



# Framework of Product Experience

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In this paper, we introduce a general framework for product experience that applies to all affective responses that can be experienced in human-product interaction. Three distinct components or levels of product experiences are discussed: aesthetic experience, experience of meaning, and emotional experience. All three components are distinguished in having their own lawful underlying process. The aesthetic level involves a product's capacity to delight one or more of our sensory modalities. The meaning level involves our ability to assign personality or other expressive characteristics and to assess the personal or symbolic significance of products. The emotional level involves those experiences that are typically considered in emotion psychology and in everyday language about emotions, such as love and anger, which are elicited by the appraised relational meaning of products. The framework indicates patterns for the processes that underlie the different types of affective product experiences, which are used to explain the personal and layered nature of product experience.

**Keywords** - Experience, Aesthetics, Meaning, Emotion, Design Psychology.

**Relevance to Design Practice** - The theoretical framework discussed in this paper can be of value for designers because it can facilitate the designers' structured attempts to 'design for experience,' that is, attempts to deliberately influence the experiential impact of new designs.

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## Introduction

The emerging interest in user-centred design has stimulated a shift of focus from the users' behaviour and cognition to the users' affective experience of (and involvement in) the human-product interaction. Since the sixties, affect has attracted the attention in various disciplines involved in product research, such as marketing, consumer research, ergonomics, economics, and engineering. Marketing researchers use insights in affect to capture pleasurable or desirable consumer experiences (see Schmitt, 1999). In the field of ergonomics, affect theory is used to explore processes involved in product usage, such as learning, problem solving, and motivation. Picard (1997), for example, discussed the role of affect in user-product communication. Helander and Tham (2003) demonstrated the importance of affect for ergonomics, Jordan (1999) discussed the role of pleasure in product usage, Vink (2005) discussed the role of affect in comfort, and Tractinsky, Katz, and Ikar (2000) demonstrated a relationship between affect and usability (see also the discussion section). Consumer researchers have studied the influence of experience on consumer behaviour. Creusen (1998) showed that affective responses to product appearance influence purchase decisions, and Oliver (1993) discussed the relationship between affect and post-purchase product evaluation. In the field of engineering, Kansei has gained popularity. Kansei engineering is a method that was developed to find relationships between product experience and product properties, in order to use these properties to design products that elicit desired experiences (see e.g., Schütte, 2006).

Although these are only few of many examples, they illustrate that the variety in objectives has stimulated disciplines to develop customised terminologies of experiential concepts. Design research takes a special place because design

is an integrated discipline that requires aesthetic, marketing, ergonomic, and engineering skills. This multidisciplinary nature has stimulated the emergence of a variety of terminologies in the realm of design research. In addition to adopting concepts from other disciplines, the design research community has also introduced some new concepts of its own. The result is a research agenda dominated by a multitude of experiential concepts that, to some extent, differ in terms of described affective phenomena, theoretical backgrounds, research purposes, and design possibilities. Although the multitude of concepts is invaluable to the enrichment and expansion of the domain, the loose relation between those seemingly different concepts frustrates a common ground for discussion. These considerations motivated us to make an attempt to develop a general framework of product experience that provides a structure that facilitates comparisons between experiential concepts. In doing so, we hope to contribute to a general understanding of approaches to experience in the domain of design research and to identify untouched areas that can stimulate new design directions.

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## Human-Product Interaction

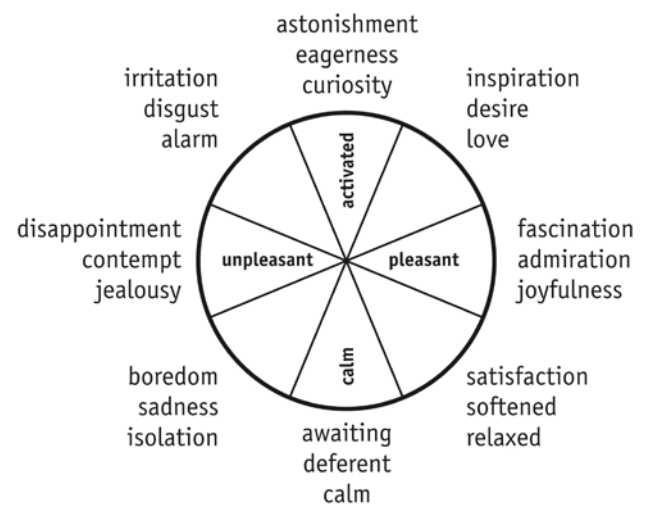
In this paper, ‘product experience’ is used to refer to all possible affective experiences involved in human-product interaction. Note that with human-product interaction we do not only refer to (1) instrumental interaction, but also to (2) non-instrumental, and even to (3) non-physical interaction. Examples of instrumental interaction are using, operating, and managing products. One can, for example, experience irritation when the TV does not respond to the remote control or pleasure when a well-designed online booking system proves to be easy to operate. With non-instrumental interaction, we refer to the interactions that do not directly serve a function in operating a product, such as playing with or caressing the product. Someone can be delighted by the soft touch of a seat or inspired by the brilliant shine of a car. Non-physical interaction refers to fantasising about, remembering, or anticipating usage. One can anticipate interaction (“I expect this handle to break when I push it too hard”) or fantasise about interaction (“My computer thinks he knows what I want, but he does not have a clue.”). One can also imagine, anticipate, or fantasise about possible consequences of interaction. For instance, a person may feel desire towards a new abdominal work-out device because he or she anticipates that with this device the perfect body is within reach. Not only the anticipation of, but also the actual consequences of human-product interaction, can elicit affective responses. The consequence of wearing a fashionable new suit may be positive remarks from colleagues; the consequence of using a laptop may be that the work is done more efficiently; the consequence of eating too much ice cream may be a stomach ache. Each of these consequences can generate affective responses. Note that the absence of an expected consequence can also elicit an affective experience. Those who expect a friend for dinner will be disappointed when the friend does not show up, and those who buy an auto-bronzing lotion will be

dissatisfied when the product does not tan their skin.

Experience is shaped by the characteristics of the user (e.g., personality, skills, background, cultural values, and motives) and those of the product (e.g., shape, texture, colour, and behaviour). All actions and processes that are involved, such as physical actions and perceptual and cognitive processes (e.g., perceiving, exploring, using, remembering, comparing, and understanding), will contribute to the experience (see also Dewey, 1980). In addition, the experience is always influenced by the context (e.g., physical, social, economical) in which the interaction takes place.

## Experience

The words ‘affect’ and ‘experience’ have been used interchangeably in the introduction, because we use ‘product experience’ to refer to an experience that is affective. In psychology, the term affect, or affective state, is generally used to refer to all types of subjective experiences that are valenced, that is, experiences that involve a perceived goodness or badness, pleasantness or unpleasantness. In experimental research, valence is traditionally used as a bipolar dimension to describe and differentiate between affective states (e.g., Bradley & Lang, 1994; Plutchik, 1980; Wundt, 1905). Russell (1980, 2003) introduced the concept of ‘core affect’ by combining the affect dimension with physiological arousal into a circular two-dimensional model. According to Russell, the experience of core affect is a single integral blend of those two dimensions, describable as a position on the circumplex structure in Figure 1. The horizontal axis represents valence (from unpleasant to pleasant), and the vertical axis represents arousal (from calm to excitement). The various positions on the circumplex structure are illustrated with examples of affective responses that can be experienced in the user-product interaction.



**Figure 1. Circumplex model of core affect with product relevant emotions** (Desmet, 2007; adapted from Russell, 1980).

We constantly experience core affect: from the moment we wake up to the moment we fall asleep, our core affect moves about in Figure 1, responding to a wide variety of internal (e.g., hormonal changes, nutritional deficiencies) and external causes (e.g., events, people, objects, weather). Core affect can be neutral (the central point), moderate, or extreme

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(the periphery). Changes can be short lived or long lasting, and can be in the focus of attention (in the case of intense core affect), or a part of the background of a person's experience (in the case of mild core affect).

Core affect theory offers a simple, yet powerful, way to organize product experience, because all possible experiences involved in the user-product interaction can be described in terms of core affect. The activated unpleasantness from the heated irritation in response to a failing computer, the calm pleasantness from the soothing experience of sliding into a warm bath, the activated pleasantness from the exhilaration of ice skating, and the calm unpleasantness from the sadness in remembering a broken crystal vase, can all be plotted on the circumplex model.

## Product Experience

Core affect can be experienced without relating to a particular stimulus. Moods, for example, are typically not elicited by a particular stimulus but by combinations of internal and external causes, like, for example, being grumpy because of the bad weather, a lack of sleep, and the traffic jam. We usually undergo these types of changes in core affect without knowing why. In other cases, the change in core affect is elicited by a single and identifiable cause. When someone offends a person, the offended person's anger is clearly elicited by the behaviour of the offender. Also, human-product interaction can be (or involve) a cause of change in core affect. Interacting with a stimulating computer game can cause the experience of exhilaration, whereas interacting with a slow computer can cause the experience of frustration. In line with these examples, we define product experience as a change in core affect that is attributed to human-product interaction. We use the word 'attributed' instead of 'caused' because a change in core affect due to a particular cause is sometimes misattributed to another, imagined, cause (see Schwarz & Clore, 1983). One can, for example, be disappointed with a colleague for a mistake for which he was actually not responsible. Or, one can be angry with the television set, because it appears to be broken as it shows a white signal, when in fact one should actually blame oneself for accidentally disconnecting the signal cable. The anger experienced in this situation is considered to be a product experience because it is believed to be caused by, or attributed to, the television.

## Manifestations of Product Experience

Product experience is a multi-faceted phenomenon that involves manifestations such as subjective feelings, behavioural reactions, expressive reactions, and physiological reactions. The subjective feeling of experience is a conscious awareness of the change in core affect. When we are irritated by a package that is difficult to open, we also feel irritated. Physiological manifestations, such as pupil dilatation and sweat production, are caused by the changes of activity in the autonomic nervous system that accompany affective experiences. Expressive reactions (e.g., smiling or frowning) are the facial, vocal, and postural expressions that accompany affective experiences. We can tell by a person's facial and bodily expression that he or she is sad, grumpy, or cheerful. Behavioural reactions

(e.g., running or seeking contact) are the actions one engages in when experiencing a change in core affect. Affective experiences initiate behavioural tendencies like approach, inaction, avoidance, and attack. For example, with respect to the experience of attachment, Mugge, Schifferstein and Schoormans (2004, p. 1) propose that "when a person is attached to an object, (s)he is more likely to handle the product with care, to repair it when it breaks down, and to postpone its replacement as long as possible." This behavioural tendency (i.e., keeping the product) is the consequence of attachment that signifies the extraordinary relationship between a user and a product. Frijda (1986) proposes that all emotions involve a particular action tendency that prepares the individual to contend with the adaptational implications of the eliciting situation. Fear comes with a tendency to flee, anger with the tendency to attack, and fascination with the tendency to explore. A product that evokes anger will be pushed aside, one that evokes fascination will be explored, and one that evokes boredom will be ignored.

Note that feelings are often expressed in terms of one of the other manifestations of affect. One can express the behavioural impact of an experience ("I was so angry: I felt like throwing my computer out of the window"), the expression ("the game was so boring: I couldn't stop yawning"), or the physiological reaction ("I was trembling from fear when I noticed the smoke emerging from my kitchen").

## Three Types of Product Experience

Following Hekkert (2006), we distinguish three components or levels of product experience: aesthetic pleasure, attribution of meaning, and emotional response. We thus define product experience as "the entire set of affects that is elicited by the interaction between a user and a product, including the degree to which all our senses are gratified (aesthetic experience), the meanings we attach to the product (experience of meaning) and the feelings and emotions that are elicited (emotional experience)" (Hekkert, 2006, p. 160). These three components or levels of experience can be distinguished in having their own, albeit highly related, lawful underlying processes. Figure 2 shows the three levels of product experience.

Let us take a personal example to illustrate how a product can be experienced at each of the three levels. One of the authors recently purchased a Chinese teacup during a visit to China. An example of an aesthetic experience is the enjoyment he experiences from hearing the sound produced by the fragile porcelain lid when it is placed on the mug. He is attached to the cup, because it is a memento that represents his visit to China, in which the attachment is an experience of meaning. An example of the third level of product experience, that is, an emotional experience, is the satisfaction he experienced when he found that the size of the cup perfectly matches his tea drinking needs. Each of the three levels is discussed in the following sections.

## Aesthetic Experience

At the aesthetic level, we consider a product's capacity to delight one or more of our sensory modalities. A product can be beautiful to look at, make a pleasant sound, feel good to touch,

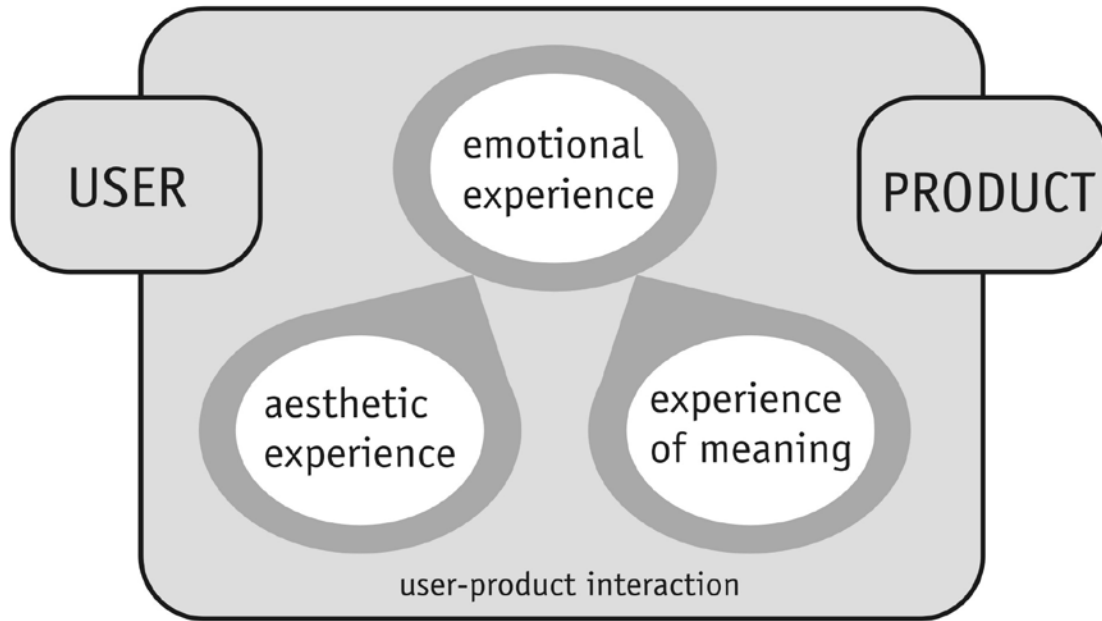


Figure 2. Framework of product experience.



Figure 3. Chinese teacup souvenir.

or even smell nice. The degree to which a perceptual system manages to detect structure, order, or coherence and assess a product's novelty/familiarity typically determines the affect that is generated (e.g., Gaver and Mandler, 1989; Hekkert, Snelders, & van Wieringen, 2003). As some authors argue, such effects can be explained by examining the evolutionary basis of our perceptual systems (e.g., Ramachandran & Hirstein, 1999; see Hekkert, 2006 for an overview). It is this level of sensory pleasure that Norman (2004) is referring to in discussing the visceral level of emotional design and that Crilly, Moultrie, and Clarkson (2004) treat as the cognitive response category 'aesthetic impression.' Note that some researchers propose that besides basic affect, there are no emotions or cognitive processes at stake at this level (e.g., Norman, 2004).

Even though the main body of research on aesthetic

experiences focuses on the visual domain, other modalities of product aesthetics are also explored. Overbeeke and Wensveen (2003) use the concept of 'aesthetics of interaction' to refer to the beauty of use, that is, the beauty one experiences when physically interacting with a product. Although belonging to the aesthetic level of experience, this concept has a specific focus on the tactile and kinaesthetic, rather than on the visual aesthetics. Some approaches have been discussed to design for aesthetic interactions. As a general design goal, Overbeeke and Wensveen (2003) focus on the perceptual-motor skills of users in order to aim for richness in sensorial experiences and action possibilities. In their discussion on tangible interactions, Zimmerman, Hurst, and Peeters (2005) refer to Durrel Bishop's marble telephone answering machine, which creates enriched action possibilities by using marbles to represent digital messages.

### Experience of Meaning

At the level of meaning, cognition comes into play. Through cognitive processes, like interpretation, memory retrieval, and associations, we are able to recognize metaphors, assign personality or other expressive characteristics, and assess the personal or symbolic significance of products. This component of the experience corresponds with Crilly et al.'s (2004) cognitive response categories 'semantic interpretation' and 'symbolic association.' It is clear that the cognitive processes involved are vulnerable to individual and cultural differences. Recently it has been shown that our body also plays a major role in understanding linguistic expressions (e.g., Gibbs, 2003; Lakoff & Johnson, 1980) and figurative expressions of products (Van Rompay, Hekkert, Saakes, & Russo, 2005).

Examples of experiences of meaning are luxury and attachment. The experience of luxury represents a symbolic value of a comfortable lifestyle that is associated with particular consumer products (see e.g., Reinmoeller, 2002). The

experience of attachment is represented by products that have some profound and sustained meaning to us. Savas (2004), for example, identifies feelings of confidence, independence, relaxation, achievement, security, friendship, and control. Both product characteristics and user characteristics influence the experience of luxury and attachment. Govers and Mugge (2004), for example, indicated that people become more attached to products with a personality that is similar to their own personality than to products with a dissimilar personality. Likewise, Uotila et. al (2005) identified product, user, and context as influential factors of the luxury experience. According to Reinmoeller (2002), luxury products are created by the use of material, processes, packaging, distribution, and promotion that exceeds the level of standard products to allow for pleasure.

### Emotional Experience

At the emotional level, we refer to those affective phenomena typically considered in emotion psychology and in everyday language about emotions, love and disgust, fear and desire, pride and despair, to name a few. Most contemporary emotion theorists view emotions as coherent, organized, and functional systems (Smith & Kirby, 2001). Emotions are functional, because they establish our position vis-à-vis our environment, pulling us toward certain people, objects, actions, and ideas, and pushing us away from others (Frijda, 1986). This basic principle applies to all emotions; the intense emotion that we may experience in a situation that threatens basic survival needs and the subtle emotion that we may experience in response to human-product interaction. Pleasant emotions pull us to products that are (or promise to be) beneficial, whereas unpleasant emotions will push us from those that are (or promise to be) detrimental for our well-being (Desmet, 2002).

According to the currently most widely adopted theory of emotions (i.e., appraisal theory), an emotion is elicited by an evaluation (appraisal) of an event or situation as potentially beneficial or harmful (e.g., Arnold 1960; Scherer, Schorr, & Johnstone, 2001; see Desmet, 2002 for an overview). It is the interpretation of an event (or product), rather than the event itself, which causes the emotion. Contrary to popular belief, an emotion is thus the result of a cognitive, though often automatic and unconscious, process. Appraisal is an evaluative process that serves to 'diagnose' whether a situation confronting an individual has adaptational relevance, and if it does, to identify the nature of that relevance and produce an appropriate emotional response to it (Lazarus, 1991). One who is confronted with a fire alarm will most likely experience fear with a corresponding tendency to flee, because the fire alarm signals a potentially harmful situation with particular behavioural requirements. This example illustrates that appraisals are inherently relational (e.g., Scherer, 1984). Rather than exclusively reflecting either the properties of the stimulus (e.g., a fire), the situation (e.g., the office), or the person (e.g., asthmatic condition), appraisal represents an evaluation of the properties of the stimulus and the situation as it relates to the properties of the individual (Smith & Lazarus, 1990). Although the fear experienced in case of a fire alarm is a basic emotion, the same principle also applies to the subtle emotions we may

experience when interacting with a product. We can experience joy in response to a mobile phone that we appraise as matching with our concern of being in touch with our friends, desire towards a new car model that we appraise as matching with our concern of mobility, frustration in response to a chair that we appraise as mismatching with the concern for comfort, etc.

In short, appraisal is an evaluation of the significance of a stimulus for one's personal well-being. It is this personal significance of a product, rather than the product itself, which causes the emotion. Because appraisals mediate between products and emotions, different individuals who appraise the same product in different ways will experience different emotions. One who is stressed may respond with irritation to the ring tone of his or her mobile phone, because he or she appraises it as undesirable, whereas another person may appraise the same event as desirable.

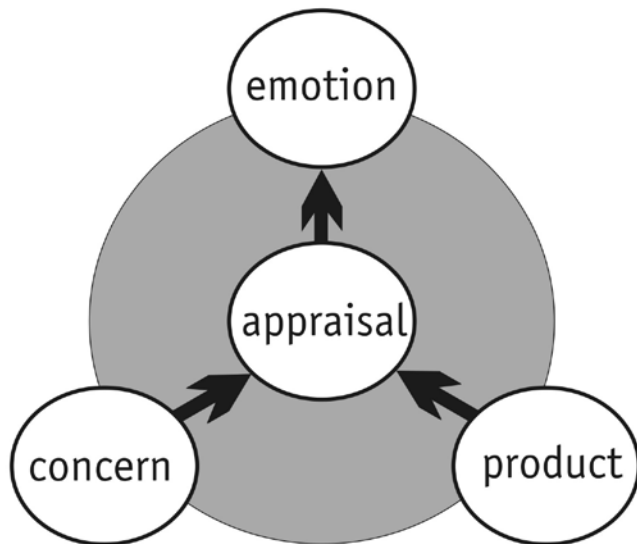
### Relationships Between the Three Levels of Product Experience

To further illustrate the distinction between the three components of experience, let us look at some of our experiences with everyday products. When the user is pleased by the sensuous shape of a vase, the silent but harmonic sound of a cellular phone, or the soft and fluffy texture of a seat, these experiences refer to aesthetic experiences. On the other hand, considering a coffee maker as masculine and very much 'for you,' a mobile phone sexy, but perfectly clear and understandable, and a new car referring to the sixties, are all examples belonging to the experience of a product's meaning. When the user is disappointed by the limited memory capacity of an MP3 player, inspired by an innovative car design for its zero-emission engine, or frustrated by the complexity of a user interface, we can identify these experiences as emotional experiences.

Particular experiences may activate other levels of experience. An experienced meaning may give rise to emotional responses and aesthetic experiences, and vice versa. An example is attachment. Although attachment was identified as an experience of meaning, emotions may very well be involved: one can, for example, be afraid of losing or proud of owning a product to which one is attached (see Schultz, Kleine, & Kernan, 1989). Moreover, Schifferstein, Mugge, & Hekkert (2004), who found an effect of positive emotional responses on product attachment, showed that emotions can also be a determinant of product attachment. Likewise, an aesthetically pleasing product may activate an experienced meaning of exclusiveness and an emotional response of desire. Even though these three components of an experience can be clearly conceptually separated, they are very much intertwined and often difficult to distinguish in our everyday experience. We experience the unity of sensuous delight, meaningful interpretation, and emotional involvement, and only in this unity do we speak of an experience. Although we acknowledge the mutual relationships between all three components of product experience, we want to highlight two that are particularly salient, because their nature seems to be hierarchical: the relationship between the emotional component and the two others. In the next two sections, we will discuss how experiences of meaning and aesthetic experiences can elicit emotional experiences.

## Meaning and Emotion

Following the tradition of appraisal theory, Desmet (2002) introduced a basic model of product emotions, as shown in Figure 4. The model is basic, because it applies to all possible emotional responses elicited by human-product interaction and identifies the three universal key variables in the process of emotion elicitation: (1) concern, (2) stimulus, and (3) appraisal.



**Figure 4. Basic model of product emotions** (adapted from Desmet, 2002).

The basic model indicates that emotions arise from encounters with products that are appraised as having beneficial or harmful consequences for the individual's concerns, that is, his or her major goals, motives, well-being, or other sensitivities (Frijda, 1986; Lazarus, 1991). Concerns are the dispositions that we bring into the emotion process, and products are construed as emotionally relevant only in the context of one's concerns (Lazarus, 1991). In order to understand emotional responses to human-product interaction, one must understand the users' concerns given the context in which he or she interacts with the product. Some concerns, such as the concern for safety and the concern for love, are universal, while others are culture and context-dependent, such as the concern for being home before dark or the concern for securing a good seat for your friend at the cinema.

We saw that at the level of meaning, we recognize metaphors, assign personality or other expressive characteristics, and assess the personal or symbolic significance of products. A car model can resemble a shark; a teddy bear can represent nostalgic value; and a laptop can be exclusive, masculine, old-fashioned, elegant, etc. This meaning component of experience can elicit emotions, because product meaning can be appraised as beneficial or harmful for the individual's concerns. In fact, some emotion researchers claim that emotions are elicited precisely by the appraised 'relational meaning' (see e.g., Lazarus, 1991). Different people, who assign different meaning to a particular product, will most likely have different emotional responses. A person who feels that a stainless steel kitchen unit is modern and efficient may experience attraction, whereas a person who feels

that it is cold and impersonal may experience dissatisfaction. Likewise, one can, for example, be attracted to a record player, because it represents a childhood memory, or feel contempt towards a pair of shoes, because the brand is associated with hooligans. Like all meaning, relational meaning can be related to the actual design (such as the material and shape) but also to other determinants, such as price, advertisements, opinions of others, and prior experiences.

Meaning is also involved in emotions elicited by anticipated usage. One has certain expectations about the consequence of owning or using products. One can, for example, be attracted to an exclusive pen, because it touches on his concern for being special. In this case, it is the meaning of exclusiveness that elicits the emotion.

## Aesthetics and Emotion

An aesthetic experience can give rise to an emotional experience, because aesthetic experiences involve pleasure and displeasure, and people are motivated to seek products that provide pleasure and avoid products that provide displeasure. Hence, we have a concern for experiencing aesthetic pleasure (and avoiding aesthetic displeasure). This is the reason we have, among others, restaurants, entertainment, and, of course, art. They are often designed to please our senses, and the very fact that they do (or do not) can result in a variety of emotional responses. While a beautiful piece of music can move us to tears, one can experience disappointment in response to a product that is not as elegant as was expected, or one can feel desire for delicious food. In these cases, the experience of (or the lack of) beauty and the delicious taste are aesthetic, whereas the resulting disappointment and desire are emotional experiences.

Note that although we distinguish aesthetic experience as a separate component of product experience, some emotion researchers consider an aesthetic experience to be a specific type of appraisal (see e.g., Lazarus, 1991). This appraisal, which is often referred to as an appraisal of 'intrinsic pleasantness' (Scherer, 2001), evaluates whether a stimulus is pleasurable or painful (or whether a stimulus is likely to result in pleasure or pain) and determines the fundamental pleasure response: liking feelings that generally encourage approach behaviour versus disliking feelings that lead to withdrawal or avoidance. The concerns at stake are often called affect dispositions, sentiments, taste, or attitudes (see Ortony, Clore, & Collins, 1998). These are relatively enduring, affectively coloured beliefs, preferences, and predispositions toward objects, persons, or events (Frijda, 1986; Ortony, Clore, & Collins, 1988; Russell, 2003). Examples of dispositions are the preference for sweet and aversion for bitter tastes (Rozin & Fallon, 1987) and preferences for particular odours and for particular facial features and expressions. Such dispositions or universal aesthetic preferences have a clear evolutionary logic (see Hekkert & Leder, 2007) and can evolve as a result of interactions with our world. One can thus acquire an individual or culturally-shared taste for wines, particular fashion styles, social activities, etc.

These experiences, independent of whether one conceptualises them as emotions or as a separate component of product experience, share some characteristics. These are all



experiences restricted to the here and now. Once the interaction comes to an end, the experience also stops (see Norman, 2004). In addition, these experiences have in common that they are elicited independent of the motivational state of the person (i.e., particular goals or motives). This may result in conflicting emotions in cases of conflicting concerns. We all know from experience that an inherently pleasant product can block goal achievement, since something pleasant (like chocolate cake) can obstruct us in reaching a goal (trying to lose weight). The resulting experience combines both pleasant and unpleasant responses.

## Discussion

The above described framework illustrates the complex and layered nature of product experience. Because it focuses on levels or components of experience, we have not systematically discussed the sources that elicit or influence them. Note, however, that the discussion of experience is related to, and partly overlaps with, some of the other recent discussions in design research that focus on sources and influencers of experience. Two of the topics that have received much attention are usability and culture. Given their salient role in design research, we will briefly discuss how they relate to the proposed framework of product experience.

### Product Experience and Usability

Consumer products are bought and used to serve particular purposes: they are used to achieve specific goals, such as pincers that are used to repair a bicycle, an oven to bake a cake, a computer to edit a letter, and an audio system to enjoy music. Product usage involved in satisfying these product-specific goals relates to what we identified as instrumental interaction in Section 1.1. Whether a user is able to achieve the particular goal depends both on (the properties of) the product, and on (the skills of) the user. In some cases goals are not achieved because the user has difficulties operating the product. A product example to which many readers may be able to relate is a DVD recorder: a product that typically has many unused functionalities. Exactly what is the use of functionalities that are too complex for an average user to understand and operate? This question is especially relevant for products that require complex interfaces to operate a multitude of functionalities, like mobile phones and computers. Designers and researchers interested in this question have introduced the concept of 'usability,' a term that is used to denote the extent to which a user can employ a product in order to achieve a particular goal (see e.g., Norman, 2002). Often used dimensions to operationalise usability are effectiveness (the degree to which the particular goal can be satisfied), efficiency (the amount of time it takes to satisfy the goal), and ease of use (the amount of effort it takes to satisfy the goal).

The concept of usability is relevant for user-centred design approaches, because it focuses on the relationship between the user (and his or her skills and abilities) and the product. In that sense, the construct of usability is similar to the construct of experience: they are both relational, i.e., an outcome of the human-product interaction instead of a property of either the user or the product. Why then do we not include usability as

a fourth level of product experience? Because usability is not an affective experience, that is, a change in core affect that is attributed to product-human interaction, as product experience was defined in Section 1.3. Rather than a product experience itself, we consider usability to be a source of product experience. In fact, usability can most likely generate and influence all three levels of product experience. Usability involves goal attainment, which, in appraisal theory, is one of the main dimensions of emotion eliciting appraisal (see e.g., Scherer 2001). Events that are appraised as facilitating goal attainment elicit positive emotions, such as satisfaction and happiness, whereas those that are appraised as frustrating goal attainment evoke negative emotions, such as frustration and anger. Hence, products that are usable will more likely elicit positive emotions than products that are not usable. For that reason, the level of experienced satisfaction (which is a pleasant emotion) is often used as a measure for usability (see e.g., Lindgaard & Dudek, 2002). The relationship between usability and aesthetic experience is explored by several researchers. In a review, Hassenzahl (2007) concluded that usability and aesthetics correlate because of several reasons. Users may infer a higher quality of a product from its beauty which in turn implies a better usability. An additional cause is that good designers may provide in general better quality than bad designers; that is, someone who cares about beauty may also care about usability. The same can also apply to experience of meaning. People attribute meaning to products, and perceived (lack of) usability, or pragmatic quality, can correlate with attributed meanings, like elegance and innovativeness, inferiority, rudeness, etc.

### Individual and Cultural Differences

Clearly, different people can respond differently to a given product. Experience is not a property of the product but the outcome of human-product interaction, and therefore dependent on what temporal and dispositional characteristics the user brings into the interaction. People can differ from one another with respect to their concerns, motives, abilities, preferences, goals, and etc., and thus with respect to their affective responses to a given event. Desmet, Hekkert, and Hillen (2003) found a correlation between personal life values (like security, challenge, and family life) and emotional responses elicited by automotive designs. The relationship between product experience and values is particularly interesting in the context of cultural studies, because implicit and explicit values are often seen as key determinants of culture (see Williams, 1961). Kim and Lee (2005) performed a study that indicated between-culture differences in responses to mobile phone interface designs. Similarly, in a study on emotional responses elicited by automotive design, Desmet, Hekkert, and Jacobs (2000) found differences in emotional responses both between and within cultures.

Although these studies show a correlation between culture and experience, the precise relationship remains inconclusive. Like experience, culture is a complex and layered construct. In following Xing-Liang He (1992), Leong and Clark (2003) identified three structural levels of culture: the external, tangible, and visible 'outer level;' the 'middle level' of human behaviour, rites, and regulations in the form of words and language; and

the 'inner level' of the manifestation of human ideologies. Each of these levels may influence product experience, and given the apparent globalizing nature of product development and marketing, the degree to which they do will make an interesting topic for the product experience research agenda.

## Conclusion

The discussion of user experience in the design research community draws on an extensive set of affective or experiential concepts (for a review see Demir, Desmet, & Hekkert, 2006). This variety in concepts is of value for a profound exploration of the complex and rich experiences people have while interacting with products. On the other hand, the drawback of entertaining a large variety of sometimes loosely defined concepts is the danger of fuzziness and ambiguity, which in the worst case can frustrate rather than facilitate fruitful discussion. We believe that social sciences, and in particular psychology, offer clear bases for experiential concepts that can structure some of the discussion in the design domain, and with this framework, we attempt to contribute some conceptual clarity.

We touched upon some of the complexities of product experience. We saw that experience influences behaviour and that behaviour influences the experience. Wensveen (2005), for example, showed that one's mood state will influence the way one will want to operate an alarm clock. A person who is assembling a closet in a bad mood may try to use additional force when confronted with ill fitting parts, whereas a cheerful person might take the time to explore the situation before using force. Where the first person may break the part and experience anger, the second may discover that he or she should try another part and experience relief. In that sense, the three components of product experience interact with cognition and behaviour, as well as with each other. This shows us that although the division in three components of experiences may seem deceptively simple; in real life, product experience is complex, layered, and interactive. In the introduction, we stated that the interest in user centred design has stimulated a shift of focus from the users' behaviour and cognition to the users' affective experience of (and involvement in) the human-product interaction. Our analysis indicates that an understanding of affective experience will require an approach that explains how behaviour, cognition, and experience are interrelated in human-product experience. It is our aim to further develop the basic framework by deepening it with the inclusion of sub branches within the three main levels of experience. A second research area of interest is the exploration of relationships and dependencies between the various concepts. These explorations will facilitate the identification of blank spots that denote research opportunities.

The framework of product experience that was proposed in this paper indicates that it is possible to distinguish patterns, both in the types of affective product experiences and in the processes that underlie these experiences. These patterns can be of value for designers, because they can be used to facilitate the designers' structured attempts to 'design for experience,' that is, attempts to deliberately influence the experiential impact of new designs.

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