Hedonomics in HCI design

Essay

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**Introduccion**

Most product designs are focused on customer needs concerning functionality and utility. Rarely has the issue of customer emotions been investigated. Traditional cognitive approaches to product usability tend to underestimate the importance of customer emotions in design. Not surprisingly, the success of a product in the marketplace may be determined by its aesthetic appeal, the pleasure it creates, and the satisfaction it brings to the customer. Emotions influence how a customer interacts with the product. In the interaction, feelings accompany thinking. (Helander, Khalid 2006[2])

User impressions, emotions and satisfaction are critical to the design of products and interfaces. What was previously dealt with as judgments and impressions can be subjected to scientific scrutiny. Some of the subjectivity in the evaluation process can then be replaced by objective data. Inspired by our colleague Peter Hancock, we name this new discipline Hedonomics—from the Greek ‘hedone’ (pleasure—akin to sweet) and ‘nomos’ (laws, principles). It is a different perspective: It is not how to evaluate the user; it is how the user evaluates. (Helander, Tham 2003)

Recently, there has been a growing interest in product aesthetics, affect, and pleasure (Helander, Khalid 2006[1], Norman 2004, Jordan 2002).
Basics and emotions in design

Notes that a product or service offering should engage the people for whom it is designed, at three abstraction levels:

First, it has to be able to perform the task for which it was designed. For example, a car has to be able to take the user from point A to B. The product’s functionality should work well, and it should be easy to use (i.e., usability function).

The second level relates to the emotions associated with the product or service in the context of the associated tasks. These emotions are part of the ‘user experience’. For example, when using an automated teller machine, feelings of trust and security might be appropriate. Driving a sports car should be exciting, but there should also be a sense of safety.

The third level reflects the aspirational qualities associated with the product or service (i.e., persona or social factors). What does owning the product or using the service say about the user? For example, owning the latest, smallest mobile phone may suggest a pretty cool person. Meeting these requirements make a case not only for ergonomics of the product or service but also for emotional design and achievement of social status as well.

In emotional design, pleasure and usability should go hand in hand, as well as aesthetics, attractiveness, and beauty (Helander, Khalid 2006[1]). Hassenzahl (2004) considered the interplay between user-perceived usability (i.e., pragmatic attributes), hedonic attributes (e.g., stimulation and identification), goodness (i.e., satisfaction), and beauty. He applied these concepts to the design of MP3 player skins, and found that goodness depended on both perceived usability and hedonic attributes. The findings are not surprising. The real use and user experience of a product, are important in product evaluation (Helander, Khalid 2004).

Emotion is a necessary part of life. It affects how we feel, how we behave and think; and it has gained significant attention in interaction design. For example, the iPod is the runaway best seller of MP3 players, although it was marketed late and is more expensive than competing models. To consumers, the iPod is easy to use and aesthetically appealing – it is cool, it feels good. ‘Feeling good’ is an emotion that can have a huge impact on consumers; it can make users feel passionate. Recently, a new trend – ‘funology’ – has been considered in Human–Computer Interactions; its equivalent in Human Factors/Ergonomics is ‘hedonomics’. The current focus on hedonomics has shifted much research interest to pleasure, away from pain and performance, which dominated ergonomics for many years (Helander, Khalid 2006[1]). A number of studies have explored fun, pleasure, and emotion in the development of products (Helander, Khalid 2006[2]).
An explicit requirement of emotional design is that it should be theoretically driven and empirically grounded, with valid and reliable measures of pleasure. Principles of personalization, aesthetic longevity, and seamless interaction between the user and the product/system are important in designing for pleasure (Hancock, Pepe, Murphy 2005).

Characterizing Emotion

Originally, emotion and thinking were considered different phenomena. The field of cognitive science has studied emotion as a separate, distinct facet of human cognition. Because they seem so distinct, there is a tendency to classify them as different kinds of phenomena. The argument has been to keep logic and emotion apart. Classical decision making used logic to formulate design options and calculated probabilities for satisfying customers – the current trend is a world apart; design is an ill-structured problem, and using logic is not appropriate. Emotions appear to be natural phenomena governed by biological mechanisms that are autonomic and beyond our control. In contrast, thinking is voluntary, learned, controlled, and dependent on cultural learning and concepts. Emotions are associated with art, beauty, poetry, and music. Thinking is associated with logic, science, and calculation. As such, emotion appears so antithetical to thinking that they are said to interfere with each other. ‘Clear thinking’ supposedly requires eliminating emotions.

Emotion plays a central role in dual-processing theories of thinking, knowing, and information processing. There is much evidence that people perceive reality in at least two ways, one is affective (intuitive and experiential) and the other is cognitive (analytical and rational). Formal decision making relies on the analytical and cognitive abilities; unfortunately, this mode is slow. The experiential and affective system is much quicker. When a person seeks to respond to an emotional event, they will search the experiential system automatically. This is like searching a memory bank for related events that are tagged by their emotional contents. Emotions do not cause thinking to be nonobjective; they can motivate a passionate concern for objectivity, such as anger at injustice. Objective thinking entails feelings, and affective thinking entails cognition. Objective thinking is more precise, comprehensive, and insightful than nonobjective thinking. However, it is just as emotional (Helander, Khalid 2006[2]).
Cultural Characteristics of Emotion

The cultural background influences what users look for in a product and how they interpret the product, including its interfaces. Humans do not respond to the physical properties of things – to their form, structure, and function – but to their individual and cultural meanings. Thus, it is commonly recognized that elements of a user interface that are appropriate for one culture may not be appropriate for another. For example, in North America, to turn on the light, the compatible relation is to flip the switch up. In Europe and Asia, the light switch goes down. Different cultural groups may have different population stereotypes that would require localized designs. Customizing a design to local cultural norms promotes aesthetic longevity – a continuous state of newness that consistently elicits pleasurable feeling (Hancock, Pepe, Murphy 2005). The differences between cultures have been well studied. Hall (1976) claimed that most Asian societies are high-context cultures, the opposite of European societies. Contextualization offers product designers a way of assessing the amount and kind of detail to include in a product for optimal effectiveness. Choi et al. (2005) noted that both Korean and Japanese participants relied on visual elements and symbols (high-context characteristics) when using mobile data services, whereas Finnish participants preferred explicit information and a text mode (low-context preferences). Similarly, Japanese and French require information to be implicitly stated, while the Swiss and Germans need explicit information. Explicit information would make a French person sneer – ‘something has to be left to my imagination and I can then take my own initiative’. While these findings reflect on user needs, they revealed that there are cultural differences also in emotion. Whereas Western cultures encourage open emotional expression, East Asian cultures promote emotional balance and control. Consequently, East Asians are less emotionally expressive and slightly more inhibited; they value self-constraint more than their Western counterparts.

When testing emotions across cultures, Desmet (2002) found significant differences between Japanese and Dutch reactions to ‘admiration, satisfaction, and fascination’ emotions when evaluating car models. The Japanese scored higher on these emotions, suggesting that they admire more, are greatly satisfied, and more easily fascinated than the Dutch. However, computer animations of faces portraying the emotions ‘desire’ and ‘disappointment’ were found to be invalid among Japanese, and needed further refinement. This implies that the portrayal of emotions via computer technology requires much validation if it is to be used in cross-cultural contexts. Intensity of emotional reactions to product design is also highly dependent on the personal goals and expectations the user has of the product (Desmet 2002).
Undoubtedly, emotion is one of the strongest differentiators in user experience. It triggers both conscious and unconscious responses to a product, web site, or system interface. When we consider emotion in product design our main purposes are to increase sales and keep the users happy. This is done by maximizing positive emotions and at the same time minimizing negative emotions. Understanding and reducing users’ anxiety and fears (negative emotions) can help to increase satisfaction with products. (Helander, Khalid 2006[2]).

Poor usability will also induce negative responses such as frustration, annoyance, anger, and confusion. On the other hand, even moderate fluctuations in positive emotions can systematically improve cognitive processing. (Helander, Khalid 2006[2]).

A happy person has an open mind, while a negative person is restrained in processing of information. When products result in positive user experiences, the emotional effects are often more important to the customer than gains in productivity, efficiency, and effectiveness. Negative emotions such as frustration, anxiety, and so forth should definitely be avoided in conceptualizing product design. However, emotion is not an exclusive factor in defining a successful user experience. Every single product feature affects the ‘experience’, which can be complex and multifaceted. Furthermore, emotions are culturally specific and variable. Because there is no such thing as a neutral interface, any design will elicit emotions from the user and the designer. (Helander, Khalid 2006[2]).

The designer should aim to ‘control’ the user experience through a deliberate design effort, thus bridging the gap between the Affective User and the Designer’s Environment, as outlined in our framework. However, measuring affective responses to designed objects can be problematic. So is designing affect into a product. (Helander, Khalid 2006[2]).

Separating emotion from cognitive functions does not seem helpful from a research perspective or from a design perspective. Instead, an integrated view of emotion and cognition is taking hold, not only in neuroscience but also in product design. A product should be designed to support customer needs, including the customer’s persona or personality attributes. This can be done by providing flow – or ease of use – and inducing feelings – or emotions – in interacting with the product. (Helander, Khalid 2006[2]).
Pleasures

The pleasures derived from the optimal experience of seamless interaction and usable functions are considered hedonic benefits that can enhance the ‘skillful’ and ‘confident’ persona of the user. On the contrary, a poorly designed application with complex user interface and controls impedes natural interaction, leading to negative emotions such as quitting the game, becoming moody, swearing at the machine or even kicking it. Such displeasures derived from the use constitute hedonic penalties, and can only help to enhance an ‘angry’ and ‘frustrated’ persona. In other words, hedonic affordances invite an emotional reaction from the user through the product’s physical attributes that result in the user’s appraisal and perception of it as enjoyable, pleasurable, and fun. Pleasurable interaction may be derived by integrating adaptability into designs and providing users with control. Further research is needed to develop expressions of emotions that are quantifiable so that they can be verified easily. In conclusion, customers tend to make decisions based on their feelings, perceptions, values, and reflections that usually come from gut feelings rather than logical or rational thinking. As such, designers and manufacturers should consider making emotional design a bottom line in product design. (Helander, Khalid 2006[2]).

Affective human factors design

Affective or pleasurable appreciation in design is nothing new. Affect is what we admit to when we buy clothes, admire beautiful objects, or select a birthday card. But it is a fairly new area in research. And it is fairly new in ergonomics and in human-computer interaction. The expectations of users or customers are changing: Functionality, attractiveness, ease-of-use, affordability and safety are today taken for granted. The new trends are for objects that inspire users, enhance their lives, and evoke emotions and dreams in their minds. While industrial and product designers are keenly aware of the importance of design aesthetics, they make aesthetic design decisions based on experience, intuitive judgments and trends in fashion. a new scientific and engineering discipline termed ‘engineering aesthetics’. This discipline addresses two major questions: How to use engineering and scientific methods to study aesthetics concepts in general and design aesthetics in particular, and how to incorporate engineering and scientific methods in the aesthetic design and evaluation process. Thus a dual-process research methodology for ‘engineering aesthetics’ identifies two special features that
distinguish aesthetic appraisal of products and system designs from aesthetic appreciation of art. (Helander, Tham 2003)

Designers seek to create products that avoid discomfort. In designing hand-held products, attributes that make a product enjoyable to touch may be considered, rather than just comfort or discomfort. In a field study participants were asked to bring in physical objects that were pleasant to the touch. The design of the ‘touchable’ objects was then analyzed on the basis of the object sizes, weight, shape, surface, and color. The results were used to design trackballs for computers. Johnson and Wiles (2003) were of the opinion that games, which are designed to generate positive affect, are most successful when they enhance flow. The fluid action and the sense of mastery are satisfying and sometimes also addicting. The study of games and a resulting understanding of flow in games can also be used for design of non-leisure software for positive affect. Their research explored the differences between games played on a personal computer and games played on a dedicated console. The findings have implications for the definition of flow and affective design. (Johnson, Wiles 2003)

Working with computers is often stressful. Luczak, Roetting and Schmidt (2003) reveal in their paper that a surprising number of people talk to computers in an attempt to reduce stress. Anthropomorphization of technical devices and the verbal interaction between human and machine was the focus of their study. They asked why people tend to treat technical devices as humans, when do they do so, and how they perceive of their own dialogue and other persons’ dialogues with technical devices? They found relationships between anthropomorphism and subjects’ personality structure, fear of technical devices and self-rated technical competency. Technical devices that were seen as helpers or friends were generally treated more friendly than devices perceived as merely tools. (Luczak, Roetting, Schmidt 2003)

Yun, Han, Hong and Kim (2004) investigated user satisfaction in the design of mobile phones. User impressions of luxuriousness, simplicity, attractiveness, colorfulness, texture, delicacy, harmoniousness, salience, rigidity, and overall satisfaction, were analyzed for 50 different mobile phone designs using multiple regressions. Design variables such as texture, use of surface curvature, surface treatment, operating sound, and control response ratio were perceived as important by customers. The product evaluation and analysis method is general and can be used for design of other consumer products.

This is a large and complex area. Measurement of emotions is difficult. Research must be based on an understanding of how emotions manifest themselves in our regular life, and how they can be measured. We understand some of these issues—but not all. We need to follow keenly developments in the basic psychological research. The ergonomics research perspective is however relevant and informative—it is the study of real life. (Helander, Tham 2003)
The effect of affect

Hancock, Murphy, Stanney (2003) evaluated the use of color in a human-computer interface to investigate how affective cues influence usability judgments. Yellow and green, were found to enhance performance on a cognitive flexibility task as compared to white and gray. Such an outcome suggests that color promotes positive affect. The aesthetically designed interface that promoted positive affect was also found to enhance perceptions of interface usability. This relationship, however, was only found when underlying usability was effective. When usability was poor, aesthetics made users more cognizant of the usability weaknesses. The results suggest that designers consider incorporating color into designs to help elicit positive emotion in users but that they must be aware that incorporation of aesthetics comes with the potential cost of disposing users to be more discerning of usability.

The relationship between aesthetics and perceived usability is congruent with the social phenomenon of inferring personality traits from physical attractiveness. Dion, Berscheid, and Walster (1972) found that people that were viewed as physically attractive were assumed to possess more socially attractive traits than those that were viewed as unattractive. A possible explanation for this phenomenon is the halo-effect, which proposes that the most obvious or salient characteristic (in this case, attractiveness) is perceived first and tends to bias perceptions and inferences that come after. Furthermore, social psychology research reveals that initial perceptions persevere even after presentation of contrary evidence (Gilbert, Krull, & Malone, 1990).

Based on this halo effect, users may attribute more desirable traits (such as ease of use, ease of learning) to interfaces that are designed to be aesthetically pleasing compared to interfaces that are not aesthetically pleasing. Users may even continue to attribute desirable traits to aesthetically pleasing interfaces even after they are presented with evidence to be contrary. Aesthetics is a concept that is defined subjectively and therefore difficult to manipulate systematically in an experimental setting. There are clear usability guidelines in interface design but no clear aesthetic guidelines. (Hancock, Murphy, Stanney 2003).

According to Norman (2002) one way of viewing aesthetics can be through color. Switching from black and white displays to color displays doesn't have an obvious affect on the usability of the display but does have an obvious effect on the aesthetics of the display. Most people prefer color displays. Color may have some emotional affect on the user rendering them to prefer a color to black and white display.
Positive affect and cognitive flexibility

While color has still to be shown to directly relate to affective state, it has already been shown to differentially affect information-processing strategy. More specifically, negative and neutral affective colors have been shown to lead to more systematic, discerning processing, while positive affective colors render a more accepting, indiscriminate processing approach. Thus, negative affect may lead to greater cognitive flexibility, where an individual perceives and interprets information from multiple perspectives and in greater detail. Yet, cognitive flexibility has been shown to increase with the presentation of a stimulus used to elicit positive affect in a person. (Hancock, Murphy, Stanney 2003).

Several studies have found that promoting positive affect improves cognitive flexibility. This presents a conundrum. Will positive color in a design lead people to process information in less detail and thus potentially gloss over usability weaknesses or will it lead to greater cognitive flexibility and a more discerning assessment of usability? If the former is true, products should liberally incorporate color as it could mask usability weaknesses. If the latter is true, incorporating color could tender usability of utmost importance, as users would readily perceive any weaknesses. (Hancock, Murphy, Stanney 2003).

Results of research from Hancock, Murphy, Stanney (2003) has contributed two new findings toward the promotion of pleasure in human-technology interaction. First, aesthetically pleasing designs may only promote pleasure in the user when coupled with good usability criteria. Despite the aesthetic manipulation, color displays were not pervasively rated higher in usability than non-color displays when the two designs (both with and without delay) were compared.

Interestingly, it appears that participants became the most frustrated with poor usability when a color display was used as compared to a non-colored display. Generally, participants preferred the color display with no delay over the other displays until the delay of feedback was incorporated into the design, then participants preferred the non-colored display. The results suggest that aesthetically designed interfaces may enhance perceptions of usability only when underlying usability is strong. When usability is weak, aesthetics may make users more perceptive of usability weaknesses. Thus, if a product has known usability flaws, it may be best to minimize product aesthetics.

Second, colors such as yellow and green were shown to enhance performance on cognitive flexibility tasks (i.e., RAT), suggesting that they have the potential to promote positive affect in users. Therefore, designers should consider incorporating color into designs to help elicit positive emotion in the user. Designers must be aware, however, that incorporation of aesthetics comes with the potential cost of disposing users to be more discerning of usability. It is thus essential that designers fully understand the
affective consequences of their designs. With today’s advances in technology we now have the flexibility to achieve both usability goals as well as promote pleasure in the user. The findings from this research confirm the importance of both in good human-technology design.

Conclusions

Emotions are often elicited by products, such as art, clothing, and consumer goods; therefore, designers must consider emotions in design. Today, many corporations challenge designers to manipulate the emotional impact of designs. Nokia design is an example. Emotional responses induce customers to pick a particular model among many; thereby emotions influence purchase decisions. In practice, user emotions toward products are well established and sometimes difficult to manipulate.

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