

BEAUTY IN USABILITY: FORGET ABOUT EASE OF USE!

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Introduction

Despite years of usability research, electronic products do not seem to get any easier to use. The design of electronic products appears to be in a dead-end street. It is time to experiment with fresh approaches. In this paper we offer a new approach based on respect for the user. We all have senses and a body with which we can respond to what our environment affords (Gibson, 1979). Why, then, does interaction design not use these bodily skills more often and make electronic interaction more tangible? And, as humans are emotional beings, why not make interaction a more fun and beautiful experience? This paper focuses on those neglected aspects of human-product interaction: perceptual-motor and emotional skills.

First we give the new background against which the designer operates. Then we give a number of examples from our own and our students' research work. As we go along we make clear why this new approach calls for new methods and what these methods are. The point we wish to make is that to get to new innovative products, the interaction problem should be dealt with on the level of creating a context for experience allowing for rich aesthetics of interaction.

Respect

The shop assistant threw the biscuit at my feet. I bent down and subserviently began to pick up the crumbs. After some fiddling, I managed to get my change out of his clenched fist. Just imagine you were treated like this in a shop. No doubt you would be most offended. But this is, in fact, the way in which a vending machine treats us when we buy something from it. Somehow we have come to accept a standard of respect in human-machine interaction which is very different from that in human-human interaction.

We believe that respect for man as a whole should be the starting-point for design. For the sake of analysis, man's skills, which are used when interacting with products, may be considered on three levels, the wholly trinity of interaction: cognitive skills, perceptual-motor skills and emotional skills. In other words, knowing, doing and feeling.

Research on human-product interaction, however, has shifted to cognitive skills. This emphasis on the cognitive is easily understood, as there is no electronic counterpart for the mechanical world-view that still dominates Western thinking. We understand the world of moving machines, since we consider, to a certain extent, our bodies to be mechanical machines. Take da Vinci as an example. His world of cogwheels and crossbars lends itself to easy experimentation and imaginative play while designing. Even a non-technical person can "feel" the strength of such designs, even when he doesn't fully understand the workings. The electronic world is more opaque to us. What happens inside electronic products is intangible: it neither fits the mechanics of our body nor the mechanical view of the world. In contrast with mechanical components, electronic components do not impose specific forms or interactions for a design. Products have become 'intelligent', and intelligence has no form.

Design research, quite naturally, turned to the intelligent part of humans. This primacy of rationality is often chosen because it leads to solutions that can be easily implemented into or simulated on computers. Interaction design typically starts from what is technical possible and follows the framework of the established sciences. The interaction problem is divided into elements and relations between these elements, and often captured in a flow chart. Ease of use aimed for through rational analysis: **the rational is assumed to lead to ease of use**. Usability is aimed for through a logical dialogue using speech recognition, through grouping and colour coding of buttons with related functions, through adding displays with an abundance of text and icons, and through writing logically structured manuals.

This is a very valuable way to go about, but not the only route, we think, designers should explore.

The experiential

We think it is necessary to include the other two levels of human-product interaction into the picture: perceptual-motor skills and emotional skills.

Perceptual-motor skills, i.e. what people can perceive with their senses and what they can do with their body, require physical interaction, i.e. handling objects instead of icons on a screen. This choice for tangibility nicely fits the newest trends in the human-computer interaction (HCI) community (Cohen., Withgott., & Piernot, 1999).

Emphasis on emotional skills is growing too. The Media Lab at MIT is making a study of “affective computing” (Picard, 1997). Damasio’s book (Damasio, 1994) has shown that pure logic alone, without emotional value, leaves a person, or a machine for that matter, indecisive. Our department organized the First International Conference on Design and Emotion last year (Overbeeke & Hekkert, 1999). And emotion has entered the stage not only in academic circles but also in industry. At our faculty, Mitsubishi is funding the “Designing Emotion“ project in which an instrument is developed to measure people’s emotional reactions to cars (Desmet et al., 1999).

Where then can the interaction designer seek advice to achieve the integration of the impossible: accelerating technological innovations, human perceptual-motor, cognitive and emotional skills and electronic aesthetics? We think that essentially this problem can be solved by turning to the user’s experience fully respecting all his skills. The designer needs to create a context for experience, rather than just a product. He offers the user a context in which he may enjoy a film, dinner, cleaning, playing, working ... with all his senses. It is his task to make the product’s function accessible to the user whilst allowing for interaction with the product in a beautiful way. Aesthetics of interaction is his goal. The user should experience the access to the product’s function as aesthetically pleasing. A prerequisite for this is that the user should at the very least not be frustrated. However, we are not promoting “ease of use” as a design goal. Interfaces should be surprising, seductive, smart, rewarding, tempting, even moody, and thereby exhilarating to use. The interaction with the product should contribute to the overall pleasure found in the function of the product itself. **The experiential is assumed to lead to joy of use.**

The following example should clarify what we mean. Suppose the user wants to watch a movie for his enjoyment. He has to program his VCR in order to get it working at a later date. VCR manufacturers certainly give the impression of having done everything in their power to make the user as frustrated as possible. Why not make a machine that is a joy to use? We are not saying that “technical” design with a large number of functions and buttons should be

avoided; some people actually like it that way. We call for diversity in product design. Not all VCRs should look the same. Why is there such an experiential diversity in car design, and not in VCR design?

To build this stage of emotionally rich interactions the designer needs new methods to sound out the experiential world of the user. Interaction relabelling and designing for extreme characters are new methods that are illustrated below.

Once the designer gets a feel for the experiential world of the user, he needs to focus on designing the interaction. He needs to stay tuned to the experiential. The following focus supports will also be illustrated in the examples (Djajadiningrat et al., 2000).

1. *Don't think affordances, think temptation.*

Ergonomics, HCI and product design have borrowed the term affordances from perception-psychology (Gibson, 1979). Affordance is a very useful concept here because it refers to the inextricability of both perception and action, and a person and his environment. It is about what people can do. Furthermore it is essentially a non-cognitive and non-representational concept. However, many researchers concentrated on the structural aspects of affordances whilst neglecting the affective aspects. We lament this clinical interpretation of affordance. People are not invited to act only because a design fits their physical measurements. They can also be tempted to act through the expectation of beauty of interaction.

2. *Don't think beauty in appearance, think beauty in interaction.*

Usability is generally treated separately from aesthetics. Aesthetics in product design appears to be restricted to making products beautiful in appearance. As the ease of use strategies do not appear to pay off, this has left us in the curious situation that we have products which look good at first sight, but frustrate us as soon as we start interacting with them. Again, we think that the emphasis should shift from a beautiful appearance to beautiful interaction, of which beautiful appearance is a part. Dunne (1999) too talks of 'an aesthetics of use': an aesthetics which, through the interactivity made possible by computing, seeks a developing and more nuanced co-operation with the object - a co-operation which, it is hoped, might enhance social contact and everyday experience.

3. *Don't think ease of use, think enjoyment of the experience.*

Current efforts on improving usability focus on making things easier. However, there is more to usability than ease of use. A user may choose to work with a product despite it being difficult to use, because it is challenging, seductive, playful, surprising, memorable or rewarding, resulting in enjoyment of the experience. No musician learnt to play the violin because it was easy. Bringing together 'contexts for experience' and 'aesthetics of interaction' means that we do not strive for making a function as easy to access as possible, but for making the unlocking of the functionality contribute to the overall experience.

Examples

The key question for design still remains however: how will these 'experiential' products differ from the 'normal' ones? We will give three examples from research and teaching projects.

Appointment manager

For his masters project, Frens designed an appointment manager, a handheld electronic device which aids its user in managing appointments. In ranking the importance of an appointment,

Frens' appointment manager not only considers the factual aspects of an appointment such as time and location but also the feelings of its user towards an appointment or towards the person the appointment is with. Frens' approach to the appointment manager acknowledges that emotions are an important consideration in managing our daily lives, often neglected in purely cognitive approaches.



Figure 1 (left): Appointment manager. A rotatable ring sits around the top screen.

Figure 2 (right): Interface example using virtual blades.

In his project, Frens used two new methods to explore aesthetics, interaction and role (Djajadiningrat et al., 2000). In the first method, interaction relabelling, designers choose an existing product that is rich in terms of actions. Then, pretending that this is the object to be designed, they have to tell and act out how it works. For example, Frens offered fellow designers a toy gun, asked them to pretend that it was an appointment manager and to describe and act out how they would interact with it. Interaction relabelling works particularly well with mechanical products as it makes designers aware of how poor electronic products are in terms of actions. Interaction relabelling also sensitizes designers to how interaction says something about the user and the relationship between the user and product. In the second method, designing for extreme characters, designers create products for fictitious characters that are emotional exaggerations. This helps to expose character traits which otherwise remain hidden. For example, one of Frens' extreme characters was a hedonistic, polyandrous twenty-year old woman. This choice of character required Frens to come up with an appointment manager which allows the woman to maximize the fun in her life and which supports her in juggling appointments with multiple boyfriends who may not know of each other. In his final design, Frens aimed to achieve aesthetics of interaction by treating hardware and on-screen graphics as inseparable. The user navigates through time by means of a ring which sits around the top screen (Figure 1). The direct coupling between the rotation of the ring and the flow of characters over the screen makes for a beautiful interaction. Through the positioning of the multiple screens, the woman can rate her boyfriends on various issues such as shopping, dining, sex etc. in a playful manner. Virtual blades allow her to compare her current view on her boyfriends with the previous one (Figure 2). These aspects of the design show respect for the user's perceptual-motor skills, not only from a structural but also from an affective point of view.

To clarify our stance on aesthetics of interaction we may contrast Frens' design with the designs of Emilio Ambasz (Sipek et al., 1993). Ambasz' products make use of soft materials which are pleasurable to the touch. We value the importance of this approach, how touch is often neglected in electronic products and the influence it has on how enjoyable a product is

to work with. However, in our approach the aesthetics of interaction stems from a symbiosis between the physical, the virtual and the resulting interaction rather than the application of pleasurable materials to an otherwise conventional interface.



Figure 3: Wallet with incorporated television and walkman by Ambasz

Interactive chair

Cheung's masters project is an example of how we try to tackle problems at a behavioural rather than an analytical level. In the context of office chair design, Cheung is researching the relationship between the visible movements of the user in the chair, called macro-movements, and user experience. Macro-movements can be seen as indicators of behaviour. As people's behaviour changes with their emotional state, macro-movements may reflect that state. In an experiment, Cheung compared macro-movements with data obtained through questionnaires and physiological measurements. This information on how macro-movements are related to the user's feelings can be used for two purposes. First, such information could be used to evaluate how users experience existing chair designs. Compared to physiological measurements, detecting macro-movements can be achieved in a less intrusive manner. Compared to questionnaires, macro-movements are more direct and can be taken 'in the act' rather than afterwards.

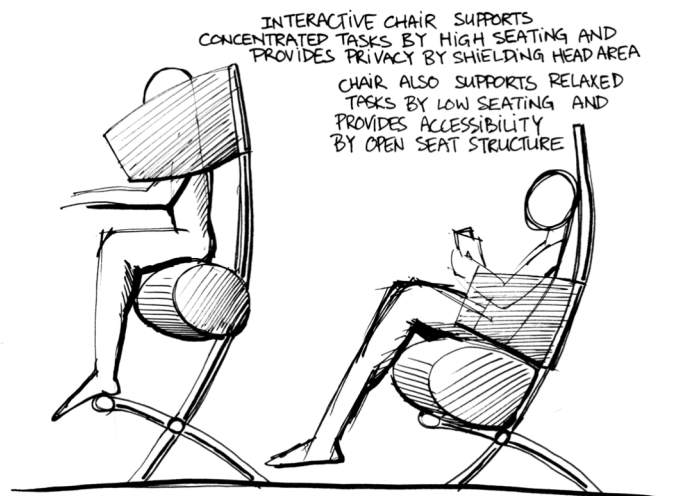
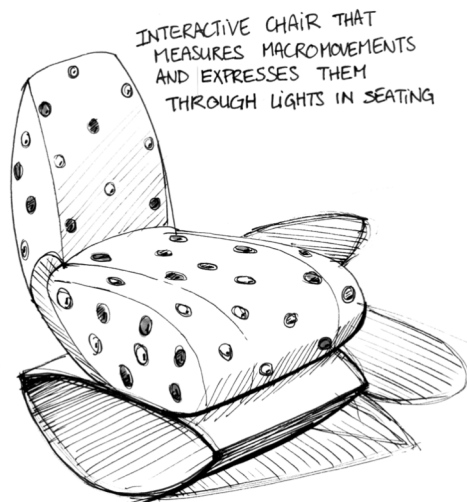


Figure 4 : Sketches of interactive chairs by Cheung

Second, this information can lead to the design of interactive chairs. Interactive chairs can be used for a number of purposes. For example, a chair may monitor the user's state of well-being and convince the user to change his posture or to change to a different task to counter RSI-related problems. Another application is to have the chair act as an input device for communication devices such as telephone or ICQ. The chair may detect a state of stress or concentration, communicate this to telephone or computer system, which enables these to filter incoming messages and limit these messages to the urgent or important. Finally, an interactive chair may support the user's current state by changing configuration. When the user is highly concentrated the chair can support this mode of working by shielding the user from his colleagues (see Figure 4).

Personal pagers

Current communication technologies do not show much respect for their users. Telephone calls and internet messages will interrupt you regardless of how busy or concentrated you are. This can be aggravating for both the sender and the recipient. For an urgent message, a sender may want to get hold of the recipient at any cost, while for a not so important message he only wants to disturb the recipient if time allows. Likewise, the recipient may wish to signal that she is busy, allowing only urgent messages to come through or that she is more generally available when things are less hectic. For a design exercise, we asked our students to design a pager which would allow the user to communicate the urgency of a message to be sent and his availability for incoming messages. The pager should be able to send the simple message "I need you" in a non-verbal manner. Furthermore, it should allow the user to contact two specific friends. In its appearance and interaction the pager had to express the users and the functions.

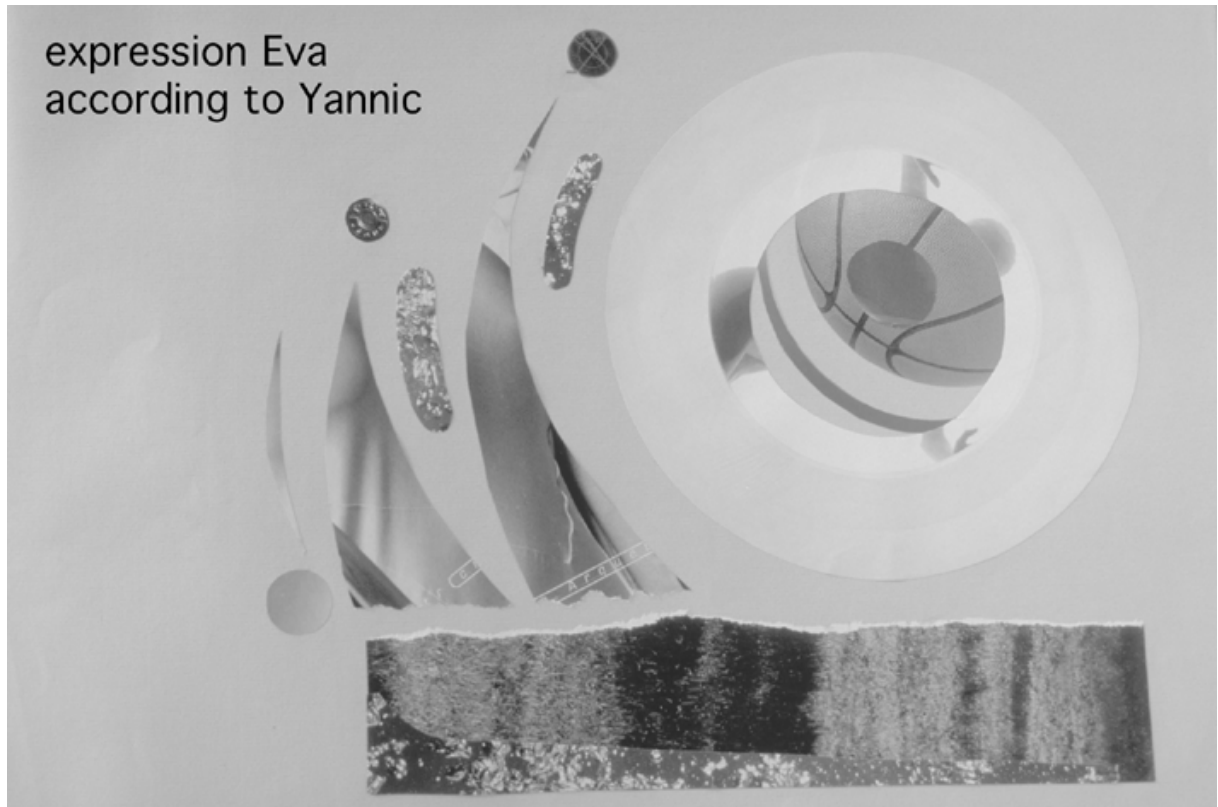


Figure 5 The collage expressing Eva according to Yannic

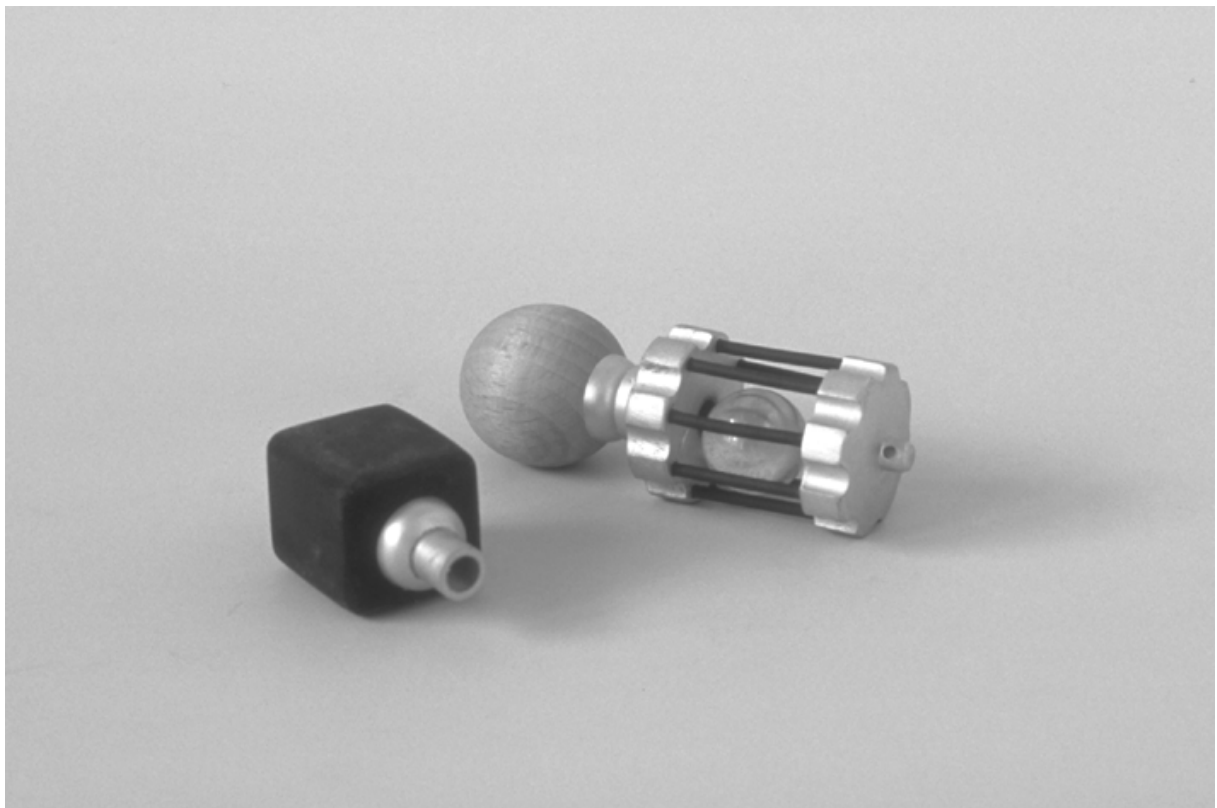


Figure 6: The pager

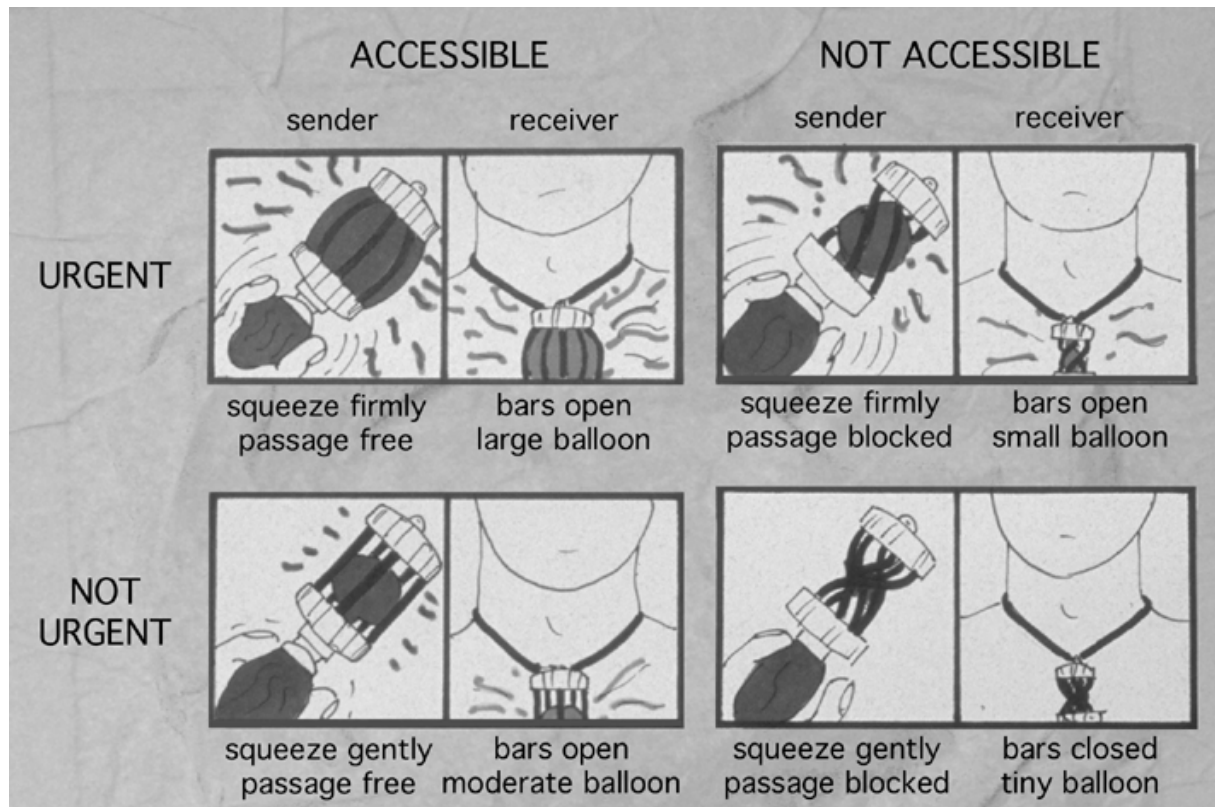


Figure 7: How to use the pager

An example of such a pager is the one designed by Yannic which consists of a central unit with bars, a balloon and two personal pumps (Figures 5 to 7). These pumps are a simplification of the collages Yannic made to express his friends Eva and Cees. The blue cube is used to contact Cees and the yellow sphere is used to contact Eva. To contact Eva, Yannic places the yellow sphere on the central unit and pumps. The force he uses to squeeze the pump indicates the urgency of his message. A comparable unit that is owned by Eva, is reacting to Yannic's call, by a growing balloon that starts emitting a red light. When Eva does not want to be disturbed, she twists the bars from her central unit, thus prohibiting the balloon to grow. Yannic's central unit twists simultaneously, blocking the passage of air and complicating the squeezing activity. These examples show that a context for experience addresses aspects that are ignored in 'traditional' technological products. These contexts for experience have an overall expression in which the appearance and the way of interaction become one. They are adjusted or dynamically adjust to the user and the situation. Finally, the example of the pager shows that intangible electronics do not have to end in intangible products.

Conclusions

In this paper we focussed on two aspects of human-product interaction design that, we think, are often neglected: human perceptual-motor and emotional skills. We discussed these issues from the point of view of *respect* for man as a whole. These issues were illustrated with three examples. With the example of the appointment manager we showed how products should have respect for the user's perceptual-motor and emotional skills. The interactive chair example is an illustration of how interaction should be tackled on a behavioural level rather

than an analytical one (see also Wensveen et al., 2000). The pagers example clarifies how technology can be respectful to the user, and what the importance is of including perceptual-motor skills in products through tangibility.

Last but not least, let us not forget one of the main ingredients in any design: the designer's creativity. Designing itself results from the designer's perceptual-motor, cognitive and emotional skills (q.e.d.).

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