



Sentence Completion for Evaluating Symbolic Meaning

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Symbolic meaning refers to the image and associations that spring to mind in regard to a product. Products can act as symbols for humans, providing personal meaning and communicating the owner's personal characteristics to others. The meanings that we attach to products play an essential role in how we feel about them and evaluate them. In this paper, we investigate how symbolic meaning could be evaluated. Symbolic meaning is challenging to design since it is hard to anticipate other people's reactions and the designer and users might attach different meanings to a product. Symbolic meaning is also challenging to evaluate because of the intangible nature of the phenomenon. Practical methods are needed to evaluate designs and gather feedback on how users interpret symbolic meanings. We used a sentence completion technique to identify the symbolic meanings that users attach to a product. Using two case studies, we describe early trials of the technique. The results show that sentence completion can help designers to understand how users see their products and how symbolic meanings can be refined.

Keywords – Product Symbolism, Product Meaning, Sentence Completion, Symbolic Meaning, User Experience, Intangible Product Properties.

Relevance to Design Practice – The designers can use the sentence completion technique presented here for evaluating the symbolic meaning of designs and gathering feedback from users. By evaluating symbolic meaning, designers can learn how users interpret the design and attach symbolic meanings to it, suggesting how the symbolic meaning of the product can be improved.

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Introduction

In design, products have long been recognized as important carriers of meaning (Krippendorff & Butter, 1984). In addition to offering practical functions, products often act as symbols for people, providing personal meaning and communicating the owner's personal characteristics to others (Crilly, Moultrie, & Clarkson, 2004). For example, an expensive car may symbolize achievement; the owner feels good and important when driving the car and other people may think that the person is successful in his or her work. Product symbolism has also generated considerable interest in market research and empirical studies have shown that in certain circumstances individuals do evaluate the symbolic meanings of products when forming overall product preferences and attitudes (Allen, 2006). For example, in Creusen and Schoormans' (2005) large qualitative study of 142 users, almost one half of the sample mentioned symbolic meaning — mostly as associations related to appearance — as a reason for product choice when asked to make a choice between alternative telephone answering machines.

Allen (2002) defines symbolic meaning as being about the image of a product, encompassing abstract ideas and associations with a product and beliefs about the kinds of people who use it. A person may attach almost any meaning to any object, as human thinking is associative by nature. Still, the object's physical characteristics and the values attributed to it in a culture seem to play a determining role (Csikszentmihalyi & Rochberg-Halton, 1981, p. 87). For example, in Csikszentmihalyi and Rochberg-Halton's study of domestic objects, the symbolic

meaning of TVs and stereos most often related to the person's self, photos were specialized in preserving memories and sculptures in embodying associations.

In this article, we investigate how symbolic meaning can be evaluated. Symbolic meaning is challenging to design, it being hard to anticipate other people's reactions and designers and users may attach different meanings to a product. A designer always makes assumptions about users, their behavior and ways of interpreting a product. Designers need feedback from users to understand how users see their products and attach symbolic meanings to them. Symbolic meaning is challenging to evaluate because of its intangible nature. In practice, interviewing is time demanding and only a limited number of users can participate. For social desirability reasons, users typically do not mention status or prestige issues in self-reports (Richins, 1994). An expensive car can have social status or prestige value and may make other people appreciate its owner, but practical methods are needed for evaluating designs and gathering feedback on how users attribute symbolic meanings to them.

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In summary, symbolic meaning is a complex and obscure concept to identify and measure. Different researchers use different terms to describe the phenomenon, including meaning (Crilly et al., 2004; Russo & Hekkert, 2007), personal meaning (Cupchik & Hilscher, 2008), symbolic meaning (Desmet & Hekkert, 2007), product meaning (Allen, 2002, 2006), linking value (Cova, 1997) and symbolic qualities associated with products (Crilly, Good, Matravers, & Clarkson, 2008). Symbolic meaning is not a one-dimensional concept. To evaluate it from users' point of view, we need to understand the factors comprising symbolic meaning and how these factors can affect user experience. This paper reviews the literature to clarify the factors of symbolic meaning to be evaluated. The empirical part of the paper reports on a sentence completion technique for evaluating symbolic meaning and the testing of the approach in two case studies.

Symbolic Meaning as a Source of User Experience

User experience and symbolic meaning are related concepts. This section discusses the concept of user experience and its relation to symbolic meaning.

Intangible Nature of User Experience

User experience refers to the user's perceptions and responses in regard to their interaction with a system or product (ISO 9241-110, 2010). The concept of user experience has evolved to take into account experiential aspects of user-product interaction, such as emotions, feelings and meanings. However, user experience is a vague and multidimensional concept, lacking common agreement on its full nature and scope (Law, Roto, Hassenzahl, Vermeerem, & Kort, 2009).

McCarthy and Wright (2004) describe user experience as a subjective, constructive, holistic, and spatio-temporal phenomenon. According to Hassenzahl and Tractinsky's (2006) model, user experience is a consequence of the user's internal state, the characteristics of the designed system and the context in which the interaction occurs. They see user experience as holistic, subjective, situated and emotional. The user experience is commonly seen as evolving in the interaction between the user and the product (Russo & Hekkert, 2007; Russo, Boess, & Hekkert, 2011), not as arising solely from a product's properties.

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In sum, user experience is intangible and clearly represents something more than the instrumental and utilitarian aspects of the product.

Symbolic Meaning as a Dimension of User Experience

The symbolic meanings and associations with a products, although intangible and dependent on personal interpretation, seem to be an integral part of how users experience a product. Various researchers agree that symbolic meaning is a dimension of user experience. For example, Desmet and Heckert (2007) identify three levels of product experience: aesthetic pleasure, attribution of meaning and emotional response. They do not give an exact definition of attribution of meaning, but state that it happens through cognitive processes such as interpretation, memory retrieval and associations. They state that meaning is related to the personal or symbolic significance of products or the possibility of assigning them personality or other expressive characteristics. They give an example of a Chinese teacup that one of the authors is attached to because it represents his visit to China. In a similar vein, Vyas and van der Veer (2006a) conceptualize users' experience as the meaning or interpretations they construct during the interaction with a product.

Hassenzahl (2003) does not explicitly mention symbolic meaning as a component of user experience, but he does describe aspects that are closely related. He categorizes the hedonic aspect of user experience as including stimulation (i.e. personal growth, an increase or knowledge and skills), identification (i.e. self-expression, interaction with relevant others) and evocation (i.e. self-maintenance, memories). Similarly, Mahlke and Thüning (2007) distinguish identification as a part of user experience. Identification and other hedonic aspects can be seen as part of symbolic meanings as discussed below.

Assessing Meaningful Experience

Factors of the Symbolic Meaning to Be Evaluated

Symbolic meaning is not a one-dimensional concept. To evaluate it from users point of view, we need to understand its components and how they can affect user experience.

In the industrial design literature, symbolic meaning is often interpreted as being related to a product's form, appearance and use. For example, Krippendorff and Butter (1984) and later Krippendorff (2006) describe the history of product semantics and define it as "the study of the symbolic qualities of man-made forms in the context of their use and the application of this knowledge to industrial design" (p. 4). They relate product semantics to a concern for the cognitive meanings, symbolic functions and cultural histories of form.

Van Rompay (2008) provides an overview of studies accounting for the relationships between a product's formal features and symbolic meaning. He gives the example that the rounded form of an object is generally perceived as being secure

or emotional. Van Rompay's conclusion is that meaning is not a fixed property of the world or mind, but results from interactions between individual and environment. One of his studies shows that forms connote different symbolic meanings across cultures. For example, increasing degrees on containment (container form) resulted in higher ratings on secure in the Netherlands, but not in Brazil. Crilly et al. (2004) also discuss symbolic associations and the social value of products. Mugge (2011) suggests that product appearance creates product personality, which people use as a cue for evaluating products.

Desmet and Hekkert (2007) consider meaning to be non-physical human-product interaction related to fantasizing about, remembering or anticipating use. People use interpretation, memory retrieval and associations in attaching meaning to products and assessing their personal or symbolic significance. Desmet and Hekkert give luxury and attachment as examples of meaning. The experience of luxury represents the symbolic value of a comfortable lifestyle associated with particular consumer products. The experience of attachment is represented by products that have some profound and sustained meaning for users (Mugge, Schoormans, & Schifferstein, 2008; Schifferstein & Zwartkruis-Pelgrim, 2008).

Product meaning is a well-established concept in consumer research and there is literature exploring the factors of symbolic meaning. Allen (2002, 2006) provides a good review of the related literature. As early as 1923, Ogden and Richards defined product meaning as the relationship between mind, object and world. According to Allen (2006), there have been various explanations of product meaning, but it is generally seen as subjective, suffused with affectivity and usually either utilitarian or symbolic. Our particular interest is in symbolic meaning that is represented by intangible attributes. Allen states that a group of individuals has a tendency to make similar inferences about a product, suggesting that symbolic meaning is culturally shared. Symbols are formed by cultural principles, which can be norms, values or social categories. For example, an American flag may symbolize freedom or conservative American.

Allen (2002) defines product meaning as the image of the product, encompassing abstract ideas and associations with the product, as well as beliefs about the kinds of people who use the product. The psychological and sociological literature argues that individuals pay attention to object symbolism mainly because they want to express, maintain or enhance their self-concept, that is, their identity and ideal image of themselves. The literature gives examples of how symbolic meaning has been used to compensate for low self-esteem and lack of experience in playing a particular social role (Allen, 2002).

Zimmerman (2009) reviews the consumer research literature and concludes that people use products as self-extension and that an essential part of identity construction is a development of a coherent life story, this being an integration of different stories that unite events from someone's past, experiences for the present and imaginings of the future. Mugge et al. (2008) review

the literature showing that people tend to develop a stronger attachment to products where they use them to express and maintain a unique personal identity. In addition to identity, Allen (2002, 2006) shows by his survey studies that to some extent users form product preferences by evaluating whether their values are represented in product meanings. For example, users' preference for achievement value was associated with a preference for larger family cars (Allen, 2002).

Cova (1997) analyses humans and consumption behavior from an ethnosociological point of view. In ethnosociology, a new tribalism is seen as characterizing postmodernity. Cova argues that to satisfy their desire for community, modern individuals seek products and services less for their use value than for their linking value. Linking value arises when a product facilitates and supports communion by providing a site, an emblem, the support for integration or recognition, and so forth. Cova states that "the postmodern individual can build an identity for themselves with cultural symbols and references (plays, exhibitions, films, and books), humanitarian references (the French Doctors, Bosnia, and Somalia), but also sporting references (the complete outfit of the OM supporter), and, in fact, all possible references" (p. 305).

Linking value can be interpreted as one kind of meaning. It refers to product properties that cause users to experience a feeling of communion. The same idea is presented in the consumer research literature. For example, Belk (1988) argues that identity is important not only on an individual level, but also on a collective level involving family group, subcultural and national identities.

In summary, the literature of industrial design suggests that symbolic meaning can arise through memory retrieval and associations (Desmet & Hekkert, 2007) and seems to be one of the determinants of product attachment (Mugge et al., 2008; Schifferstein & Zwartkruis-Pelgrim, 2008). Consumer behavior research shows that symbolic meaning is important to users mainly because they want to maintain, enhance and express their identity and ideal image of themselves. It has been shown that symbolic meaning arises when products support user values (Allen, 2006). The sociological literature suggests that the goal can also be a feeling of communion (Cova, 1997).

The different definitions and fields of research provide complementary views of the concept of symbolic meaning. Symbolic meaning is something intangible and subjective, but also culturally shared. Figure 1 summarizes the identified factors of symbolic meaning and the relationship of symbolic meaning to product experience as presented by Desmet and Hekkert (2007). The identified factors overlap, but they describe the nature of phenomenon.

Assessing Symbolic Meaning in Practice

Gathering feedback from users and evaluating the symbolic meaning of a product is not straightforward in practice because of the intangible nature of the phenomenon.

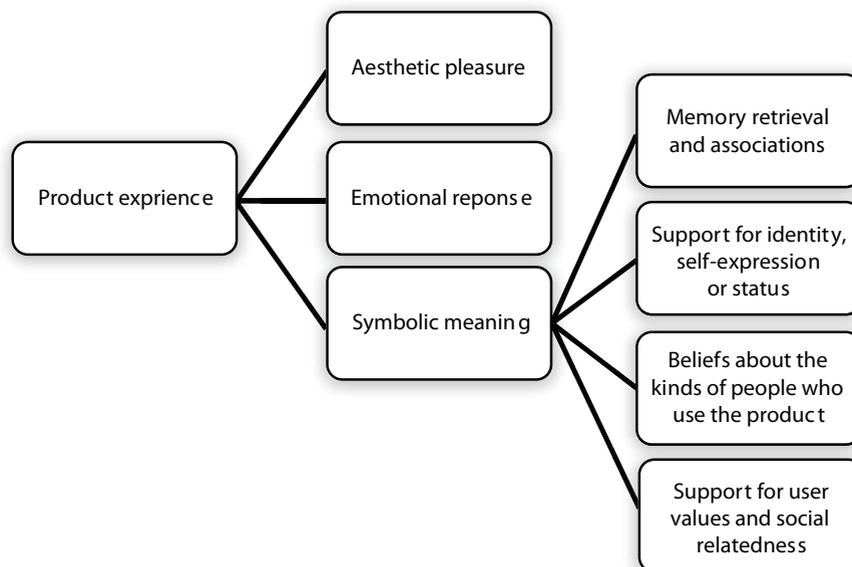


Figure 1. Factors comprising symbolic meaning as a part of user experience.

Interviews related to possessions

Cupchik and Hilscher (2008) interviewed eight professional designers and eight graduate students to understand why they found design objects “meaningfully and emotionally connected” (p. 248). On the basis of qualitative analysis and factor analysis, they identified four factors. First, people can feel a personalized connection to products as if they have a social relationship with them. Second, products can be idealized for their uniqueness or the prestige of their designer. Third, products can provide an occasion for meaningful self-exploration and the expression of a personal identity. Fourth, products can provide meaning through metaphors and symbolism.

Csikszentmihalyi and Rochberg-Halton (1981) asked people to identify those objects in their home that were special to them and give reasons for this. The reasons were then assigned to meaning categories. The most frequently mentioned meaning categories related to self, immediate family and experiences. Then, memories, association, intrinsic qualities, style, personal values and utilitarian reasons were mentioned. Links to other people such as friends and heroes were also mentioned. Vyas and van der Veer (2006b) used an Explication Interview to get users to talk about their feelings, emotions, values and meanings related to a TV system. However, they asked users to describe their usage and expectations only in very general terms.

Survey and other methods

Richins (1994) used survey to identify the private meanings of valued possessions, followed by a card sorting method to identify the public meaning of the objects mentioned in the survey. The survey included open questions. For example, the respondents were asked to think about a possession they owned that was important to them, to describe the possession and to explain why it was important to them. Two coders analyzed the content of the

subjects’ responses and categorized the results guided by earlier studies. Richins then asked other participants to sort cards that included the possessions mentioned in the surveys, telling them that other people had mentioned these possessions as being particularly important to them. The participants were asked to sort them into piles of objects that might be valued for similar reasons.

Richins’ (1994) findings reveal some differences between public and private meanings. Status or prestige was present in public meanings, but was not represented in the content analysis of private meanings. When the respondents evaluated their personal meanings they mentioned the item’s appearance or financial worth instead of status or prestige. Richins suggests that the respondents declined to disclose meanings connected to status or prestige for social desirability reasons. On the other hand, public meanings did not distinguish between symbolic meaning associated with interpersonal relationships and symbolic meaning associated with personal identity. The public meanings tended to be less nuanced than private meanings.

Jindo and Hirasago (1997) used a semantic differentiation method in Kansei engineering in a survey in which the participants were asked to evaluate very detailed design element variations such as fonts. The results focus on detailed product properties, but do not reveal how users interpret symbolic meaning or how they see the whole image of the product or how well the product supports their identity.

In summary, interview is the most frequent method for identifying symbolic meaning. In the reviewed studies, users were usually asked to discuss an object that is important to them, but when a product is evaluated for design purposes, it may not be special for the respondent. Symbolic meaning is a difficult concept to grasp. The interviews reported in the literature are very open, making analysis demanding and limiting the number of users who can be studied. A more specific method is needed to identify the varied factors of symbolic meaning.

Sentence Completion Technique

To respond to the challenges of evaluating symbolic meaning, we applied a sentence completion technique that is a popular projective psychological technique in consumer research (Hoyer & MacInnis, 2007). Sentence completion combines a projective technique and questionnaire whereby respondents are provided with the beginnings of sentences that they complete in ways that are meaningful to them (Soley & Smith, 2008, p. 132). Soley and Smith (2008) attribute the popularity of sentence completion tests to their advantages over other projective techniques. The tests are easily administered, are amenable to group administration, can be qualitatively or quantitatively analyzed and can be used to assess motivations or attitudes. Sentence completion has previously been used to identify user values for product development purposes (Kujala & Nurkka, 2009; Nurkka, Kujala, & Kempainen, 2009).

The strength of the technique is that respondents use their own words to describe their situation, thus giving more spontaneous and honest answers compared to traditional questionnaires (Hoyer & MacInnis, 2007). The technique can uncover conflicted attitudes and values that are difficult to uncover with other types of measures (Soley & Smith, 2008), suggesting the approach is particularly well suited to evaluating symbolic meaning that may be partly subconscious.

Cases: Evaluating Symbolic Meaning

Evaluating symbolic meaning with a sentence completion technique was tested in two case studies to establish its suitability for identifying how users interpret the meaning of existing products. We created sentence stems (beginning of sentences) to represent the symbolic meaning factors identified in the literature. We aimed to develop sentence stems that were fluent to complete and open enough to not lead respondents to answer according to any preconceived expectations. The stimulus material was first developed for Case 1 as shown in Table 1, with most of the sentences then applied in Case 2.

Case 1

The first case study was performed for Polar Electro, a global company producing various fitness and sports products. The study aimed to evaluate the user experience and symbolic meaning of an existing product, the RS200 heart rate monitor, to establish ideas for improving it.

Participants

An invitation to participate in the study was emailed to 99 owners of the RS200 heart rate monitor randomly selected from a customer database. The users were given one week to respond to the online questionnaire. Those who filled in the questionnaire were told they would be entered into a lottery with a Polar product as the prize. 36 users filled in the questionnaire. Their average age was 38.7 years and 16 (44%) were women.

Questionnaire

The questionnaire consisted of four background information questions and 50 sentence completion tasks (Appendix 1). The sentence completion tasks aimed to gather users' general views about exercising and some specific feedback about the RS200 heart rate monitor. Only 15 of the sentences were particularly aimed to measure different factors of symbolic meaning (Table 1).

The first sentence stems were particularly open in seeking to probe information about users and user values. The sentences related to users' dreams and best experiences sought to understand what kind of experiences users enjoy and consider valuable. The sentences related to the feelings the product arouses aimed to gather feedback how the product supports users' emotional values. The remaining sentences mostly probed other factors of symbolic meaning such as associations with the product, its appearance and support for identity or status. A common technique employed in market research when measuring the image of a product is to ask participants to describe the characteristics of the typical product user (Allen, Gupta, & Monnier, 2008). This technique was applied in one sentence to elicit beliefs about the kinds of people using

Table 1. Sentence stems related to symbolic meaning and their rationale.

The sentence stem	Factors of symbolic meaning aimed to be measured
In relation to sports, I dream...	User values (hedonic and emotional values) (Allen, 2002, 2006).
The best of my training experiences was...	User values (hedonic and emotional values) (Allen, 2002, 2006).
The feeling the RS200 arouses...	User values (hedonic and emotional values) (Allen, 2002, 2006).
When I use the RS200, I feel myself...	User values (hedonic and emotional values) (Allen, 2002, 2006), support for identity or status (Boztepe, 2007).
The RS200 brings to my mind...	Associations with the product (Allen, 2002).
To me the RS200 means...	Associations with the product (Allen, 2002).
Compared to other products, the RS200 is...	The image of the product (Allen, 2002).
The appearance of the RS200 is...	Associations with the product's appearance (Rompay, 2008).
The style of the RS200...	The image of the product (Allen, 2002).
The RS200 fits best...	Associations with the product (Allen, 2002).
The RS200 does not fit...	Associations with the product (Allen, 2002).
The image that the RS200 gives of its user...	Support for identity or status (Boztepe, 2007).
The typical owner of an RS200 is...	Beliefs about the kinds of people using the product (Allen, 2002; Allen et al. (2008).
The RS200 makes me...	Support for identity or status (Boztepe, 2007).
When I use the RS200, other people think...	Support for identity or status (Boztepe, 2007), support for user values e.g. relatedness (Allen, 2002, 2006).

the product (Allen, 2006). The responses reveal how users see the product communicating status value and the owner’s personal characteristics. Status may not be mentioned in self-reports, but as Richins (1994) shows, respondents find it easier to make statements about status when they are thinking of people other than themselves.

The respondents were instructed that there were no wrong answers and that they should complete the sentences rather quickly, on the basis of what first came into their mind.

Results

The respondents completed an average of 11.4 sentences (76%) out of the 15 sentences related to symbolic meaning. Overall, 409 sentences were completed and 131 sentences were left empty. The number of the responses required seemed to tire the respondents. Only 38 sentences were left empty for the first half of the sentences and 93 were left empty for the last half of the sentences, showing the gradual fatigue. 167 (41%) of the responses were of one word only and all respondents provided some longer replies.

The participants’ responses were first put into a table to present all answers given by a single respondent and compare answers from different respondents. The respondents used varied wordings, but their meanings were mostly very similar. The frequency of similar replies was then counted to provide the percentages of users reporting the same meaning. To keep the content of results close to the original replies of the users, the exact wordings of the responses were used. The most frequent response was used as a title of the category. If there was a slight difference between the wordings, for example, “active” and “active exerciser”, both of the words were included in the title of the category.

Table 2 shows that respondents mostly associated a typical user of the RS200 with being an active exerciser, enthusiastic and sporty. 55% of the responses include one or the other of these words and many other answers were related to this view. One answer described the typical user as being interested in technology. This probably suggested that the product is rather technology-oriented, which might be a negative association for certain users. One female respondent answered that the typical user is a man and later described the product as not very feminine.

Table 2. Users’ view of the characteristics of the typical user of the RS200 heart rate monitor.

Response	Number of responses
Active/Active exerciser/Active runner	10
Exerciser/Enthusiastic	4
Sporty	2
Runner	2
30 years/25-30 years	2
Amateur/Ordinary	2
Like me	1
Satisfied with the product	1
Relaxed exerciser and high-spirited	1
Novice runner	1
Interested in technology	1
Man	1
Middle aged, looking for self and experiences	1

The sentence “To me the RS200 means...” produced less homogeneous responses. Most often the participants described utilitarian meanings. They responded that the product means better, healthier or more systematic training (11 responses). Some of the responses were very positive, the product being seen as very personalized (Cupchik & Hilscher, 2008). Although the product is only a measuring device, it was seen as a partner, motivator, coach and supporter (5 responses). Other users saw the product as just a tool (8 responses). Both positive and negative attributes were connected with the product when the users responded to the questions “The RS200 brings to my mind...” and “The RS200 does not fit...”. Two respondents considered the product to be easy to use or clear. Four respondents indicated in varied wordings that it was difficult to use. One woman mentioned the product’s unsuitability for small people, which may be the reason why it did not feel feminine. Figure 2 summarises the responses to these three questions according to meanings.

In addition to these two example figures, we received information on user goals, values, feelings and dreams as well as feedback on the quality, style and appearance of the product.



Figure 2. The meaning of RS200 heart rate monitor to users.

The responses of the two user groups show some similarities. For example, both saw plastic dishes as glad and colorful. However, the differences were more striking, demonstrating that sentence completion can identify differences between user groups. The collectors' strongest association was their own childhood, while the control group's association was suitability for children's use and practicality. The collectors considered the plastic dishes as pleasant and many-sided, whereas the control group considered them commonplace and cheap.

The results provided some design inspirations. For example, the control group had negative associations with the plastic material and its chemicals, but the group appreciated the practicality and colorfulness of plastic dishes. This prompted an idea that plastic could be combined with glass or porcelain. Plastic could be used for the cover of a glass or porcelain dish so it would not touch the food.

Conclusions

In this study, a sentence completion technique used in psychology and marketing was applied and further developed for evaluating symbolic meaning. Sentence completion was tested in two case studies. The stimulus sentences used were developed to probe information about the varied factors comprising symbolic meaning that were identified in the literature review. In addition, a special effort was made to reveal the status and prestige issues that are usually not disclosed for social acceptance reasons.

The two case studies provide preliminary evidence that the sentence completion technique can provide useful information on how users interpret the symbolic meaning of products. The experience of evaluating product meaning shows that users seem to have a consistent and shared view of meaning, although individual users may have personal meanings that are not commonly shared. Users are different, which is why in Case 1 some may have considered ease-of-use feelings and others very different feelings.

The results of the sentence completion technique are qualitative by nature, but can help designers understand how users see their products and how the symbolic meaning of a product can be refined. This feedback can be used in design by supporting the positive meanings and correcting features that create negative reactions. For example, in the first case study, users considered the heart rate monitor to be a coach, motivator and partner, suggesting that new ways to make the heart rate monitor provide even more advice, encouragement and social support could be considered. On the other hand, a few users saw the monitor as resembling a computer and being difficult to use, so one of the design goals could be developing the monitor to look more human-oriented. In addition, one user felt that the product did not fit small people and did not feel feminine. It is challenging to support both male and female identity with one product, but users could be provided means for personalizing a product to better support their identity or the company could provide several heart rate models so that users could select the one that is most suitable to them.

The second case study showed that sentence completion can identify differences between user groups. The collectors of plastic dishes expressed far more positive associations than the control group, showing that positive emotional bonding to the products was related to positive symbolic meanings. Sentence completion provided information on how the views of the two different groups differed. The collectors' positive views were related to childhood experiences. The control group appreciated the practicality of the plastic dishes, but considered them commonplace, not suitable for festival use and possibly containing chemicals. The memories related to childhood are difficult to support by design if all users do not have them. However, the responses of the control group reveal that the symbolic meaning of plastic dishes has negative connotations that need to be considered when designing new plastic dishes. In addition, the results may give inspirations to design. For example, different materials could be combined to combine their strengths. Practical plastic could be used in lids for dishes made of porcelain or glass. Some users are afraid of chemicals in plastic, but the lids of dishes are rarely in direct contact with food.

The strength of the sentence completion technique is that it helps users to describe their associations in their own words in a structured way. Although interviews can provide rich and high-quality data, in practice they are time-demanding to perform and only a limited number of users can participate. The sentence completion technique allows a representative set of users to be easily reached online. The analysis of sentence completion data is easier than interview data as the responses are in a written and structured form. However, the results are qualitative in nature and analyzing them is not so straightforward as when using quantitative data. As Case 2 shows, tag clouds can be used for counting the frequencies of different responses and visualizing the results. Respondents may use many different wordings and synonyms that need to be gone through, but tag clouds can provide the first quick expression of the results when the number of respondents is high or in industry contexts where there are not enough resources available for thorough analysis. Currently, there are few easy methods for analyzing qualitative data. In the future, automatic semantic analysis may enable the analysis of large amounts of data.

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Appendix

Appendix 1. Sentence completion stimulus material used in Case 1

Please, complete the sentences below so that they describe you and your thoughts. There is no wrong replies, respond rather quickly without thinking too long. You can leave a sentence without an answer if you feel that it is not suitable for your situation.

- It is important in exercising that _____
- As an athlete I am _____
- I like sports because _____
- In relation to sports, I dream _____
- I receive positive attention in exercising if _____
- Exercising helps me _____
- It is best in exercising that _____
- Exercising makes me feel myself _____
- The best of my training experiences was _____
- Exercising is especially successful, if _____
- I would get more of exercising, if _____
- Exercising is not nice if _____
- The worst that can happen in exercising _____
- I admire in exercisers _____
- When I am exercising, the problem is _____
- When I am exercising, the goal is _____
- I am encouraged to exercise by _____
- I exercise most _____
- I use RS200, because _____
- Using RS200 is _____
- The best in RS200 is _____
- The most important functions of RS200 are _____
- Starting to use RS200 was _____
- When I give up RS200 _____
- I want that by RS200 _____
- I would like to know about R200 _____
- To me the RS200 means _____
- When I use RS200, my goal is _____
- It is irritating that the RS200 _____
- Using RS200 while I am running _____
- The dream heart rate monitor _____
- Wearing a heart rate monitor while not training signals _____
- Using RS200 is embarrassing if _____
- Compared to other products, the RS200 is _____
- The RS200 brings to my mind _____
- The appearance of the RS200 is _____

- I hope that RS200 _____
- The typical owner of an RS200 is _____
- The RS200 fits best _____
- The RS200 does not fit _____
- The image that the RS200 gives of its user _____
- The style of the RS200 _____
- The feeling the RS200 arouses _____
- When I use the RS200, I feel myself _____
- When I use the RS200, other people think _____
- The problem in RS200 is _____
- The RS200 makes me _____
- In the course of time, the RS200 begins _____
- Data transfer of the RS200 is _____
- The accessories of the RS200 _____

Appendix 2. Sentence completion template used in Case 2

Please, complete the sentences below so that they describe you. There is no wrong replies, respond rather quickly without thinking too long.

You can leave a sentence without an answer if you feel that it is not suitable for your situation.

- Plastic as a material is _____
- Plastic dishes look _____
- Compared to other dishes, plastic dishes are _____
- Plastic dishes fit best _____
- Plastic dishes do not fit _____
- To me the plastic dishes mean _____
- If I use plastic dishes, I feel myself _____
- If I use my plastic dishes, other people think _____
- My plastic dishes make me _____
- My plastic dishes bring to my mind _____
- The appearance of plastic dishes _____
- The typical owner of retro-plastic dishes is _____
- The image that plastic dishes give of their owner _____
- The style of the retro plastic dishes _____