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Special Issue Editorial: *Design & Emotion*

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A Decade of Design and Emotion

This 'emotional' issue marks the 10th anniversary of the International Design & Emotion Society. In November 1999, the society was established after an event organized in Delft that became known as the first International Conference on Design & Emotion. It was an event that brought together a diverse group of 41 designers, design researchers, and design thinkers to share and discuss their views on the role of emotions in product design. The 13 position papers published in the proceedings of this event provide a succinct historical perspective on the ideas of some of the pioneers in the field (see Overbeeke & Hekkert, 1999). Since then, a steady growth in design research has been published that focuses on understanding the emotions of product users, and on the development of tools and techniques that facilitate an emotion-focused design process. The field is interdisciplinary by nature, and ten years after the first conference it is—more then ever—a challenge for students new to the field to gain an overview of the kinds of research represented by the design and emotion domain. By looking back at the proceedings of the Delft event, and referring to some of the exemplary statements made in those position papers, we would like to provide a basis for appreciating the wide variety of research initiatives that have been reported since that first conference.

Note that back then, in 1999, the initiation of the Design and Emotion Society was not an isolated initiative; emotion was in the spirit of the times at the turn of the millennium. In that year, some now-famous seminal books came out that foreshadowed the current widespread interest in emotion. One of the most prominent examples is *The Experience Economy,* in which Pine and Gilmore (1999) were among the first to predict the development towards an economy driven by experiences, foreseeing that the world of goods and services was diminishing. They stressed that, in order to become or remain successful, businesses should learn to stage rich and compelling experiences. In a similar spirit, Jensen (1999) wrote *The Dream Society,* in which he signaled an increasing commercialization of human emotions. In his view, consumers would shift from buying products to the experiences and emotions conveyed by products. In line with this vision, Schmitt (1999) introduced the concept of experiential marketing, transforming the then-popular features-and-benefits approach into one that focused on sensory responses and emotions. Schmitt stressed that emotions are key to developing new products, communicating with costumers, and even in creating business partnerships.

Also in the design profession some visionary books were published expressing an increasing awareness of the importance of user emotions. With *The Inmates Are Running the Asylum*, Cooper (1999) compellingly argued how the majority of available technological devices (videocassette recorders, car alarms, software applications, etc.) made users feel inadequate and frustrated by poorly designed user interfaces. Two years earlier, Picard (1997) advocated in her influential work *Affective Computing* that computerized systems would perform better when emotional competencies would be incorporated. Designers of electronic products, Dunne (1999) wrote in *Hertzian Tales*, must begin to think more broadly about the aesthetic role of their products in everyday life. He stressed that industrial design had much more potential to enrich our daily lives than was evident with the current designs, and argued how design could be used to improve the quality of our relationship to the artificial environment of technology. To facilitate these developments, Gaver, Dunne, and Pacenti (1999) introduced "cultural probes," a research method that enables designers to obtain contextualized and rich insights into the experiences of difficult-to-reach user groups. One year later, Jordan (2000) published *Designing Pleasurable Products*. Traditional usability-based design approaches, he explained, were limited and even dehumanizing because they only focused on a person's physical and cognitive abilities. As an alternative, he proposed a pleasure-based approach to human factors—addressing the relationship between people and products holistically, judging the quality of designs on the basis of the wider relationships between products and the people for whom they are designed.

The bestseller status of these books demonstrates the initiation of a profound interest in the emotional aspects of designing, buying, and using products. But, ten years ago, these books mostly expressed imaginative visions yet to be embraced in education and practice. At that time, in our teaching of design at Delft's Industrial Design Engineering faculty, we found that there was actually little room for experience or emotion in the educational curriculum. Students were thought to conceptualize and optimize products in terms of function, ergonomics, production, and economics. Nobody would argue against the

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idea that usage experience should be pleasurable. But little knowledge was available to support our students in their efforts to consider the experiential impact of their designs. Our initial attempts to study product user emotions in order to increase our understanding of how to deal with them in product development processes, were thus driven by the motivation to support our design students, as well as design professionals. Surprisingly, we found an unexpected resistance against our attempts—from designers. Most designers we discussed our ideas with acknowledged the relevance of emotions, but at the same time many somehow believed them to be the exclusive domain of their intuition, and too intangible to model or predict. This resistance may have been elicited by a fear of compromising design authenticity, as resonated in the words of Green (1999), stating in his introduction to the *Proceedings of the 1st International Conference on Design and Emotion,* "there remains a strong element within the design profession which regards all analysis of design activity as merely attempts to produce 'recipes' for those who can't to emulate those who can!" (p. 7). We were driven, however, by the intention to support and empower designers rather than to unravel the mystery of design expertise and craftsmanship. Or, in the words of Green: "Our objective is not to provide recipes for non-designers to become designers, but to provide tools for the design profession to do what they do better." Although the authors represented in the proceedings of that first conference were diverse in their backgrounds and approaches, all of their papers expressed this basic objective to develop tools, methods, or insights that would help designers to 'design better' by understanding and dealing with the effects of design on the emotions of the user.

Moreover, all of these authors shared the realization that *all* products affect the emotions of users—emotionally neutral products do not exist. Or, as Gaver put it: "There is no such thing as a neutral interface. Any design will elicit emotions from users, or convey emotions from its designer, whether or not the designer intends this or is even conscious of it. Interfaces can be designed for neutrality, but the effect is not neutral in the sense that it allows emotions to be neglected; instead it is a choice with its own implications" (p. 51).

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Paul Hekkert is a full professor of form theory in the faculty of Industrial Design Engineering at Delft University of Technology. There he chairs the design aesthetics section and supervises a research group that carries out innovative research on our sense perception and (emotional) experience of products. Much of this research is done in cooperation with industrial partners. He has published numerous articles on product experience and aesthetics in major international journals and is co-editor of *Design and Emotion: The Experience of Everyday Things* (2004) and *Product Experience* (2008). Together with a colleague/designer, he has also developed an interaction-centered design approach, called Vision in Product Design (ViP), that is widely applied in both education and industry. They are presently finishing a book in which this approach is laid out (to be published in 2010). Dr. Hekkert is founder and chairman of the Design and Emotion Society (www.designandemotion.org) and serves as a member of the editorial boards of *The Design Journal*, *Empirical Studies of the Arts*, and *International Journal of Design*.

Motivating Design for Emotion

These authors were—implicitly or explicitly—driven by one of two main reasons to understand the effects of design on users' emotions. The first was that not being aware of these effects can generate unexpected and unwanted user responses. Jacobs (1999) described an example from design practice that illustrates this first motivation. In this particular project, an unexpected negative emotional response surfaced during product testing. An innovative office desk was created, using tabletops made with sheet metal that was covered with a thin layer of plastic. The strengthening profiles needed to be glued to the tabletops because traditional welding would leave marks on the plastic sheet. "We placed this set, as a test, in our own office and after a week there were some minor complaints. The test-users didn't like the new tops, they didn't feel right. We found that the glue had a vague, bad aroma, and this was the reason for the emotion of disgust from the user" (Jacobs, 1999, p. 9). Any design decision can create this kind of unexpected and unwanted emotional 'side effect.' An understanding of user emotions can help the designer to anticipate these emotional effects and therefore to avoid the ones that are unwanted—such as feelings of disgust in response to a new desk design.

Whereas the first motivation was to prevent unwanted effects, the second was to stimulate intended user responses. Tan (1999) mentioned that "if a product meets all the requirements, the only emotion it will provoke in the user is satisfaction, and perhaps enthusiasm" (p. 60). Based on the proposition that products "are signaled as emotionally relevant (good or bad) when they appear to favor or harm one or more of the individual's concerns," Desmet (1999, p. 67) proposed a concern-based approach to designing products that would elicit emotions like attraction, fascination, and inspiration. These views were driven by the idea that understanding the emotional responses of product users can help in designing products that surpass the mere satisfaction experience. In their introduction to the conference proceedings, Overbeeke and Hekkert (1999) stated that this is important because "not only are consumers not interested in the 54th new function, many products have reached a level of technical perfection that it has become difficult to discriminate on that basis. Thus, when two coffee makers basically make the same pot of coffee, we take the one that gives us a pleasant, desirable, or inspired feeling" (p. 5). Not being aware of the experiential impact of design decisions can generate unwanted effects, whereas being aware of this impact offers possibilities for 'designing better.'

What Inspired the Interest in User Experience?

The authors did not express the motivation to manipulate users into buying products. In fact, the stance expressed in the proceedings was one that distanced itself from marketing thinking—having a user- rather than a company-driven focus; even aiming to provide designers with the tools and confidence

to take position against marketing thinking: "It is of absolute importance to give the designer insight in all aspects surrounding product emotion. Insights into the role they play, the way they could or should be used or manipulated need to be given. It is also of importance because the area of design, or the position of the designer becomes more and more threatened by marketers and trend watchers" (Jacobs, 1999, p. 14). Typical to this domain is that the initial initiatives were not so much driven by the desire to understand the relationship between users and products as such, but driven by the need to improve design and to improve design processes. One finds three main ingredients of 'designing better' conveyed in the variety of notions of user experience expressed in the position papers: designing better results by creating products that are more engaging, more authentic, and easier to use.

Making Products More Engaging

In some papers, the authors signaled that the development towards increased usage of technological complexity stimulated a development towards less interesting products. Hummels (1999) used a personal example to illustrate the tendency to design products that showed an impoverished interaction style: "I hardly use my record player anymore. Several years ago, I yielded to the tempting quality of sound and bought a CD player. The voice of [Mathilde] Santing is now written on a silver disc, which is tucked inside a black box with several anonymous buttons. Although the sound has improved, I do miss the subtlety of interaction that enhanced my experience of listening" (p. 39). A focus on the experience of the user when interacting with the product was believed to result in products that are more interesting and engaging: "By designing contexts for experience instead of simply products, the focus shifts from the result of interaction, e.g. the music, the weight, towards the involvement during interaction, e.g. putting on a record and listening to music, weighing food. This means that the designer's emphasis should not merely lie on creating a beautiful, pleasing product in appearance, but expand to creating a beautiful, engaging interaction with a product" (Hummels, 1999, p. 41).

Improving Ease of Use

A focus on emotion is also believed to contribute to easy and efficient product usage: "We can see that some so-called high-tech products, such as computers, require an enormous cognitive effort on the part of the user. In order to support this user in operating these machines, they try to make them intelligent, for instance by anticipating user responses or needs. User behavior is however highly emotion driven, leading to a quest for emotional or affective intelligence" (Overbeeke & Hekkert, 1999, p. 5). Products that can assess and adapt to the emotional state of the user are believed to stimulate an interaction style that is more intuitive and sensitive: "Using psychological sensors or behavioral cues, digital products might be able to surmise their users' emotional states and react accordingly. For instance, upon sensing frustration software might automatically open a help package, or to-do lists might automatically suggest task depending on their users' mood" (Gaver, 1999, p. 52).

Making Products More Authentic

Some authors expressed the belief that the majority of products found in the marketplace focused on easy pleasure and uninspired satisfaction. According to this belief, the consequence of designs that intend to reinforce rather than challenge the status quo is that we are surrounded by products that give an illusion of choice and encourage passivity. Dunne (1999) suggested that in focusing on conformist values, electronic devices had become commodities that were expressions of culture closer to toothpaste than to artistic or individual expressions. Emotional design was believed to be of use for designing products that could challenge preconceptions about how electronics shape our lives: "What I'm proposing, is that product designers could become more like authors. They could draw from the narrative potential of electronic product misuse and abuse to create alternative notions of use and need, rather than the official images of how people live with technology. Instead of thinking about appearance, user friendliness or corporate identity, industrial designers could propose new products which are more challenging" (Dunne, 1999, p. 84).

Besides diverging in their intentions, the authors also differed in their approaches to integrating user emotion in the design process. The papers show four basic approaches: user-based, designer-based, research-based, and theory-based.

User-based Approach

Some of the authors stressed that a focus on emotion and experience can be facilitated by involving users in the design process—by using *their* feelings and aspirations as the creative driving force. Explorative techniques, such as cultural probing, and generative techniques in which users materialize their needs and ideas in creative expressions like collages and mock-ups, produce insights that can inspire appropriate and successful products: "Generative research occurs very early in the design development process. Its purpose is to discover as-yet unknown, undefined, and/or unanticipated user or consumer needs. It is in the generative phase that we are looking for ideas and opportunities to fill unmet user needs. Ideas and opportunities generated by users are usually quite relevant and powerful when acted upon and brought to market" (Sanders, 1999, p. 90). These approaches are based on the idea that the user can be involved in both early idea-generation stages and in advanced testing stages.

Designer-based Approach

With this approach, the role of the designer is more autonomous. Designers are seen as authors, communicating ideas with their designs. Rather than pleasing users, they use products to challenge them. In the words of Tan (1999): "We can compare the man or woman sitting on the chair or using the CD rack to the viewers of popular movies, who laugh and weep, according to the genre they have ordered and paid for, and feel good. The 'design' of the movie is taken for granted, it is not perceived, it does not 'show through' the product. But recognition of the product's design as design is needed, that is a recognition of the problem or challenge that the designers have set themselves, if the user is to have an

aesthetic emotion" (p. 61). With this approach, emotional design can be seen as a manifestation of the individual designer's visions or principles: "Different genres of electronic products could enrich and expand our experience of everyday life rather than closing it down. Industrial design's position at the heart of consumer culture (after all, it is fuelled by the capitalist system), could be subverted for more socially beneficial ends by enriching our experiences" (Dunne, 1999, p. 85).

Research-based Approach

With research-based approaches, emotion measurement is used to reveal relationships between design decisions and emotional responses. Desmet (1999) introduced a non-verbal self-report instrument developed to measure a range of 18 positive and negative emotions elicited by product design. Harada (1999) introduced "Kansei Engineering," a research-based design approach that aims to identify and quantify the relationship between product design features and the emotional (and other subjective) responses of product users. The approach starts by assembling a set of product variants selected to elicit a wide range of emotional responses. In a questionnaire study, respondents report their subjective responses to each of the product variants (typically using semantic differential scales). Then, using statistical techniques, such as regression analysis or multidimensional scaling, relationships between product features and subjective responses are identified.

Theory-based Approach

Research-based approaches require existing products and users who are familiar with these products. These approaches are therefore primarily suitable for product optimization: insights regarding the influence of product features on user emotions can help designers improve a product design in terms of emotional impact. Some authors proposed augmenting research-driven approaches with advanced theoretical insights into how products elicit emotions. The idea is that these insights can enable designers to conceptualize new user/product relationships. Cupchik (1999) distinguished three levels of meaning attached to products, and explored how these levels relate to emotional processes: sensory/aesthetic, cognitive/behavioral, and personal/symbolic meanings. The first level represents sensory qualities that have an immediate effect on experience, the second represents meaning related to performance and ease of use, and the third represents supplementary meaning which may not be directly related to product function or appearance.

Back to 2009

In their editorial introduction to the first conference proceedings, Overbeeke and Hekkert (1999) stated, "we think that these developments are more than a fashionable uprising. They mark the beginning of an era in product design in which the way we emotionally relate to products becomes of increasing interest and importance. Not only because pleasing products sell better, but also because of the widespread belief that we should put an end to technology driven product design that is not going to contribute to a human and sustainable world" (p. 5). Ten years later, the domain is flourishing, with dedicated conferences, such as the Design & Emotion (D&E) conference and the Design for Pleasurable Products and Interfaces (DPPI) conference, special interest sessions on User Experience (UX) in many other design-related conferences, numerous journal papers, and books that have been published about the role of emotion in product design (e.g., Norman, 2004; Schifferstein & Hekkert, 2008). Our goal with this special issue of the International Journal of Design is to provide a cross-section overview of some current developments in the domain. Seven research papers and one case study were selected from the proceedings of the 6th Design & Emotion conference, hosted in 2008 by the Hong Kong Polytechnic University. The authors were invited to extend and revise their papers for journal publication.

Overview

The papers were foremost selected for the quality of the research work in this area, but also with the idea of showing the variety of perspectives taken. The intriguing liaison between design and emotion—or experience in a broader sense—has become a topic of inquiry in many fields of study, such as design research, engineering, HCI, human factors, marketing and consumer science, and builds on theoretical developments in several branches of psychology and other fields in the social sciences. In their introduction to the recently edited volume *Product Experience*, Hekkert and Schifferstein (2008) chart the main disciplines contributing to the field of product experience.

Rooted in consumer research, the paper by Chitturi investigates relationships between product benefits and consumer emotions. The author presents a framework that explains how expectations about product benefits influence the particular type of pleasant and unpleasant emotions that are elicited. He demonstrates that the type and intensity of emotions experienced by consuming hedonic benefits are different from those experienced by consuming utilitarian benefits. In a slightly different, but related, tradition is the paper by van Rompay, Pruyn and Tieke. Bridging marketing, design research and psychological aesthetics, the authors present a carefully designed experiment on the congruency between the shape of a product and the accompanying advertising slogan. As predicted, congruent messages resulted in more positive product and brand evaluations, but only for people with a high "need for structure."

Drawing even more heavily on theoretical insights from psychology are the design research papers by Markussen and by Demir, Desmet and Hekkert. The latter paper further explores how the dominant appraisal theory in the psychology of emotion can be made actionable for designers. By examining the specific appraisal components in people's accounts of emotional interactions with products, the authors attempt to build design-specific appraisal structures for emotions such as joy, satisfaction, and disappointment. Markussen applies the same appraisal theory and 'blends' it with the theory of embodied cognition, a prominent theory in the field of cognitive science, to account for the rich

and mixed emotional responses people have towards interactive healthcare systems. His blending theoretical examination of our interaction with a blood-taking robot helps us to understand how people interpret and, therefore, appraise products in novel ways (by blending conceptual structures), resulting in new or different emotional responses that differ from the ones derived from the separate appraisals.

A central and prominent line of research in (design and) emotion research is constituted by the measurement of emotions. If we are to design for emotions, we need to capture or monitor them, or at least be able to evaluate the success of our design afterwards. Design researchers traditionally rely on self-report methods (verbal & non-verbal questionnaires) for the measurement of user experience/emotions. However, many alternative techniques are available, such as facial expression coding systems and psychophysiological techniques. The paper by Jenkins, Brown and Rutterford presents an interesting effort to test the application possibilities of the IRT (Infrared Thermography) technique for design research, and offers the *IJDesign* reader an introduction to some alternatives for self-report methods.

Strongly related to the engineering-based Kansei approach and distantly rooted in psychological aesthetics is the work by Chen, Shao, Barnes, Childs, and Henson, which is typical of the increasing interest in the experiential effects for other sensory modalities, such as touch and sound. They report an experiment in which a range of material surfaces, after being touched, are physically measured and rated according to a number of semantic pairs, such as hard-soft and warm-cold. Correlational analyses between the two measures reveal that our subjective judgments are always based on the combined effect of more than one physical property. Whereas a lot of research has been done on the expression of a product's shape and material properties, few studies so far have addressed meaning in interaction. Embedded in the tradition of interaction design research, Ju and Takayama studied meaningful gestures of moving objects as a way to inspire tangibility in the design of intelligent devices. For this, they performed two studies on people's feelings towards and interpretations of doors that (seem to) make gestures. In line with classic studies on the attribution of intention towards inanimate, moving objects, they showed that people differently ascribe human characteristics, such as reluctance, welcome and urgency, to various door trajectories. Meaningful interactions also play a central role in the final design case study. This description of ceramic design was selected to demonstrate what 'design for emotion' has to offer when adopted by a sensitive designer with a good understanding of emotion theory. Lacey describes an elegant and successful attempt to design a series of ceramic cups and bowls that are meant to evoke surprise and wonder in the user, perhaps leading to a more emotionally sustainable relationship with these objects.

With these eight papers, we feel we have covered much of the broad range of approaches and perspectives that are so characteristic of this field at present. This selection is, however, far from complete; many more interesting and divergent papers were presented at the conference that could unfortunately not be included. We nevertheless feel that the papers selected are a good representation of the quality and richness of the field of design and emotion, and testify to the maturity of the field, in theoretical depth, methodological rigor and design inventiveness.

In Closing

As the papers in this issue show, much has happened since the design and emotion movement more or less started back in 1999. Design and emotion has become a widely explored field of study in a variety of disciplines, and subject areas such as emotional design, product experience and user experience have become integrated in curricula at design schools across the globe. If our students wonder today how to 'design for emotion,' we have a rich repertory of tools, methods, models and theories on offer. We now know fairly well when products evoke what emotions; we have some understanding of the role our primate brain, our cognitive system, and previous experiences play in this process; we are able to conceptually separate emotional responses from other experiential phenomena, such as aesthetic responses and meaning attribution; we are starting to understand the role of our body in these experiential states; we are able to link these processes to all kinds of physical and measurable product properties; we understand better and better how the different senses contribute to these experiences and how they affect each other; we have many techniques to measure emotions, both at a single moment in time and dynamically; we know emotions cannot be separated from product function and issues of usability; we are much better now at tapping people's everyday experiences; we have started to develop methods that allow us to define desirable emotional consequences; we can explore and to some extent predict the experiential ramifications of new interactive and ambient technologies and novel digital devices; we are starting to expand the user-emotion relationship beyond the product itself and to include retail, service and brand issues; we are seeing more and more methods that incorporate (aspects of) this knowledge and these tools to help us design for emotion; we can indicate how 'design for emotion' could be integrated in the product development process and what role the different players, i.e., engineers, designers, and marketers, must have. We know a lot and are capable of doing a lot. Yet, and this will not come as a surprise, there are still many unresolved issues and questions that need to be formulated (and answered). We trust that this special issue will encourage you to make the next moves.

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