

# Emotional Design; Application of a Research-Based Design Approach

P. M. A. Desmet · R. Porcelijn · M. B. van Dijk

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**Abstract** In this paper, we discuss an approach to ‘design for wow’ that focuses on the emotions that constitute a wow-experience. In this approach, the eliciting conditions of these emotions are used to define a product character with a high wow-impact. In addition to the approach, a measurable wow-index is introduced. First, a concept of wow is described in which wow is explained as a combination of fascination, pleasant surprise, and desire. The eliciting conditions of these three emotions are examined and combined to a ‘wow-appraisal.’ This concept is applied in the design of a mobile telephone. A combination of qualitative and quantitative research methods was used to formulate concern themes relevant for the wow-appraisal. These themes were used to create a layered product character and a

prototype of the final design. An evaluation study demonstrated that the product designed with this approach rated higher on the wow-index than alternative products.

**Keywords** Emotions · Product character · Wow-impact · Wow-index · Wow-appraisal

## Introduction

Some products are more exciting than others, and this experience of excitement is often seen as something that should be strived for because it motivates customers to prefer one product over another (Wakefield and Baker 1998). Consumer researchers have argued that those products that excite customers will be more successful than those that do not (Millard 2006). In line with this view, Terninko (1995) proposed a model of differential advantage that distinguishes between three types of product features: basic, performance, and excitement features. Basic features are those that the product type is expected to deliver. A basic feature of a mobile phone, for example, is a database function to store telephone numbers. Performance features are those that differentiate between competing products. Mobile phones have performance features such as weight, screen size, and stand-by time. In his model, Terninko proposed a linear relationship between consumer satisfaction and performance features: the higher the

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performance, the higher the level of satisfaction. The third type of features, excitement features, are those that the consumer did not expect to see in the product and is excited to learn are there. GPS systems or high-resolution video cameras can be excitement features of mobile phones. Following this feature-based excitement model, Mann (2002) proposed that those who want to design products that evoke feelings of ‘wow’ should find and apply one or more ‘excitement features’.

The main difficulty of this approach is that this kind of excitement does not last. A photo camera on mobile phones, which was an excitement feature when it was first introduced (“wow, I can take pictures with my phone”), quickly became a basic feature of the next generation of mobile phones. The focus on excitement is basically a focus on surprise by newness, and a feature that excites today will inevitably stop being exciting tomorrow – or the day after tomorrow. This technology-focused approach lacks direction apart from the search for newness. In this paper, we propose an alternative approach that focuses on the relationship between users and their products. The approach is user-oriented rather than technology-oriented, and holistic in the sense that the wow-impact of the product is considered on a conceptual rather than on a feature level. The main advantage is that this approach generates a unified concept in which (visual) appearance, interaction, and features are aligned to elicit a coherent experience. First, the emotional structure of a wow-experience is analyzed. On the basis of this analysis, we propose that wow can best be considered a compounded emotional response. Then, a design project is discussed in which a mobile telephone was designed to evoke wow. The paper describes the design process, the results, the evaluation study, and discusses implications and future research directions.

## Product Emotion

Products can evoke many different kinds of emotions. We can admire the latest ultra-slim laptop, be irritated by an annoying telephone, feel at ease in a comfortable sofa, and so on. And although the touch of melancholy felt when coming across a long forgotten childhood teddy bear seems incomparable to the thrill of driving a motorcycle, both these responses belong

to the wide spectrum of human emotions. Our studies support the idea that even conventional products, such as mobile telephones and fabric softeners, can evoke complex and layered emotional profiles (see Desmet et al. 2001). The last few years, we have been exploring the possibilities to employ such emotion profiles as the starting-point for new ‘emotionally innovative’ designs (see Desmet and Dijkhuis 2003). We found that by measuring emotional responses, it was possible to design products that target specific types of emotions. For this project, it was decided to follow a similar approach in which research was used to feed the design process. Because an integrated approach was believed to be constructive, both the designer (second author) and the researcher (first author) were involved in all stages of the project.

## Appraisal Theory

Most contemporary emotion theorists view emotions as coherent, organized, and functional systems. In fact, the basic Darwinian presupposition that emotions fulfill some sort of adaptive function is probably shared by all psychologists. In this view, emotions are considered the mechanisms that signal when events are favorable or harmful to one’s concerns. The process of signaling the relational meaning of an event is commonly conceptualized as ‘a process of appraisal.’ An appraisal is a “direct, non-reflective, non-intellectual automatic judgment of the meaning of a situation” (Arnold 1960 p. 170) in which our concerns serve as points of reference. Following Arnold (1960), Frijda (1986) argues that when we appraise a stimulus as beneficial to our concerns, we will experience positive emotions and try to approach this particular stimulus. Likewise, when we appraise a stimulus as colliding with our concerns, we will experience negative emotions and try to avoid it. Most contemporary researchers in the cognitive tradition of emotion hold that particular types of emotions are associated with particular types of appraisals, and that emotions can be predicted from the nature of the underlying appraisal and concern. In our view, design for emotion requires an approach that focuses on appraisals and concerns. Although emotions may be subjective, the process of emotion is universal and people that share concerns and appraisals will experience similar emotions to a given product.

## Product Concerns

Ortony et al. (1988) developed a typology of human concerns in which three types of emotional concerns are distinguished: goals, standards, and attitudes. This typology was used in the current project because Desmet and Hekkert (2002) found these three types of concerns to be particularly valuable for describing concerns that are relevant for product emotion. The first concern type is goal. Goals are event related concerns. These are the things one wants to get done and the things one wants to see happen. The goals that people try to satisfy are often assumed to be structured in a hierarchy ranging between abstract goals or aspirations, like the goal to have a successful life, and goals as concrete and immediate as the goal to catch a train. Many goals are directly and indirectly activated in the human–product relationship. For example, we buy, own, and use products because we believe they can help us to achieve things (a digital agenda to make us more organized) or they fulfill a need (a bicycle fulfils the need for transportation).

The second concern type is standard. Standards are our beliefs, norms or conventions of how we think things should behave. Whereas goals refer to the state of affairs we want to obtain, standards are the states of affairs we believe ought to be. For example, many of us believe that we should respect our parents, eat more fruit and vegetables. Most standards are socially learned and represent the beliefs in terms of which moral and other kinds of judgmental evaluations are made. Whereas goals are relevant for our personal well-being, standards are relevant for the preservation of our social structures (and thus indirectly also for our personal well-being). We approve of things that comply with standards and disapprove of things that conflict with standards. We not only have standards regarding human (inter)action, but also regarding products. With respect to products, our values represent our beliefs of how a product (or a person associated with the product) should behave or function. We expect a car to drive, and we expect a vase to be water-resistant.

The third concern type is attitude. Our attitudes are concerns that are related to objects. They represent our dispositional likings or dislikings (taste) for particular (attributes of) objects. We have

affect dispositions towards product types (“I don’t like microwave ovens”), towards aspects or features of products (“I like red cars”), towards style (“I like Italian design”), towards quality of interaction (“I like cars that have a firm drive”), and towards context-related consequences of products (“I like feeling relaxed after drinking a beer”). Some people like red cars, others like black cars. Some people like Italian furniture style, whereas others prefer the Scandinavian style. Emotional responses related to attitudes are elicited by the appearance of the ‘object as such’ and not by an (anticipated) consequence of usage or by (expected) behavior or functioning.

## The Concept of Wow

What is a wow-experience? Essentially, “wow” is nothing more than a simple verbal exclamation. The research literature does not indicate attempts to define or explain the conditions that elicit this experience that would enable us to be more precise. This is not surprising given that the concept of wow belongs to the domain of everyday experience, and is a laymen’s rather than a scientific concept. To some extent, we all have experienced wow, and thus, from experience we all know what wow is. It is not difficult to come up with examples in the domain of product design: “wow: that is the coolest car”; “wow: look at the size of that coffee cup”; “wow: feel how this knife cuts the onion as if it is made of butter”. On the basis of an exploration of these and similar everyday examples, we consider wow to be an affective experience, that is, a valenced experience that includes an unpleasant or (as in this case) a pleasant feeling. Moreover, we consider wow to be an emotional experience because all four components that constitute emotions can be observed in wow-experiences: a subjective feeling, a facial and bodily expression, a change in arousal, and a motivational tendency (see Lazarus 1991). But if wow is an emotion, why is it not mentioned in the emotion discourse found in social sciences literature? Why is it not included in any of the reported emotion typologies or taxonomies? Our explanation is that wow is not an emotion as such, but represents a composite of several pleasant emotions: pleasant surprise, desire, and fascination.

## Wow Emotions

Many emotion models advanced to date include appraisal themes to differentiate between emotions. A relevant question is therefore what particular appraisal theme evoke the wow-experience. On the basis of reported appraisal themes, Desmet (2003a) developed a typology of emotion types that we generally experience in response to consumer products. Five of these types represent pleasant emotions, and three of these five are considered to combine to a wow-experience: pleasant surprise, fascination, and desire.

*Pleasant surprise* We experience surprise in response to products that we appraise as novel, both in terms of suddenness and unexpectedness. To experience pleasant surprise, the product must be appraised as unexpected and as suddenly matching a concern.

*Fascination* We experience fascination in response to products that we appraise as unfamiliar. If the product touches on our need of curiosity, we will experience the pleasant sense of unfamiliarity that we call fascination.

*Desire* We desire for products that we appraise as fit objects that call for possession. The product is appraised as a fit object because using or owning it will fulfill a goal, its design is delightful or it expresses some desirable quality.

If wow is a combination of pleasant surprise, fascination, and desire, the wow-experience should be elicited by products that are appraised as unexpected, unfamiliar, promising, and fit for possession. The design value of this proposition was explored with a case in which a 'wow' mobile telephone was designed, prototyped, and tested.

### Case of Design for Wow

In 2003, one of the main Dutch telecom companies initiated a design project to develop a mobile telephone model. The new model was to serve as the visual identity for their mobile Internet service. In addition, the company wanted the new design to evoke a wow-experience. The project consisted of three parts: an exploration, a design, and an evaluation stage. In the explorative stage, two studies were performed that

resulted in a concern profile. This concern profile was used to develop a product concept in the design phase. In the evaluation stage, it was studied if the new product concept elicited the intended wow-response.

### First Stage; Exploration

The aim of the design project was to design a mobile phone that the target group users appraise as unexpected, unfamiliar, promising, and fit for possession. For that reason, two studies were performed to explore this appraisal and the underlying concerns of the target group users. In the first study, emotional responses elicited by existing mobile phones were measured. The results were used to create an emotional benchmark. The benchmark identifies three current wow-telephones. The second study was designed to understand the underlying user concerns that are responsible for this wow-experience. The first study was a quantitative measurement, and the second a qualitative group discussion.

### *Emotional Responses to Existing Designs; Study 1*

The emotional responses elicited by eight existing mobile phones were measured in study 1.

### *Stimuli*

Eight mobile telephones were selected by design and marketing managers of the telecom company who were instructed to select telephones of which they believed had excitement features that evoke a wow-experience. Two additional criteria used to select stimuli were (1) the telephones should be new to the Dutch market and (2) they should show substantial design variation. Figure 1 gives an overview of the eight selected stimuli.

Models A, C, E, and G have 'candy bar' shapes (no sliding or folding mechanism). Model B slides from a closed to an open position; models D and F flip from a closed to an open position; model H twists from a closed to an open position. All models are colored silver and black, except for model D that is colored metallic red, silver, and black.

### *Participants*

Thirty-five participants (20 men, 15 women) between 20 and 28 years of age ( $M=24.8$ ;  $SD=2.3$ ) participated.

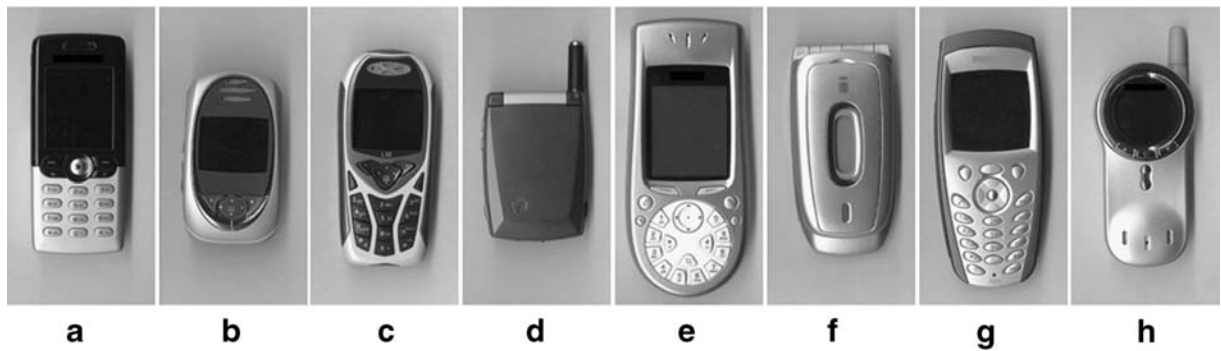


Fig. 1 Stimuli study 1

They were students of Delft University of Technology, recruited from the university cafeteria, and paid for their participation. All participants were in possession of a mobile telephone, and used their telephone five times (or more) a day to call, and two times (or more) a day to sent an SMS. None of the participants were subscribed to a mobile Internet provider.











*Method*

The product emotion measurement instrument (PrEmo, see Desmet 2003b) was used to measure the emotional responses elicited by the stimuli. This instrument was used because it was especially developed to measure emotional responses elicited by product design. PrEmo is a nonverbal self-report instrument that uses animated cartoon characters to

represent emotions. Instead of relying on words, respondents can report their emotions with the use of these characters. The interface of PrEmo depicts stills of the characters, each accompanied with a three-point scale. Table 1 gives an overview of the emotions that were measured in study 1 with the accompanying animation stills.

The scale represent the following ratings: “I do feel the emotion”, “to some extent I feel the emotion”, and “I do not feel the emotion expressed by this character”. During the study, respondents were shown a mobile telephone and instructed to use the characters to report their emotional response(s) elicited by the model. The study was conducted in a neutral room, participants participated individually, and the order in which the models were presented was randomized over respondents.

Table 1 Emotions measured in study 1

<i>Pleasant emotions</i>		<i>Unpleasant emotions</i>	
	Desire		Boredom
	Fascination		Contempt
	Pleasant surprise		Dissatisfaction
	Satisfaction		Disgust
	Amusement		Unpleasant surprise

Results

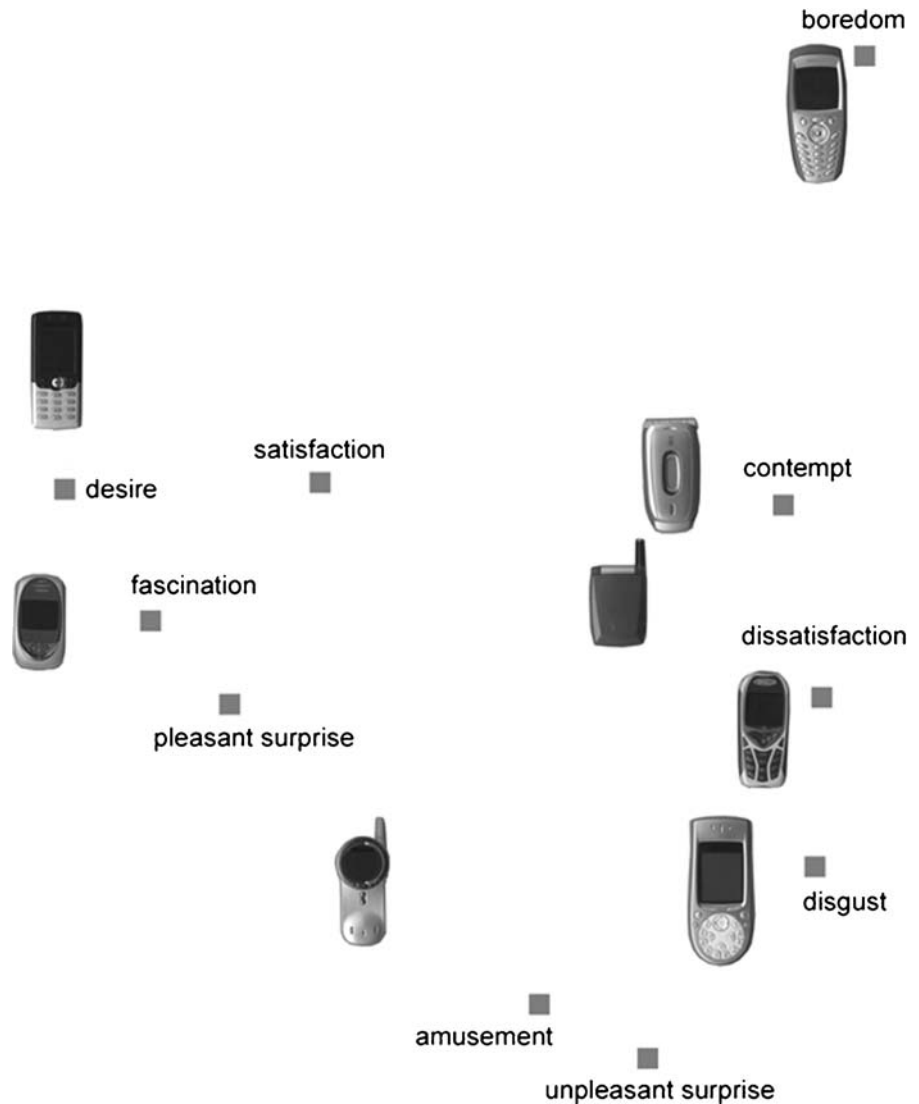
To obtain a graphical representation of the results, a correspondence analysis was performed with two factors: stimulus (eight levels; each level representing a mobile phone) and emotion (ten levels; each level representing a measured emotion). Figure 2 shows the two-dimensional solution of this analysis. The first dimension, which is represented by the horizontal axis, accounts for 65% of the total inertia, and the second dimension, which is represented by the vertical axis, accounts for 29% of the total inertia.

The solution in Fig. 2 shows a ‘mobile phone and emotion’ space that visualizes the associations between the phones and reported emotional responses. The

distances between the stimuli reflect the relationships between these stimuli (with similar phones plotted close to each other). Similarly, the distances between the products and the emotions reflect the relationships between them. This means that products that are plotted close to each other elicited similar emotions, whereas those that are plotted at a distance from each other elicited different emotions. The responses elicited by models C and E, for example, are more similar than those elicited by models C and A.

The space indicates that three models elicit a higher level of wow-experience than the other five: models A, B, and H. These three models are positioned closest to the three emotions pleasant surprise, desire, and fascination. Table 2 shows the mean ratings of all

Fig. 2 Mobile telephone and emotion space, study 1



telephone models on these three wow-emotions (on a three-point scale rating ranging between one and three). The last row, the ‘wow-index,’ shows the overall mean rating on these three emotions.

The telephone models are ordered in accordance with their wow-impact in Table 2. The model in the second column (model B) has the highest wow-impact, whereas the model in the ninth column (model G) has the lowest wow-impact. Consistent with Fig. 2, the table indicates that models B, A, and H evoke the highest level of wow-experience. In our view, this indicates that these three models match the concerns that are relevant for the wow-appraisal. A second study was performed to understand these concerns that underlie the wow-appraisal.

### Design Parameters; Study 2

The aim of study 2 was to identify the emotional concerns that are relevant in the process of experiencing desire, fascination, and pleasant surprise in response to mobile telephones. For this purpose, two group discussions with target group consumers were organized.

### Stimuli

The same eight mobile telephones as in study 1 were also used in study 2. The telephone and emotion map that resulted from study 1 served as an additional reference.

### Participants









Ten participants (five men, five women) between 21 and 28 years of age ( $M=24.3$ ;  $SD=2.0$ ) participated,

divided in two groups of five participants. The first group consisted of two male and three female participants, and the second group consisted of three male and two female participants. Participants were recruited from the university cafeteria, and paid for their participation. All participants had the Dutch nationality and were in possession of a mobile telephone. They used their telephone five times (or more) a day to call, and two times (or more) a day to send an SMS. None of the participants were subscribed to a mobile Internet provider, and none participated in study 1.

### Procedure

The relationship between product design and emotional responses to mobile telephones was discussed in 2-h sessions. The group members first discussed the emotional impact of each of the eight mobile telephones. The models were placed randomly on the table, and the moderator invited participants to express their affective responses. After this first part that took place in approximately 1 h, the moderator introduced and explained the mobile telephone and emotion map. He explained the map and how it was produced. The group members were stimulated to discuss to what degree they ‘agreed with’ the map, that is, to what degree they felt that the map represented their emotional responses. After that, the group was stimulated to discuss the underlying reason why the models and emotions were placed in that particular configuration. By using a technique that was loosely based on the depth interview technique ‘laddering’ (see Reynolds 1986), the moderator was able to direct the discussion to the abstract

**Table 2** Measured wow-impact in study 1

	<i>B</i>	<i>A</i>	<i>H</i>	<i>D</i>	<i>E</i>	<i>F</i>	<i>C</i>	<i>G</i>
								
surprise	2.54	2.23	2.37	1.86	1.89	1.66	1.66	1.46
desire	2.03	2.20	1.57	1.57	1.40	1.46	1.29	1.26
fascination	2.14	2.06	1.86	1.63	1.51	1.51	1.40	1.29
overall	2.32	2.16	1.93	1.69	1.60	1.54	1.45	1.34

level of underlying concerns. All discussions were recorded on audiotape.

### Results

All comments made by any of the participants that referred to concerns were recorded and subsequently categorized in terms of the three concern types goals, standards, and attitudes. Table 3 gives an overview of the categorized concerns. The first column shows the concern type, the second shows examples of mentioned concerns, and the third column shows concern themes that were formulated to represent the concern examples.

The concern themes that are considered to be relevant for a wow-experience (given the target group and the particular product) are:

*Goals* I want a mobile telephone that is manageable, practical, and reliable.

*Standards* A telephone should be of best quality and logical in usage.

*Attitudes* I like telephones with designs that are consistent, unique and luxurious.

### New Product Design

The concern themes served as points of departure in the design phase. The first step was to define a product character; the second step to translate this character to a product concept; and the final step was to make the detailed design.

### Product Character

Some of the mentioned concerns in Table 3 appear to be inconsistent or even conflicting. In the process of defining a product character, we found these apparently conflicting concerns to be particularly inspiring. For example, the telephone should be innovative, surprising, and stimulating, and at the same time, it should be no-nonsense and harmonious. Or, the appearance should be simple and balanced, and at the same time, distinctive and unique. These paradoxical concerns are interesting because they consti-

**Table 3** Concern profile found in study 2

Concern types	Concern examples	Concern themes
Goals		
I want a telephone that	Fits my hand (not too small or too big); is convenient to store; does not have awkward folding mechanisms.	Manageable
	Has clear and unambiguous buttons; has buttons that are easy to operate; provides me with clear interaction feedback; can be operated with uncomplicated interaction protocols.	Practical
	Does not have parts that can break off; is not sensitive for damage; has a protected screen; has sturdy buttons; is always reliable.	Reliable
Values		
A telephone should	Have a solid cover; not be too light; have a clear click if it has a folding or twisting mechanism, not have the tactile quality of plastic; not make cracking sounds when held in the hand.	Quality
	Be recognizable as telephone; have a design that emphasises the telephone function; should be functional; have a no-nonsense expression; not have 'design-frills;' should not have unnecessary ornaments.	Logical
Attitudes		
I like telephones that	Are consistent in general shape, colour and buttons; are shaped geometrically; have even shapes; have simple shapes; have balanced shapes; have quiet shapes; have harmonious shapes; have symmetrical shapes; are made of real materials like metal (instead of plastic with metallic paint) and rubber.	Consistent
	Are not boring; have powerful shapes; show distinctive features; have distinguishing characteristics; have an innovative design; have an exciting design; are stylish; are elegant; are modern; are unique (not mainstream).	Unique
	Have classy design; are made of beautiful materials; are well-detailed and finished; do not look childish; do not look cheap; show perfection in design and fabrication.	Luxurious



tute a tension field by defining a design space that excludes existing design solutions. On the basis of the conflicting concerns, a character triangle was created that represents the eight concern themes. Figure 3 shows the character triangle in words and pictures.

This product character includes three successive layers: the first impression is impetuous and self-willed; then the character becomes sincere and balanced; and finally it becomes beneficent and sophisticated.

### *Product Concept*

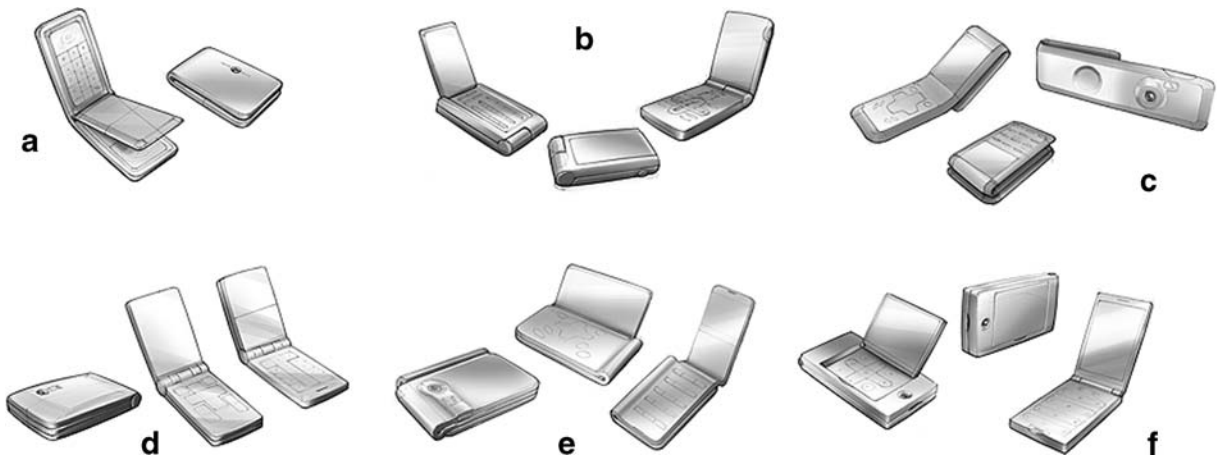
In the process of sketching product ideas, the designer aimed to create a product concept that fits the layered character. In addition, the initiating telephone company defined a set of predefined product design requirements, such as features to be included (e.g., an Internet function, a photo camera), and restrictions in the types of buttons that were to be used. The first step was to decide on a structural solution, which is a definition of how the three main functions (i.e.,

telephone, Internet, and photograph) are combined to a unified product concept. In study 2, it was found that the one of the concerns of the users is the standard that the telephone function should be predominant and direct in usage. It was therefore decided not to integrate the telephone, photograph, and Internet functions in a single interface, but to separate them. In the light of this decision, two design directions were explored: structures in which each function has an equal presence, and structures in which the telephone function dominates over the other functions. For both strategies, structural solutions were explored through sketching and modeling. Figure 4 shows some of the sketches that were made to explore structural solutions.

Figure 4 shows six structures: equal dominance with (A) single, (B) double hinges, and (C) double squared hinges; unequal dominance with (D) single, (E) double, and (F) double squared hinges. The equal dominance with double squared structure (E) was selected because it was believed that this best fits the



**Fig. 3** Product character that represents eight concern themes

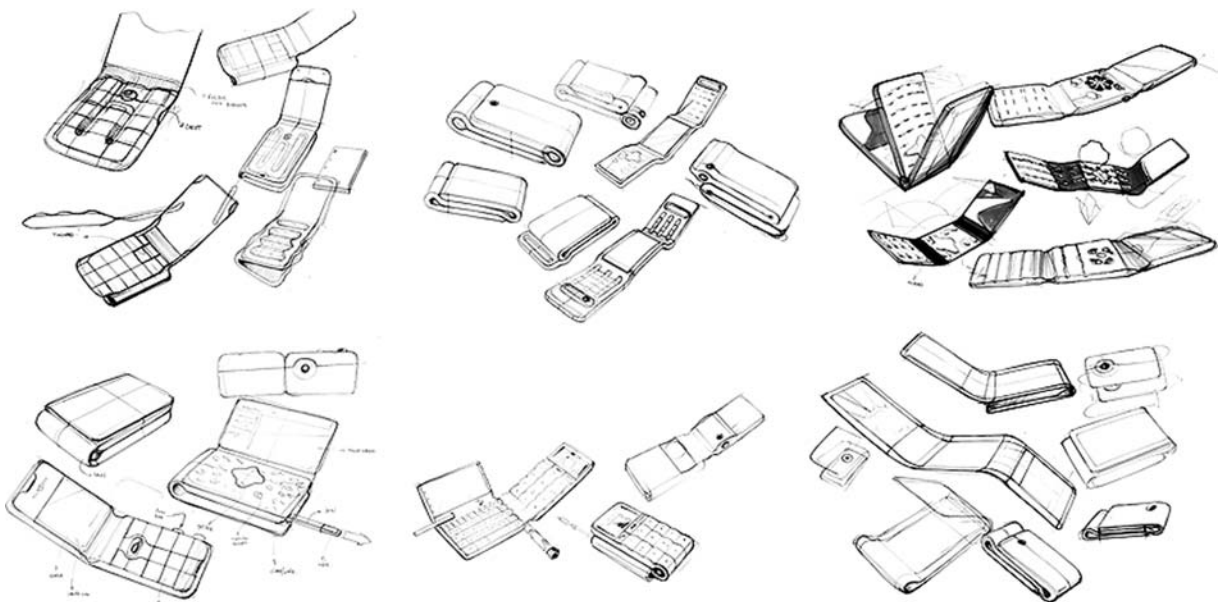


**Fig. 4** Structural product solutions

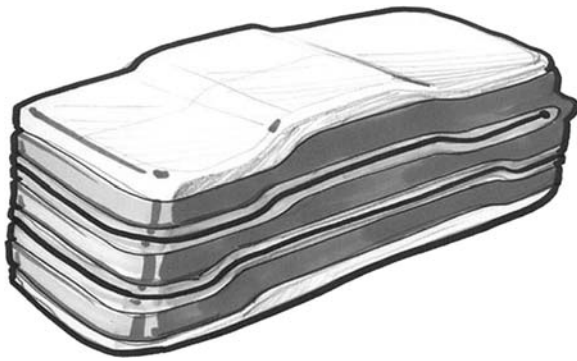
character and concern themes. Equal dominance is required because that allows for a design that is 'honest' in the sense that it directly communicates its functions. A double hinge is required because that allows for a clear separation between the Internet and phone function that will support a simple and direct interfacing. The hinges should be squared because this will generate a design that uses prototypical configurations (a phone by two rectangles in disconnected lengthways and an Internet 'computer' by two rectangles connected breadthways).

### *Product Design*

The product design was explored with sketches and modeling. To prevent a wow-response that has only a short existence, it was decided to focus on the overall (holistic) concept rather than on feature-based concepts. Sketches explored the possibilities to create a layered response in which each character domain represents one layer of experience: an initial impact at first sight, a second impact, and a long-term impact. The first impression of the product is that it is



**Fig. 5** Design sketches



**Fig. 6** Three functional layers

impetuous and self-willed; when using the product one experiences its beneficence and sophistication; and after a period of using the product one will experience its sincerity and balance. Figure 5 shows some of these design sketches.

The final design has three functional layers. Each functional layer is built from three material layers. The two outer layers are made of soft rubber and the inner layer is made of metal (see Fig. 6).

Figure 6 shows that the layers are curved and each layer fits in the other. The rubber layers include interfaces, buttons, and hinges. The metal layers create a solid structure. The three functional layers define three product functions as shown in Fig. 7.

Figure 7 shows the final design. When closed, the product looks like a photo camera, and when opened it looks like a small computer, or like a simple mobile phone, depending on how it is opened. The parts that are touched (by the finger when interacting with the product or by the face when using the telephone function) are made of white soft rubber. The exterior is made of cool metal (aluminum anodized in the color gold). The basic dimensions are:  $122 \times 42 \times 22$  mm.

The design has an impulsive spirit; the basic shape is clear, but the lines are playful. The product shows diversity in color and material (both in visual and in tactile quality): soft rubber for all operating elements; plastic pieces for the construction, and metal pieces for the protection. The shape (and therefore also the character) changes when opened. The layered character is applied in all details of the product in order to create a subtle and sophisticated design experience.

### Third Stage: Evaluation

An evaluation study was performed to assess if the product design elicits the intended wow-experience. A prototype was built of the new design. This prototype did not function as a telephone, but was functional in terms of interacting with the physical object (opening and closing the telephone and



**Fig. 7** New mobile phone design concept



**Fig. 8** Prototype of the new design

computer function). Study 1 was repeated with the new prototype as an additional stimulus.

### *Stimuli*

It was decided that, similar to study 1, the evaluation study should include eight mobile telephones. The first stimulus was the prototype of the new design as shown in Fig. 8.

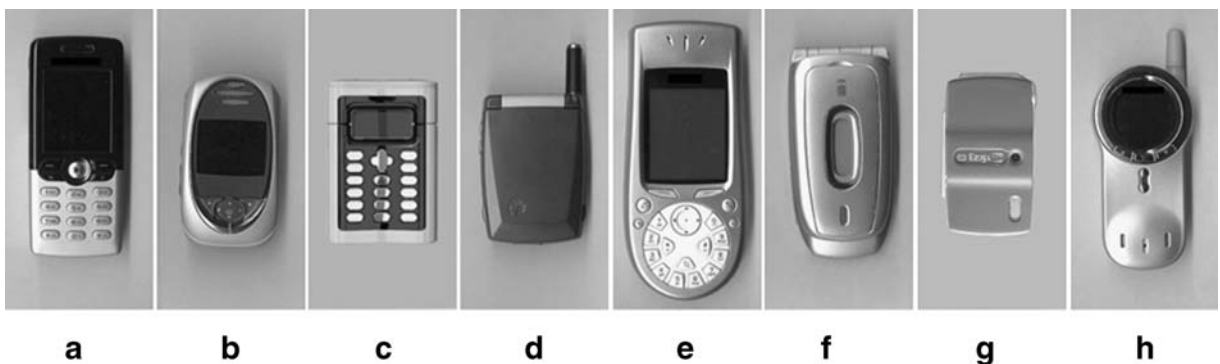
The second stimulus was a prototype of an additional design that was developed by another project team. The remaining six models were selected from the set of eight that was used in study 1. The following models were included: A, B, D, F, and H. Model G was not selected because in study 1 this model was found to elicit least wow of all models (see Table 2). Model C was omitted because a repeated-measures ANOVA (with emotion as the dependents)

indicated no significant differences in emotional responses between models C and E. Figure 9 gives an overview of the eight selected stimuli.

All stimuli were nonworking prototypes. Models A and E are ‘candy bar’ shapes (no sliding or folding mechanism). Models B and C slide from a closed to an open position; models D, F, and G flip from a closed to an open position; model H twists from a closed to an open position. All models are colored silver and black, except for model D that is colored metallic red, silver, and black; model C that is blue and gray; and model G that is metallic gold.

### *Participants*

Thirty participants (15 men, 15 women) between 20 and 28 years of age ( $M=24.8$ ;  $SD=2.3$ ) participated. They were students of Delft University of Technolo-



**Fig. 9** Stimuli study 3

gy, recruited from the university cafeteria, and paid for their participation. All participants were in possession of a mobile telephone, and used their telephone five times (or more) a day to call, and two times (or more) a day to sent an SMS. None of the participants were subscribed to a mobile Internet provider, and none participated in study 1 or 2.

### Method

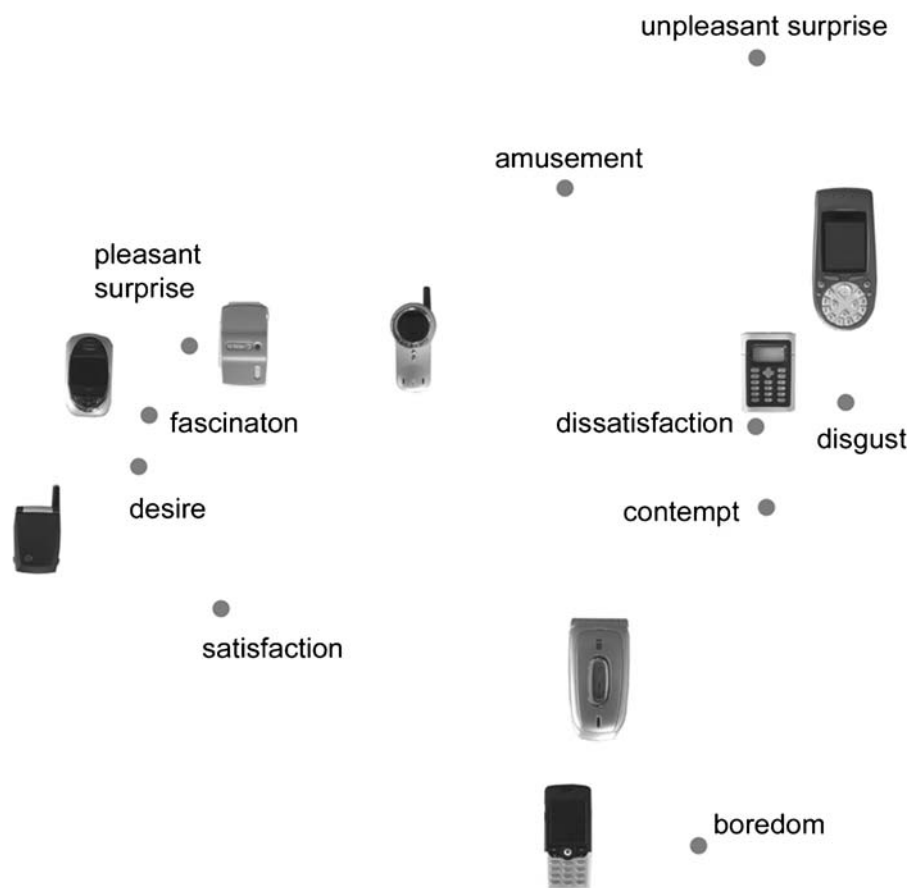
PrEmo that was used in study 1 was also used in study 2 to measure the emotional responses elicited by the stimuli. The participant was shown a stimulus and instructed to use the characters to report his or her emotional response(s). The same procedure was used to measure the emotional responses elicited by the other stimuli. The study was conducted in a neutral room, participants participated individually, and stimuli were presented in a randomized order.

### Results

To obtain a graphical representation of the results, a correspondence analysis was performed with two factors: stimulus (eight levels; each level representing a mobile phone) and emotion (ten levels; each level representing a measured emotion). Figure 10 shows the two-dimensional solution of this analysis. The first dimension, which is represented by the horizontal axis, accounts for 69% of the total inertia, and the second dimension, which is represented by the vertical axis, accounts for 22% of the total inertia.

The solution in Fig. 10 shows a ‘mobile phone and emotion’ space that visualizes the associations between the phones and reported emotional responses (see also Fig. 2). The distances between the stimuli reflect the relationship between these stimuli (with similar phones plotted close to each other). Similarly, the distances between the products and the emotions

**Fig. 10** Mobile telephone and emotion space, study 3



reflect the relationship between them. This means that products that are plotted close to each other elicited similar emotions, whereas those that are plotted at a distance from each other elicited different emotions. The space indicates that the new design is one of three models that elicit the wow-emotions: pleasant surprise, fascination, and desire. Table 4 shows the mean ratings of all stimuli on the three wow-emotions (on a three-point scale rating). In addition, the last row shows the ‘wow-index,’ that is, the overall mean wow-rating.

In Table 4, the models are ordered in accordance with their wow-impact. The new model in the second column (model G) has the highest wow-impact, whereas the model in the ninth column (model E) has the lowest wow-impact. Consistent with Fig. 10, the table indicates that models G, B, and D have the highest wow-impact with the new model (G) as the model with the highest overall wow-impact. A repeated-measures ANOVA with the emotions as the dependents indicated a significant difference ( $p < 0.5$ ) between the wow-rating of model G and all other models except model B (and between model B and all other models except model G). This indicates that both models G and B elicit higher levels of wow-experience than all other stimuli.

## Discussion

The aim of this project was to explore how a wow-experience can be conceptualized and how one can design products that elicit such an experience. It was found that with the proposed approach, it is possible to design a product that evokes a wow-experience.









The approach has three main ingredients. The first ingredient is that it conceptualizes wow as an emotional experience that combines the emotions fascination, desire, and pleasant surprise. These three emotions are elicited by particular appraisals that can be combined to the following ‘wow-appraisal’: the product is appraised as unexpected, unfamiliar, promising, and fit for possession.

The second ingredient is that it draws its design parameters from a combination of qualitative and quantitative research in which the wow-impact of existing products is measured and discussed with users to find the relevant concerns underlying the wow-appraisal. The strength of combining qualitative with quantitative research methods is that it generates rich and stimulating design parameters, and at the same time, testable premises.

Third, it focuses on the product concept (in terms of character) instead of on product features as is done in feature-based approaches such as the excitement approach proposed by Mann (2002). In our view, the character-based approach creates a more durable wow-impact. The experience is not a first impression experience (that was measured in the evaluation study) only, but one that evolves over first impression, usage, and ownership. The design for wow approach that focuses on layers fits the conception that products can evoke multiple ‘layers’ of emotion, and an understanding of the various layers that combine to product experience enables the designer to create rich and desirable products.

At first sight, the concept of wow seems superficial as it is nothing more than a simple verbal exclamation that comes with excitement. This excitement will last until a new and even more exciting product comes

**Table 4** Measured wow-impact in study 3

	G	B	D	H	C	F	A	E
								
surprise	2.57	2.40	2.07	1.97	1.80	1.57	1.37	1.53
desire	2.03	1.97	2.17	1.83	1.27	1.50	1.50	1.40
fascination	1.87	2.17	1.93	1.83	1.37	1.47	1.40	1.37
overall	2.16	2.15	2.06	1.88	1.48	1.51	1.42	1.43

into view. At second sight however, this experiences is more complex and rich than a mere excitement. It is evoked by an intricate and compound appraisal and has an experiential, physical, and behavioral impact. In that sense, design for wow can result in products that people are not only excited about to see—but also excited about to use and to own; independent of the inevitable future products that surpass its wow-impact with the newest up-to-the-minute excitement features.

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