercise where students work on objects' peak shift looking for aesthetically pleasant results. It could be done, for instance, by giving a peak shift to a shape that doesn't have any. This could be easily obtained by exercising with a 3D computer programs that very quickly stretch shapes and proportions.

Indeed it would be useful for students to deeply understand the meaning of this principle that has been commonly used by designers so much as by artists. Examples can be traced in design styles such as streamline, where cars shapes were exaggerated in their aerodynamic lines, as in the famous Saab (Figure 2) designed by Sixten Sason or in product's, such as OXO tools (Figure 2) where ergonomic shape are dominant in the aesthetics of the product. Actually, in this second example, the object's shape is a result of ergonomic choice rather than an esthetical choice, still, eventually the Company success is largely based on the Brand recognizability given by its products typical style where ergonomic shapes are certainly a pick shift of the product whole figure.

As for the Pick Shift, each principle can be studied and transferred to specific exercises defined to develop student's understanding and sensibility toward the content, meaning and potentiality of the principle.

4 CONCLUSIONS

The study here described has an explorative character meant to investigate the relation between Neurosciences findings and Industrial Design, putting the stress on teaching activity, purpose and tools. From a methodological point of view, it should alternate theoretical studies to practical experiments realised by new Basic Design exercises. These will be performed at first by the author and, later on, tested (after first attempts and improvements) by other subjects (preferably product design students). Probably it would be useful to elaborate one exercise (or a family of exercises) for each single principle. So the procedure could be based: elaboration of the new exercise, test by the author and later test with a class of students. This procedure could be followed again

until reaching a effective exercise that help the students to understand and to be able to apply the principle.

This experimental part of the study would represent a base for a theoretical understanding, on a broad perspective, of the relation of Neurosciences and Industrial Design discipline. In particular the experimental elaboration of exercises should help to investigate what knowledge reached in Neurosciences is interesting for the discipline. Furthermore the elaboration of Basic Design exercises could be implemented in Product Design teaching in order to reach the activity of designers in an indirect but effective way.

Form an educational point of view the study described in this paper aims also to participate to the effort of bringing Basic Design to a larger extent of action, while updating the teaching, looking for new Basic Design exercises based on new findings in the field of Neurosciences.

REFERENCES

- [1] Ramachandran, V.S., Hirstein W. The Science of Art in Journal of Consciousness Studies, 6, No. 6-7, 1999, pp. 15–51
- [2] The Cognitive Science of Art: Ramachandran's 10 Principles of Art, January 20, 2005, <http://mixingmemory.blogspot.com/2005/01/cognitive-science-of-art-ramachandrans.html>
- [3] Maldonado, T., Disegno Industriale: un riesame, 1st.ed.1976, Feltrinelli, Milano, 2003, p. 9
- [4] Ibidem, p.12
- [5] Albers, J., Search versus research: three lectures by Josef Albers at Trinity College, April 1965, Hartford, Conn., Trinity College Press, 1969
- [6] Trabucco, F., *Residui di produzione*, Aracne, Roma, 2006, p.64
- [7] Bürdek, B. E., Design: History, Theory and Practice of Product Design, Birkhauser, Basel, 2004, p. 293
- [8] Anceschi, G., Basic Design, fundamenta del design in *L'ambiente dell'apprendimento. Web design e processi cognitivi*, McGraw Hill, 2006, pp.55-57
- [9] Bürdek, B. E., 2004 aforsaid, pp.28-32
- [10] Behrens, R. R., Art, Design and Gestalt Theory, in *Leonardo*, Vol. 31, No. 4, 1998
- [11] Bürdek, B. E., 2004 aforsaid, p. 200
- [12] Maiocchi, M., Comunicazione, Design, Strutture, INAC/ Ulisse& Calipso, Napoli, 2006
- [13] *The Cognitive Science of Art: Ramachandran's 10 Principles of Art*, January 20, 2005, <http://mixingmemory.blogspot.com/2005/01/cognitive-science-of-art-ramachandrans.html>

Silvia D. FERRARIS
Unità di Ricerca ProgettoProdotto,
Dipartimento INDACO, Politecnico di
Milano
via Durando 38/a, 20158 Milan, Italy
silvia.ferraris@polimi.it
+39 02 2399 5988