

The Development of Emotional Engineering and the Role of Design

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1. Introduction

In a seminar room in Seoul in the late 1980's, Prof. Nakamachi of Hiroshima University, Japan, was having a seminar on an unfamiliar theme of "KANSEI engineering."¹⁾ As soon as the key words of images corresponding to a product wanted were typed in, the computer, through its "mysterious" logic, visualized up a product which matched the image. The CEOs, who were accustomed to designers whose works depended on their "feelings," were amazed at the computer; on the other hand, designers were perplexed at the unfamiliar "systematical" and "engineering" words such as "expert system" and "multiple regression analysis," while looking down at the somewhat "rough" designs of furniture or female clothing that the computer was putting out. Soon emotional engineering became a keyword in design and the Korean government founded a basis of research for emotional engineering, by including the subject into their G-7 project.

Then, what questions does this kind of globalization raise with regards to our topic of design? Do we literally mean the globalization of design? What does this mean in concrete terms? We can say that the globalization of design has already occurred in the sense that anywhere we go in the world, we can find an international kind of architecture as well as people wearing blue jeans and using the Internet. Therefore, design today disseminates the same tastes and same lifestyles across regions and borders, transcending races and generations. However, this phenomenon itself is not new at all. Viewed on a macro level, globalization is the outcome of a continual process of modernization and westernization that started as early as the 16th century or more recently, from the 19th century. Globalization is simply the term used to describe this phenomenon which has become relatively more accelerated recently. We often understand the history of design as the continuation of two different trends, modernism and postmodernism. Of course this kind of definition originates from an intellectual discourse centered on Western design and thus it does not fully explain the development of design in the 20th century. However, design in the age of globalization looms as an evident reality, not intellectual discourse. It is the result of a longer-term modernization process, which encompasses the discussion on modernism or postmodernism.

Prof. Nakamachi defines emotional engineering as "the technology to design goods which appeal to emotion and sensibility by translating human sensibility and images into physical design factors." Designers are perplexed at this definition because they have been doing the same thing for a long time. Though the word emotional engineering was not used, the same method such as semantic differential or image board have been used for so long. The difference was that while Prof. Nakamachi proposed a method which was transparent and persuasive, based on the computer and statistics, designers have emphasized intuition and obscured the method in the realm of art inaccessible to laymen. Therefore, the current situation is that the livelihood of designers is being threatened is somewhat caused by the designers themselves, for they couldn't systemize their methods.

2. The Development of Emotional Engineering and Design

By the time emotional engineering was introduced, the academic paradigm was proceeding from hardware to software, from a machine-centered age to a human-centered age of sensibility. Ergonomics, the source of emotional engineering, could become the dominant discipline, since it adapted itself to the big current of the time, by changing from physical research which mainly focused on the measurement of human body, human-machine interface, degree of fatigue, tools, and introduced emotion and sensibility into the discipline.

Emotional engineering, at its inception stage, focused on the "image keyword and its transformation into a form." The process included showing customers the products with various formal elements, asking them for adjectives appropriate to the image, analyzing their responses through factor analysis, and arranging the products into groups in the image space. Or products with a specific image were designed by the combination of formal elements, which contributed to the image through conjoint analysis or multiple regression analysis. The more advanced system included methods like data-basing customers' responses and inferring the forms which the target group preferred in relation to the demographic characteristics and life style of the customer groups. The main focus of these processes was given to the "visual realization" of how language should be transformed into the visual form. It was definitely more systematic than conventional image-board work, in which designers cut pictures with various images and put them on a board with the axes of "soft-hard" and "warm-cool." However, the statistic methods mentioned above were so unfamiliar and complicated that designers remained at the stage of visualizing the results of statistic process in marketing rather than actively participating in the process.

Consequently, the research result was not fully reflected in design, while designers and researchers were pursuing their own way respectively. Therefore, "design produced by emotional engineering" meant something marginal in design such as a more curved line or soft color.

Though emotional engineering in its early phase centered on the visual sense, it soon extended to include the "highly psychological experiences which external physical stimuli and senses produced within humans" to encompass all five senses. For example, Mazda MX5 in Picture 1, adopted the artificial sound similar to those of the British sports cars in order to appeal to the ear and give a "more real" effect than original friction sound at the time of gear-shifting. Similar examples can be found in the cars of some younger people who remodel their mufflers to make a din. Likewise, research can be done on the strength of air coming out of an electric fan, the kind of wind which gives the optimum freshness, the type of air-freshener which gives the most comfort, and the kind of texture which gives a fresh feeling. A few years ago, I was proposed to do research on the degree of friction and noise of a refrigerator that is acceptable to a customer.

As its research area extended from "visual sense" to cover "entire senses," emotional engineering was divided into areas: "Evaluation," which measures various human emotion and sensibility, "simulation," in which reaction of emotion and sensibility can be obtained in advance in a simulated environment, and "application," which applies the research results into the making of specific products. The disciplines involved in emotional engineering include not only ergonomics but also cognitive engineering, psychology, physiology, fuzzy-neural network, and technologies on virtual reality, human sensibility measurement, biodynamics, and sensor.

Prof. Akira Harada of Tsukuba University, Japan, is carrying out special research projects on "Modeling the Evaluation Structure of KANSEI" with funding from the Ministry of Education for five years since 1997 (more than 4.5 million dollars was granted). Professors and experts in design, ergonomics, fine art, linguistics, robot engineering, electronic information engineering, and sociology are involved in this project. In the project, a remote user can view the images of works of fine art and design in the virtual museum of Tsukuba University, by operating a robot. All kinds of interaction data on the attitude of the audience toward the works of art such as the tracks of appreciation and the time of appreciation, are stored in the server, and then interpreted to evaluate the audience's emotional structure. Considerable progresses in technologies on networking, robot operation, evaluation, virtual reality, and representation have been made.

While participating in this project as an overseas researcher, I was at first doubtful about how a robot could be related to emotional engineering or design. But looking at the recently developed robot products, AIBO, the robot pet dog by Sony and Mindstorm, a robot toy by Lego, dismisses our ideas of robots as a welding machine in an automobile plant. The role of the designer needs to change in designing such an intelligent robot. In the future, designers may have to design an "emotional expression of the face" or a "movement."

3. Conclusion

As the research area and range of emotional engineering broadens, Korean designers are being left behind, for they have been focused on the realization of visual characteristics of their products. For example, of the 16 research projects of emotional engineering conducted in the first year of G-7 Projects, which was initiated in 1995, only one project of "the development of the next-generation emotion-intended multimedia product for domestic use" was conducted by designers. This tendency will continue as long as designers limit their roles to the realization of visual characteristics of their products. Designers don't have to become Leonardo da Vincis, who could do everything himself. However, designers need to co-operate with other academic disciplines and pursue the common objectives of the emotional satisfaction of users within them.

In the new millennium, a number of new areas, which no conventional discipline can claim to be its own are emerging, such as HCI(Human Computer Interactivity) and emotional engineering. Designers need to break the tall fence around themselves and discover the new world of the unknown.