Surprise & emotion

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Theoretical paper

Key conference theme: Interest, surprise and delight

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Creating surprising products can be beneficial because a surprising object attracts attention, can evoke interest and is remembered better. However, a surprise can also result in negative reactions such as disappointment. Therefore, understanding the working mechanism of surprise and the different emotions it can bring about is valuable for product designers. In research on surprise in product design we found tentative evidence that a surprise reaction to a product has two stages. We propose a model in which surprise (first stage) can lead to different emotions (second stage). This model allows designers to better understand to which emotions a surprise can lead eventually. With this knowledge, designers will be better equipped to use surprise in products to their benefit.

Keywords: surprise, emotion, appraisal, sensory perception

Introduction

A surprise reaction towards a product can be beneficial for both the user and the designer/ producer of the product. A surprise can be a pleasant experience for users because it allows them to experience or learn something new. For a designer/ producer of a product, a surprise reaction can be beneficial because something surprising attracts attention and it stimulates word-of-mouth. However, a surprise can also be an unpleasant experience: someone can be disappointed or put off by a surprising product.

This indicates that it is relevant for designers to understand why and in what way products surprise people. Understanding the working mechanism of surprise and especially why people experience it as either pleasant or unpleasant is valuable for product designers. In most cases, designers will aim at creating pleasant surprises. However, term pleasant may be too general to work with. After all, we all know from experience that a surprise reaction can evoke, e.g., interest, fascination, admiration, joy and amusement. Although these are all pleasant surprise reactions, they are nevertheless very different. Therefore, understanding how surprise in product design can bring about these various reactions is even more valuable.

Both Richins (1997) and Desmet (2002) mention surprise as an emotion that is frequently elicited by products. Desmet asked people to photograph products that

elicited pre-defined product emotions and to explain why this emotion was experienced. The 21 cases of pleasant surprise and 20 cases of unpleasant surprise thus obtained showed that product characteristics that surprised people varied considerably and included shape, tactile sensation, functioning of the product, its size, its construction and its material. This suggests that designers can use multiple ways to create surprising products.

Surprise in emotion theory

Over the last decades, emotion theorists have put forward different views on emotion in general and on surprise in particular. Some of the researchers adopting a categorical approach to emotions regarded surprise as one of the 'basic emotions' (Ekman and Friesen, 1971; Izard, 1977; Plutchik, 1980). They distinguished surprise from other emotions based on its unique manifestations (e.g., facial expression, and feeling of surprise). Following a dimensional approach to emotions, that focussed on interrelations among emotions, Russell (1980) organized emotions on two dimensions, arousal and pleasantness. He classified surprise as an emotional state high in activation and neutral in valence, i.e. neither unpleasant nor pleasant.

A third group of theorists have used appraisal theories to explain the differences and similarities between emotions. They see emotions as the result of an individual's evaluation and interpretation (appraisal) of events in the environment (Smith and Ellsworth, 1985; Scherer, 1987; Roseman and Evdokas, 2004). Lazarus and Smith (1988) see true appraisal as the assessment of the implications of events for an individual's goal commitments. Most appraisal models suggest that combinations of several different appraisal types eventually cause an emotion. Surprise has been associated with appraisals of unexpectedness, pleasantness, novelty, motive consistency, and complexity (Smith and Ellsworth, 1985; Roseman et al., 1996; Reisenzein, 1999).

For our purposes, appraisal theory is valuable because it explains how emotions are elicited. For surprise elicited by products, Desmet (2002) defined different appraisal patterns for pleasant surprise and unpleasant surprise. Both appraisal patterns consist of the combination an appraisal of novelty (in terms of suddenness and unexpectedness) combined with one of three other appraisal types that determine whether the surprise will be experienced as pleasant or unpleasant. The patterns of appraisals Desmet defines to distinguish pleasant surprise from unpleasant surprise

are similar to the patterns he defines for the product emotions amusement and disappointment respectively.

The combinations of multiple appraisals Desmet defined for pleasant and unpleasant surprise and the overlap with the appraisals he defined for amusement and disappointment are in line with theories in which surprise is seen as the first stage in a sequence of appraisals. The evaluation of the environment is a dynamic and continuous process. Events evaluated as relevant to a person are evaluated further. In this way, emotions result from appraisal structures rather than from single appraisals (Silvia, 2005a). Several researchers (Scherer, 1987; Meyer et al., 1997) have argued that in a sequence of appraisals that starts with an appraisal of an event as unexpected surprise is elicited, after which the surprising event is further evaluated and a 'second' emotion is elicited. Silvia (2005b) suggests that interest is related to surprise through such a sequence of appraisals, in which an appraisal of novelty is followed by an appraisal of coping potential. In Roseman's model (Roseman et al., 1996) of the appraisal determinants of emotions, surprise is the only emotion that results from a single appraisal (unexpectedness), whereas all other emotions result from combinations of appraisals.

Surprise & emotion in product design

In experimental studies on products that surprise people because they provide incongruent sensory information through vision and touch, we found tentative evidence that surprise in products can be seen as the first stage in a process resulting in different emotions (Ludden et al., 2006a). An example of a product with visual – tactual incongruities is a vase that looks like a familiar crystal vase but that is made out of plastic and, therefore, feels much lighter than people would expect (see Figure 1). Results of our study show that even though the products in both types pleasantly surprised people, they are not always experiencing the same thing. An analysis of facial expressions of surprise showed that in 19% of the cases in which a facial expression of surprise was observed, the facial expression revealed two stages. The first stage comprised one of the subcomponents of a surprise expression (widened eyes, opened mouth or raised eyebrows) and the second stage either an expression of joy or amusement (raised mouth corners: smiling) or of puzzlement or interest (lowered eyebrows: frowning) (Ludden et al., 2006c).

Figure 1. Plastic (polycarbonate) vase that looks like a crystal vase.

In addition, the transcripts from several focus group discussions in which participants talked about surprising products from their own experience and from examples presented (Ludden et al., 2006b) suggested that people first evaluate the event of experiencing surprise, after which they experience a variety of emotions. For example, surprises evoked by products were relatively often evaluated as funny or as disappointing. Other emotions that were mentioned as following surprise were: fascination, amusement, interest, excitement, joy, annoyance, disappointment, and irritation. Several respondents commented on the long term evaluation of surprise. Some of these argued that even pleasant surprises will eventually evoke boredom or even annoyance. However, it was also mentioned that surprising products can remain interesting in the long term, because it is fun to show surprising products to other people and to let them experience the surprise.

Two-stage model of surprise

We propose a model, in which surprise is the first stage in a sequence of appraisals that can lead to different emotions (Figure 2). The concept of a two-stage model for surprise is not completely new. Besides suggestions in this direction in emotion theory, several researchers in other fields have suggested similar definitions of surprise. For example, in theories on humor, where surprise plays an important role, Suls (1972) introduced a two-stage model of the comprehension of a joke. In this model, surprise is elicited by something conflicting. In order to solve the conflict, cognitive processing occurs and, subsequently, laughter (when the cognitive processing solves the conflict) or puzzlement (when the conflict is not solved)

follows. In marketing research, Vanhamme (2000) investigated the link between surprise and satisfaction.

The model we propose differs from earlier models because it tries to offer a more complete overview of how surprise can eventually result in a set of emotions, rather than describing the link between surprise and a distinct other emotion. It is important to note that the appraisals in this process are not conscious and controlled but rather subconscious and fast (Silvia, 2005a). Therefore, the different stages in the process may not be experienced as such.

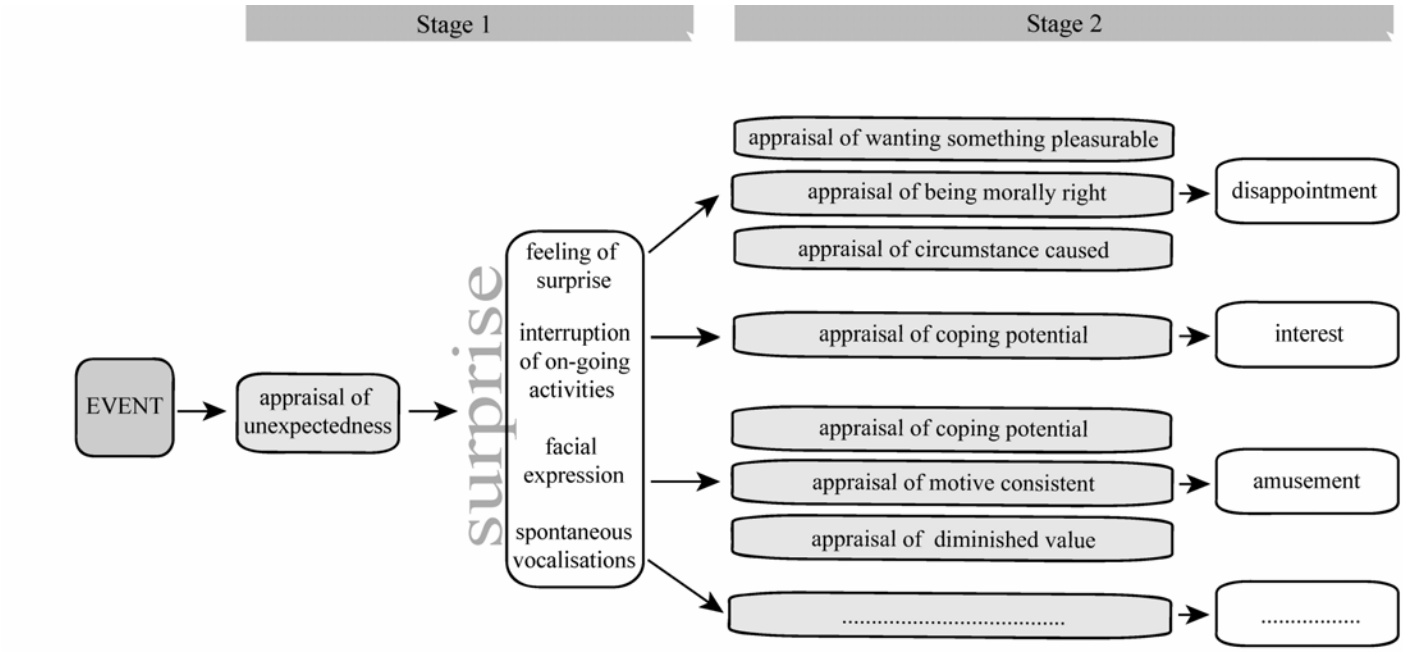

Figure 2. Two-stage model of surprise.

Following Roseman et al. (1996), we propose that the process of experiencing surprise starts with the appraisal of an event as unexpected (i.e., as discrepant with someone's anticipatory representation of what was likely to come next, evoked upon perceiving a stimulus (Berlyne, 1971, pp 143)). A different, but related appraisal, novelty, has also been associated with surprise. Especially in the case of surprise in product design, the concept of novelty is closely related to unexpectedness. The application of a new material in a product, for example, may be experienced as unexpected and therefore surprising. After all, what is expected (in products) is often familiar and what is surprising is novel (Berlyne, 1971, pp 145). Besides acknowledging the relationship between novelty and surprisingness, Berlyne also

explains how one can occur without the other. Translating his example to the field of product design we can imagine someone exploring a new model of a mobile phone and discovering that it has largely the same features as an older model. Although in this case the person exploring the phone encounters something that is *not* novel, she may feel surprised because she was expecting new features. Analogously, Roseman et al. (1996) state that only when novel, unfamiliar, or uncertain stimuli are unexpected, they will produce surprise. The unexpectedness of the event thus causes the surprise reaction.

During a surprise reaction, physiological, behavioral, and verbal/ subjective reactions may occur. In other words, someone can feel surprised, he or she can act in a certain way (for example, decide to explore the surprising event further) and/ or can express his or her feeling of surprise through facial or vocal expressions.

Subsequently, entering the second phase in our model, the surprising event is further evaluated, using one or more different appraisal types that can lead to various emotions. Which appraisal type is used to evaluate the surprising event further depends on the concerns of the observer, (e.g., on the goals he or she wants to achieve), and on the specific surprising event. We will further explain this later. Unfortunately, most available appraisal models (e.g., Smith and Ellsworth, 1985; Roseman et al., 1996) include only small sets of appraisal types differentiating sets of emotions that do not always include those relevant to product design. Therefore, a complete and definitive overview of which appraisal types following surprise can lead to which emotions is not yet available.

Disappointment, interest and amusement

We will discuss the appraisal patterns of three emotions following surprise that seem relevant for product design: disappointment, amusement and interest (see Figure 2). All three were mentioned in our focus group discussions as examples of emotions that followed surprise. Disappointment and amusement belong to the set of product emotions identified by Desmet. In addition, creating interesting products is an everlasting wish of designers. We discuss the appraisal patterns for these emotions and we will illustrate how one particular surprising product (the vase in Figure 1) can evoke these three emotions. This vase is surprising because it looks like it is made out of crystal but is actually made out of plastic and, therefore, feels much lighter than

expected. Perceiving the lighter weight of the vase is the unexpected event that initiates the sequence of appraisals.

For designers, understanding how disappointment can follow surprise is valuable because it is a reaction that is in most cases undesirable. Van Dijk & Zeelenberg (2002) investigated the appraisal patterns of regret and disappointment based on the appraisal dimensions formulated by Roseman et al. (1996). They concluded that disappointment is associated with appraisals of unexpectedness of wanting something pleasurable (motivational state), of thinking that one was morally right (legitimacy), and of circumstance caused (agency). The appraisal of unexpectedness reflects the first stage in the two-stage model of surprise. Someone who appreciates the high quality of crystal as a material may feel disappointed upon perceiving that the example product in Figure 1 is made out of plastic. He or she would prefer perceiving a crystal vase (perceiving a crystal vase would be pleasant, motivational state) and he or she feels entitled to perceive a crystal vase because the material looks like crystal (legitimacy). Instead, a plastic vase is perceived. If this event is evaluated as caused by circumstances beyond anyone's control, (for example, when the vase was encountered in a shop) disappointment may be evoked.

Silvia (2005b) explored the appraisal structure of interest and proposed that its appraisal structure involves two components: an appraisal of novelty-complexity and an appraisal of coping potential. Silvia uses the term novelty-complexity to refer to a family of variables that includes unexpectedness. This seems to be related to the first stage in our model. Coping potential is broadly defined as the evaluation of the extent to which the individual is able to deal with or control an event. Silvia also recognizes the link with surprise, arguing that if an appraisal of coping potential follows an appraisal of novelty, a shift form surprise to interest would be expected. He states that for interest, coping potential probably refers to appraisals of whether people can understand the ambiguous (i.e., novel, complex, unfamiliar, unexpected) event. Being able to understand the ambiguous event is positively related with interest. A principle in product design that reflects the relationship between the appraisal of coping potential and interest is the Most Advanced Yet Acceptable (MAYA) principle (Hekkert et al., 2003). According to this principle, people prefer things that have an optimal combination of typicality (or familiarity) and novelty. It seems that people feel that they are able to deal with (appraisal of coping potential) novel things as long as their typicality is preserved.

Interest could be evoked by the ‘crystal’ vase, for example, when it is perceived by someone who is familiar with and wants to understand production processes. Upon perceiving that the vase is made out of plastic, this person may want to understand exactly how it was produced and how the producer was able to make the product look like crystal.

Amusement is typically not covered in appraisal theories (Desmet, 2002; Hemenover and Schimmack, 2003) but, it is discussed in theories on humor. Wyer and Collins (1992) define a humor-eliciting stimulus as an event that is perceived to be amusing. They state that the most common general conception of humor assumes that it is stimulated by the sudden awareness of an incongruity. Indeed, in Suls’ (1972) two-stage humor model referred to earlier, perceiving incongruity forms the first stage, and solving this incongruity the second in evoking amusement. However, according to Wyer and Collins, perceiving and solving incongruity are necessary but not sufficient for humor elicitation. They argue that two additional conditions need to be met. First, the new information must not replace the interpretation that had appeared to be correct. Second, a diminishing attribute must be perceived: something must be evaluated as less valuable or important than it appeared to be. Furthermore, to experience amusement, an event must be evaluated as not conflicting with an individual’s goals.

For example, upon perceiving the ‘crystal’ vase, most people will immediately understand the incongruity perceived, i.e. that the vase is made out of plastic and not out of crystal. Some people may evaluate plastic as a ‘diminishing attribute’ relative to crystal, because plastic is generally less valuable than crystal. If the perception of plastic does not conflict with a concern described before (that of wanting to perceive crystal, because the status of crystal as a material is appreciated) the vase may be perceived as amusing.

Discussion

The proposed two-stage model of surprise was developed based on emotion theory as well as on tentative research findings. The model has not been tested in experimental research and should, therefore, be seen as a working model. It can serve as a starting point for future research on surprise in product design.

The examples describing the experience of disappointment, interest and amusement show that the same surprising product can evoke these different emotions

depending on the appraisal patterns that are used to evaluate the unexpected event. As the examples described illustrate, the concerns, goals or beliefs of the person perceiving the product determine for a large part which appraisal patterns are used to evaluate the surprise further. However, this does not imply that designers have no influence on the emotions products will evoke. If designers understand the processes described above, they may be able to design products addressing typical concerns, and thereby influence the appraisal process.

Other appraisal patterns than the ones discussed in this paper are expected to precede other emotions that can follow surprise. Additionally, it is not unlikely that surprise can eventually result in mixed emotions when appraisal patterns of different emotions concur. For example, experiencing both amusement and interest upon perceiving a surprising product is not hard to imagine.

It is interesting to consider whether it is possible to experience surprise without a further evaluation (and a subsequent resulting emotion). In theory this seems possible. We can imagine a situation in which someone experiences something unexpected which is not further evaluated because it is not relevant to him or her. However, in real life, someone experiencing an unexpected event will generally try to 'solve the puzzle', to find out what caused the felt surprise. Inevitably, 'solving the puzzle' is then relevant to this person which will induce a further evaluation.

Therefore, we agree with Scherer (1987, pp15) that surprise is often only the precursor to other emotions. The question of whether or not surprise is an emotion has been addressed previously. Ortony, Clore et al. (1988) suggested that surprise is not an emotion because it lacks hedonic value. However, because of its distinct manifestations (e.g., the feeling of surprise and the facial expression of surprise) others view surprise as an emotion. Of course, the answer to the question lies in the definition of emotion, an extensive discussion (see Kleinginna and Kleinginna, 1981) that does not seem particularly relevant to designers.

Acknowledgements

This research was supported by grant number 452-02-028 of the Netherlands Organization for Scientific Research (N.W.O.) awarded to H.N.J. Schifferstein. The authors would like to thank Pieter Desmet for valuable discussions on the topic of product emotions.

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