# RELEVANCY OF BIPOLAR WORD PAIRS ACROSS PRODUCT CATEGORIES: A COMPARATIVE STUDY BETWEEN AUTOMOBILES AND THE IPHONE

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# ABSTRACT

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This thesis investigates human product interaction with a focus on the physical experience provided by products. The differences of users' perceptions are discussed according to the differences of bodily experiences served by products. The interaction with products is taken as a holistic experience phenomenon, and in order to assess users' understandings and evaluations about the experience with products; perceived pragmatic qualities, perceived hedonic qualities and elicited emotional reactions are analyzed. The research is conducted by means of surveys in order to compare users' perceptual differences in relation to two different product groups: automobiles and the iPhone, which differ in content of interaction, namely one serves a more physical (bodily) experience while the other a more virtual one. In order to find out the perceptual differences, verbal descriptions of perceived qualities and emotional states are used as measurement tools. A list consisting of bipolar word pairs in relation with pragmatic qualities, hedonic qualities and emotional reactions has been composed, and perceptual differences are investigated through the bipolar word pairs' relevancy levels according to the product. In addition, in order to show that meaning associations related to the same verbal description are context dependent, the meanings that are associated with the same word pairs for both products are investigated. Apparent differences between the relevant word pairs of the two different product groups have been observed, in addition with pragmatic qualities' higher relevancy scores compared to hedonic qualities and emotional reactions in defining users' interactions with products.

**Keywords:** User experience, pragmatic quality, hedonic quality, emotional reaction, product interaction, bodily experience, relevancy of bipolar word pairs, meaning association.

# ÖZ

ÜRÜN KATEGORİLERİ ARASINDA ÇİFT KUTUPLU KELİME ÇİFTLERİNİN İLGİLİLİK DÜZEYLERİ: OTOMOBİLLER VE IPHONE ÜZERİNE KARŞILAŞTIRMALI ÇALIŞMA

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Bu tez çalışması kişi ürün etkileşimi konusunu ürünün sağladığı fiziksel deneyim odağı üzerinden inceler. Ürünlerin sunduğu bedensel deneyim farklılıklarına göre kullanıcıların algılarının farklılaşması tartışılmıştır. Ürünlerle etkileşim bütünsel bir deneyim fenomeni olarak düşünülmüş olup, kullanıcıların ürünle ilgili deneyimlerine ilişkin anlayış ve değerlendirmelerini belirlemek amacıyla algılanan yararcı nitelikler, algılanan hazcı nitelikler ve ortaya çıkan duygusal reaksiyonlar analiz edilmiştir. Araştırma kullanıcıların iki farklı örnek ürün grubuna ilişkin algısal farklılıklarını karşılaştırmak amacıyla anket çalışmaları aracılığıyla gerçekleştirilmiştir. İki farklı ürün grubu, otomobiller ve iPhone, etkileşim içerikleri açısından farklılık göstermekte olup, biri daha fazla fiziksel (bedensel) deneyim sunmakta, diğeri ise daha sanal bir deneyim sunmaktadır. Algısal farklılıkları ortaya çıkarmak amacıyla, algılanan nitelikler ve duygusal durumlara dair sözsel ifadeler ölçüm araçları olarak kullanılmıştır. Yararcı nitelikler, hazcı nitelikler ve duygusal reaksiyonlara ilişkin çift kutuplu kelime çiftlerinden oluşan bir liste oluşturulmuş, ve algısal farklılıklar bu listedeki kelime çiftlerinin ürünlerle ilgililik dereceleri üzerinden değerlendirilmiştir. Bunlara ek olarak, aynı sözsel ifadeye dair anlamsal ilişkilendirmelerin bağlama göre farklılıştığını işaret etmek adına, iki farklı ürün için kelime çiftlerinin çağrıştırdığı anlamlar araştırılmıştır. Ürünlerle ilgili bulunan kelime çiflerinin iki farklı ürün grubu için açıkça farlılıklar gösterdiği, ve kullanıcıların ürünlerle etkileşimlerini ifade etmelerinde yararcı niteliklerin hazcı nitelikler ve duygusal reaksiyonlara göre daha yüksek ilgililik dereceleri aldığı gözlenmiştir.

**Anahtar Sözcükler:** Kullanıcı deneyimi, yararcı nitelik, hazcı nitelik, duygusal reaksiyon, bedensel deneyim, çift kutuplu kelime çiftlerinin ilgisi, anlam ilişkilendirmesi.

To My Parents

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# CHAPTER 1

# INTRODUCTION

## 1.1 PROBLEM DEFINITION

In our century, with the developing technology, the consumer products' market becomes more complicated. Users are no longer simply interested in the products for their utilitarian characteristics; products' aesthetic appeal, usability characteristics, symbolic aspects and emotional contributions to the user are also important when determining the value and meaning of that product in their lives. As Norman (2004) states, everything in an individual's life has both a cognitive and an affective component; namely, cognitive component is related to assigning meaning while affective component to assigning value. Like all the other things, consumer products' value and meaning associations are rather important when evaluating those products.

Until recently, user focused design studies investigated usability concerns focused on instrumental aspects in order to explain the interaction between user and the product, and to develop a quality measure. Then it was realized that effectiveness and efficiency-focused usability issues cannot result with a holistic understanding of the user about that product, which determines the user's preferences. Users' wants and needs from products are not limited to pragmatic concerns; pleasing users aesthetically, psychologically, physiologically, socially, intellectually are also demanded issues. A more comprehensive understanding of usability has been constituted with incorporating users' hedonic needs with the traditional usability concerns, and user centred design expanded its focus to design not only for efficiency and effectiveness but also for the full range of human experience. User experience is the expression that defines the shift to a more holistic approach, which is associated with positive user experience and its expression in the emotions,

attitudes and values resulting from the interaction with a product, rather than just preventing obstacles and errors (Zimmermann, 2008).

Jordan (2002) explains that a product should engage the people at three abstraction levels. First, it has to be able to perform the task for which it was designed. For example, a car has to be able to transport the user. The product's functionality should work well, and it should be easy to use. The second level relates to the emotions associated with the product in the context of the associated tasks. These emotions are part of the 'user experience'. For example, when using an automated teller machine, feelings of trust and security might be appropriate. Driving a sports car should be exciting, but there should also be a sense of safety. The third level reflects the aspirational qualities associated with the product, namely personality or social factors. What does owning the product or using that product say about the user? For example, owning the latest, smallest mobile phone may suggest a 'pretty cool' person. Meeting these requirements makes a case not only for ergonomics of the product but also for emotional design and achievement of social status as well.

Modes of interaction with products differ from physical to virtual, namely some products provide bodily experiences with stimulating five of the senses, creating tactile, auditory, olfactory, gustatory and visual experiences all together, while the amount of bodily experience and stimulated senses differ according to the product. The purpose of the product, performed actions and fulfilled activities through that product determine the mode and content of the interaction. Since physical bodies of humans play a central role in shaping human experience in the world, understanding of the world and interactions in the world, the quality of the experience with a product may change according to the interaction content, namely a more physical interaction or a virtual one. Despite all experience and interaction related researches in the literature, there is not any comprehensively constituted framework that explains the relation between the mode of interaction and understandings of users about that product. Although the elements constituting the product experience have been researched and comprised attributes of experience have been identified as pragmatic attributes, hedonic attributes and elicited emotions; how these attributes differ according to the mode of interaction remains unclear. The literature lacks a coherent understanding of differences between experiences provided by physical and virtual interactions, and whether bodily experiences and stimulated sensory

modalities create any difference in the total understanding of that product, also meaning and value associations with that product.

## 1.2 SCOPE OF THE STUDY

This study presents an insight on human-product interaction concerns, especially focusing on experience with products and the physicality content of the interaction. In order to design for the user, how people experience products should be comprehended. People's subjective experiences that result from interacting with different products are investigated with comparing the users' understandings about two kinds of products which differ much in the physical interaction (bodily experience or virtual experience) they provide. The study aims to constitute a source of information on the differences of users' understandings (perceptions) about products and how the importance of product related concerns (utility, functionality, pleasure, meaning, etc.) differ through different product categories.

Looking at the interaction with products as a total experience phenomenon, users' subjective evaluations (their understandings) about this experience are investigated using bipolar word pairs that are found relevant for defining their understandings about products and related experiences. In order to find out the differences of relevant dimensions for different product categories, automobiles and iPhones are chosen for the comparison study. These products differ with their interaction modes; the first one provides an intense multisensory bodily experience, while the other offers virtual experience through some physical interaction that has been enriched with the touch screen interface allowing users to physically manipulate data (virtual content).

The main research question of the thesis is:

- How do the perceptions of users differ depending on the amount and content of the physical experience that the product provides?

During the study, the issue will be explored through the sub-questions listed below:

1. What are the dimensions of user experience with products?
2. What is the contribution of sensory modalities and bodily experience in product usage?

3. How can users' subjective experiences that result from interacting with products (users' understanding of a product) be measured?
4. In which ways do meaning associations with explanatory (descriptive) words differ according to the type and content of interaction with a product?

## 1.3 STRUCTURE OF THE THESIS

General structure of the study consists of seven chapters referring to the questions mentioned in the previous section. Following this introductory chapter, the remaining five chapters are formalized as follows:

Chapter Two discusses human-product interaction related issues, focusing on user experience concepts including the affective and hedonic content of product interaction beyond functionality and usability concerns. Different models on experience of products are categorized and the key elements of product experience are addressed through these models. In order to construct the empirical study's framework of experience, pragmatic, hedonic and emotional contents of product experience are emphasized. Answers to the first sub-question of the study are generated.

Chapter Three focuses on the human side of the user-product interaction, and investigates the content of human response to interaction including perception, cognition and emotion, and the role of human senses and body in experiencing products. The second sub-question of the study is investigated throughout this chapter.

Chapter Four investigates measuring methods used in human-product interaction and user experience studies. In order to answer the third sub-question of the study, how to assess users' understandings about products, semantic differential studies and measuring methods by using descriptive words and expressions are discussed. Based on the findings about the use of descriptive word pairs (semantic differentials) for users' subjective assessments, the measuring tool that will be used in the empirical study is constructed: investigating the relevancy of word pairs with

products according to different users using a questionnaire consisting of bipolar word pairs.

Chapter Five presents a review on research conducted on automobile interiors, by giving examples of researches on interactions with the physical components of the interior and the interior environment as a whole. Since automobiles and iPhones are selected as the research objects for the empirical study, before going on the methodology and results of the empirical study, this chapter provides an insight on the researches focused on automobile interiors, which provide an example to a totally physical (bodily) human-product interaction. Automobiles are conventional products, on which many different kinds of researches have been conducted investigating use and experience concerns; however it is apparent that iPhones are recently designed high-technology products which provide several new concepts for product experience issues that should be investigated henceforth.

Chapter Six describes the methodology followed in order to find out the perceptual differences in relation to automobiles and iPhones, and presents the details of the conducted research, data analysis methods used and results of the study. This chapter provides answers to the main research question, and also supplies information on the forth sub-question about difference of meaning associations with different descriptive words for automobiles and iPhones, respectively.

Chapter Seven summarizes and evaluates the findings of the conducted research, pointing out the major findings of the empirical study. It also discusses the limitations of the study and opportunities for further research in this area.

# CHAPTER 2

# DEFINITIONS AND MODELS OF USER EXPERIENCE

## 2.1 INTRODUCTION

Today, developments in technology, material sciences, production techniques and logistics, drop of prices of materials, and increasing manufacturing opportunities have given great freedom to the designers and manufacturers while creating and producing products. The global markets for technology and materials have led to technically mature, but also very similar products in respect to functionality, technical standard and price. Therefore, on a global market it becomes increasingly important for companies to differentiate their products with many different attributes, like a distinctly visible design or an individual image created through marketing and company brand, instead of adding new functionality attributes or reducing the price.

In addition, consumers and users more and more express a demand for differentiated products and designs. People look for more than performance or serving for a special purpose in products or technical systems. For example, people like to express their individual lifestyle or their affiliation with the social peer group through products they own and use (Crilly, Moultrie, & Clarkson, 2004). Clothing, cars, bags or mobile phones have become a projection surface for people's identity. Experiential marketing has picked up this line of thought by stressing that what is important to the consumer is not functionality and features of a product, but the overall experience that people choose after identifying the relevance of a brand or product to their needs. Customers want products "that dazzle their senses, touch their hearts and stimulate their minds" (Lenderman, 2006, p. 18).

In order to harmonize the changing conditions in the global market and meet the demands of modern humans, focus is shifted onto the person in design related

issues. User-centered design places the person, as opposed to the product, at the center and focuses on human factors as they come into play during peoples' interactions with technical artifacts. User centered design seeks to answer questions about users and their tasks and goals, and then uses the findings to drive development and design (Katz-Haas, 1998). The evaluation of products and plays an important role in all areas that apply a user-centered design approach.

While evaluating products, there is a shift from performance and task-oriented systems, people use to get work efficiently and effectively done, to experiences with and through interactive systems that stimulate or please them aesthetically, psychologically, physiologically, socially, intellectually, and so on. User focused research has put a lot of effort in the development of methods and tools for usability evaluation, but has only recently started to describe theoretical models that explain the attractiveness of products and the elements that describe the experience before, while and after the use of products. The question is less how the system is used, but why people like and use certain products while others do not, and what they gain from using it. An efficient and effective product interaction that leads to a satisfied user seems just not enough (Zimmerman, 2008).

**Usability and User Satisfaction**

One particularly important concept to define the interactive quality of interactive systems that has been developed over the last thirty years is usability. ISO 9126 (ISO, 2001) on general product quality associates usability with the properties of a system that lead to high quality of use. Criteria of quality of use are effectiveness, productivity, safety and satisfaction. On the other hand, ISO 9241-11 (ISO, 1998) applies a slightly different definition, namely "… the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use". According to this, effectiveness can be described as the degree of accuracy and completeness with which the user's goals are satisfied. Efficiency can be characterized as the effectiveness of system usage in relation to its costs in terms of effort or time. Satisfaction relates to users' comfort and their acceptability of working with the system. Measurement approaches to usability range from a focus on product attributes to an assessment of quality of use.

ISO 9241-11 states that satisfaction can be specified and measured by attitude rating scales or measures such as the ratio of positive to negative comments during

use. Measures of satisfaction may assess attitudes towards use of a product, or assess the user's perception of aspects such as efficiency, helpfulness or learnability. A variety of standardized questionnaires were developed especially during the mid 1990s to assess user satisfaction. For example, The Software Usability Measurement Inventory-SUMI (Kirakowski, 1996) is the most established instrument to measure user satisfaction. Another well established approach to assess users' attitudes comes from the technology acceptance literature. Davis (1989) proposed a model of users' intention to use an interactive system that takes into account the perceived usefulness and perceived ease of use as two main aspects of technology acceptance. This approach also offers specific questionnaires to measure perceived usefulness and perceived usability. Users' perceptions of aspects such as efficiency, helpfulness or learnability as recommended in ISO 9241-11 are linked to users' perception of their performance with an interactive system. Therefore, this definition focuses on users' experience of instrumental qualities of the system.

**User Experience**

Furthermore, Norman and Draper (1986) use a different term to consider the user's subjective view on interaction: user experience. User experience takes an entirely user-oriented perspective on human-technology interaction. The user's perspective on the quality of the interaction is the ultimate criterion. In comparison to user satisfaction, user experience is not only an outcome of the interaction that can be measured in the end, but a complex process that is influenced by various relevant characteristics of the user, the usage situation and the used interactive system. Even in usability research, although the concept of user satisfaction was established to consider the user's perspective, further approaches were proposed to enhance the user-oriented view on product quality. Logan (1994) developed a two-component usability concept that considers behavioral and emotional usability. While behavioral usability refers to a more or less traditional use of the term usability, Logan (1994) defines emotional usability as the degree to which a product is desirable or serves a need beyond the traditional functional objective. Moreover, Kurosu and Kashimura (1995) showed that subjective judgments of usability differ from objective usability measures and are strongly affected by the aesthetic appearance of the interactive product.

Today, various approaches that are used to evaluate interactive systems go beyond the notion of efficiency and effectiveness, and aim to better understand how people experience technology, and the relation with interactive products. For today's people, interactive products are not only useful and usable, but also are fashionable and fascinating things to desire. In this regard, Hassenzahl and Tractinsky (2006) explore two important concepts in particular: emotions and non-instrumental qualities. They classify the studies made on user experience in three major perspectives. First thread predominantly deals with addressing human needs beyond the instrumental, which means beyond traditional usability metrics, non-task related aspects. Second thread stresses affective and emotional aspects of the interaction, whereas affect can be thought of as the consequence of an interaction, where emotion influences the quality of the interaction. Third thread deals with the nature of experience and looks at the experience as a whole, in a holistic manner.

## 2.2 USER EXPERIENCE MODELS AND APPROACHES

There is not a simple structure available to classify different contributions made in user experience research. A great many diverse approaches are found for user experience in human-technology interaction. Researchers from different disciplines and with different backgrounds have contributed to the field.

Related literature can be reviewed according to the classification of Hassenzahl and Tractinsky (2006), which was mentioned above. The first perspective is taken as the one looking at the interaction as a whole experience in a holistic manner. The second is the emotion-focused approach, interested in the affective and emotional aspects of the interaction. Third one is the quality-focused approach that is interested in human needs beyond the instrumental (non-task related aspects) in the interaction phenomena.

Phenomenological approaches to user experience argue for a holistic and qualitative study of the user experience of interaction. They resist the reduction of the experience into a number of factors or processes, and emphasize the situatedness and the temporal character of user experience. The frameworks that take an experiential position look at experience as a unique combination of

various elements over time, which makes it difficult to conceptualize these models for research.

Forlizzi and Ford (2000) summarize the influencing factors on user experience as well as its different qualities. They highlight characteristics of the user and the product as well as the context of use, shaped by social, cultural and organizational behavior patterns, as the influencing factors. They introduce four relevant concepts to understand the quality of an experience: sub-consciousness, cognition, narrative, and storytelling. Sub-conscious experiences are those that do not compete for user's attention and thinking process, but are rather used 'thoughtlessly'. Cognition is used to represent experiences that require users to think about what they are doing: interactions with unfamiliar or confusing products as well as tasks that require attention, cognitive effort or problem solving skills. The narrative concept represents experiences that have been formalized in the user's head: ones that force them to think about and formulate what they are doing and experiencing. A product's set of features and affordances offer such a narrative of use. In turn, a user interacts with some subset of features and affordances, based on location in a context, prior experience and current emotional state to make a unique and subjective story. The concept of storytelling is used to represent this subjective aspect of the experience. Battarbee (2003) introduces the concept of co-experience to consider experiences constructed in social interaction. Co-experience can be described as an experience that users themselves create together in social interaction.

McCarthy and Wright (2004) proposed a framework for analyzing experience with technology, which consists of four intertwined threads of experience. Experience has compositional, sensual, emotional, and spatio-temporal threads. Each of these parts are inter-connected and constitute an integrated framework. The compositional thread deals with how the elements of an experience fit together to form a coherent whole. This refers to the narrative structure, action possibility, plausibility, consequences, and explanations of actions. The sensual thread is concerned with how the design, texture and overall atmosphere make us feel. This relates to the concrete, palpable, and visceral character of experience that is grasped pre-reflectively in the immediate sense of a situation, e.g. the look and feel of a mobile phone and the sense of warmth in a social space. The emotional thread is concerned with the emotions that are part of an experience. This refers to value judgments that ascribe importance to other people and things with respect to our

needs and desires. The emotional quality of an experience tends to summarize the experience as fun, exciting, frustrating, etc. Finally, the spatio-temporal thread deals with place and time. This draws attention to the quality and sense of space and time that pervades experience. Time may speed up or slow down, pace may increase or decrease and spaces may open up or close down, affecting user's willingness to linger or to re-visit such places.

Crilly, Moultrie and Clarkson (2004) present an integrative framework of user response to products that considers three distinct components: cognitive, affective and behavioral. Qualities of a product that play a role on the cognitive level are summarized in three categories: semantic interpretation, aesthetic impression, and symbolic association. Semantic interpretation describes the proportion of a product's value that is attributed to its utility. Contrast, novelty, and order as well as subjective concinnity that may be regarded as the extent to which the design appears to make sense to the viewer in respect to the consumer's personal, cultural, and visual experience, are aspects of aesthetic impression. Furthermore, two categories of symbolic association are described. On the one hand, self-expressive symbolism is specified as associated with products that allow the expression of unique aspects of one's personality. On the other hand, categorical symbolism is associated with products that allow the expression of group membership, including social position and status. To describe the affective level of consumer response Crilly *et al.* (2004) apply a model of product emotions initially presented by Desmet (which is described below). Additionally, they see users' psychological responses (comprising cognition and affect) to influence the way in which they behave towards the product. They use the concepts of approach and avoid to distinguish between the behavioral responses of an interested or disinterested consumer. This framework is discussed in more detail in Chapter Three.

Desmet (2003) proposes five categories of emotional responses elicited by products, which are: instrumental, aesthetics, social, surprise and interest. Instrumental emotions (such as disappointment and satisfaction) derive from perceptions of whether a product will assist the user in achieving their objectives. Aesthetic emotions (such as disgust or attraction) relate to the potential for products to delight or offend people's senses. Social emotions (such as indignation and admiration) result from the extent to which a product is seen to comply with socially determined standards. Surprise emotions (such as amazement) are driven by the

perception of novelty in a design. Finally, interest emotions (such as boredom or fascination) are elicited by the perception of challenge combined with promise. Each of these types of emotions can result from an appraisal of the product.

### 2.2.1 EMOTION-FOCUSED APPROACHES

Emotion-focused approaches have different perspectives. Some approaches focus on specific emotions like pleasure, fun or flow, whereas others take emotions in general into account and try to explain the role of emotion in users' product perceptions. On the other hand, one perspective understands emotions as consequences of product use, whereas the other perspective on emotions in user experience sees emotions as antecedents of product use and evaluative judgments.

Jordan (1998, 2000) discusses the concept of pleasure as a design goal. He (2000) argues for a hierarchical organization of user needs where functionality is the basis, usability is another level and pleasure is an even higher, and increasingly important level. Based on the psychologist Abraham Maslow's 'hierarchy of human needs' model (Maslow, 1970) (Figure 2.1), Jordan puts forward a model (Figure 2.2) that applies the idea of hierarchy of needs to human factors.

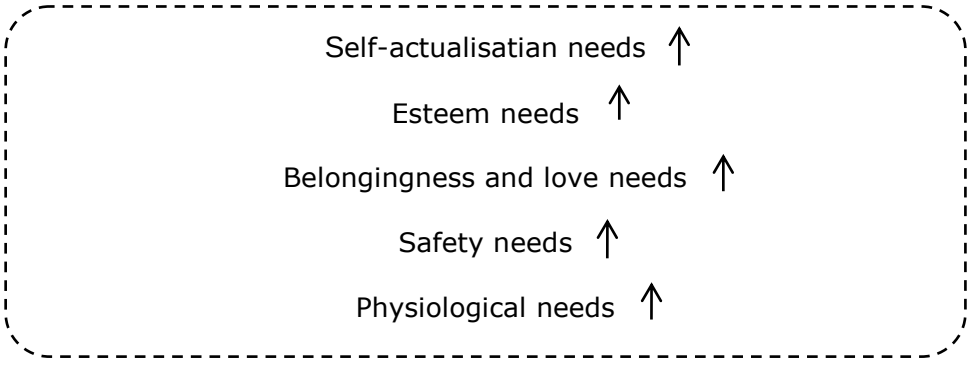



Figure 2.1 Maslow's hierarchy of needs (1970; cited in Jordan, 2000, p. 5)

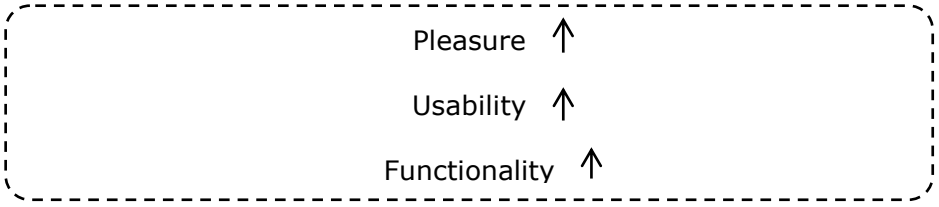



Figure 2.2 A hierarchy of consumer needs (Jordan 2000, p.6)

The idea in the Maslow's hierarchy (1970) is that as soon as people have fulfilled the needs lower down the hierarchy, they will then want to fulfill the needs higher up. Even if basic needs such as physiological and safety ones have been met, people will still meet with frustration if their higher goals are not met (cited in Jordan, 2000). According to Jordan's model (2000), level one is functionality: a product will be useless if it does not contain appropriate functionality; level two is usability: after people become used to having appropriate functionality, they then also expect usability, products that are easy to use; level three is pleasure: after people become used to having usable products, then they want products to offer emotional benefits, products that are not only tools but living objects that people can relate to.

Based on a general approach to pleasure by Tiger (1992), four aspects of pleasure are distinguished by Jordan (2000). These are: physio-pleasure, psycho-pleasure, socio-pleasure, and ideo-pleasure. Physio-pleasure is associated with a user's sensual experience of product use. It is the pleasure derived from the sensory organs, includes pleasures connected with touch, taste and smell as well as feelings of sensual pleasure. Psycho-pleasure is related to the experienced usability of an interactive system and emotions that arise because of the existence or absence of effective or efficient interaction. It pertains to people's cognitive and emotional reactions, includes issues relating to the cognitive demands of using the product and the emotional reactions engendered through experiencing the product. Socio-pleasure refers to emotions that arise based on relationships with others, e.g. products that make people feel socially accepted. It might include relationships with friends and loved ones, with colleagues or like-minded people, and also with society as a whole, issues such as status and image play a role for socio-pleasure. The person's relationship with the product forms part of his/her social identity. Lastly, ideo-pleasure pertains to people's values that can include tastes, moral values, or personal aspirations. It would relate to the aesthetics of a product and the values that a product embodies. For example, a product made from bio-degradable material might be seen as embodying the value of environmental responsibility and would be a source of ideo-pleasure to the people concerned about environmental issues.

Additionaly, in his study of human factors for pleasure in product use, Jordan (1998) associates feelings of security, confidence, pride, excitement and satisfaction with using pleasurable products, and feelings of annoyance, anxiety, contempt and

frustration with using displeasurable products. The properties of products that were salient in terms of influencing the level of pleasure/displeasure with a product included features, usability, aesthetics, performance and reliability. In Figure 2.3, emotions mentioned by respondents in connection with pleasurable or displeasurable products can be seen. Pleasurable feelings reported are security confidence, pride, excitement, satisfaction, entertainment, freedom and nostalgia; whereas displeasurable feelings are aggression, feeling cheated, resignation, frustration, contempt, anxiety and annoyance.

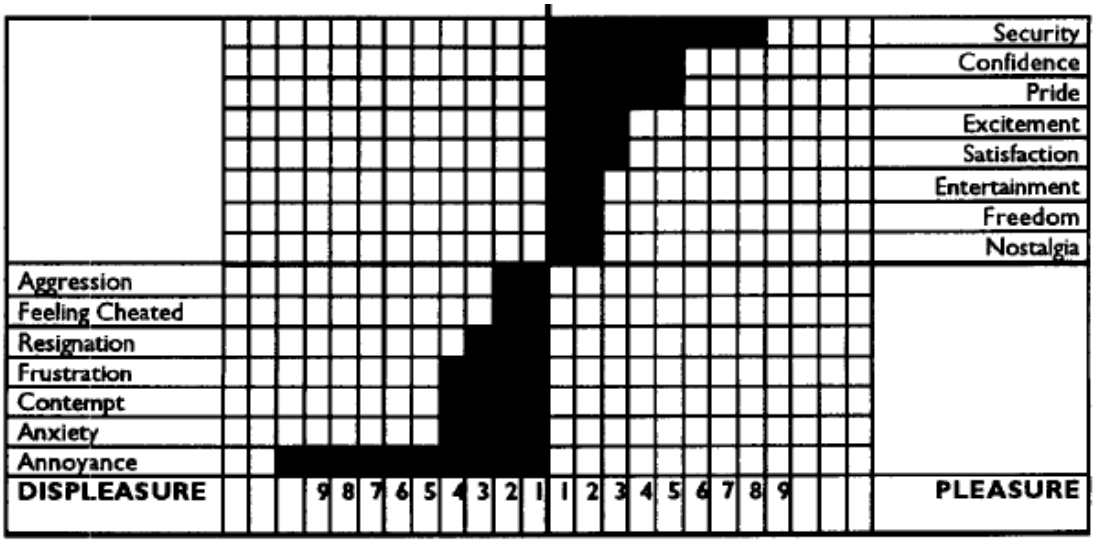



Figure 2.3 Number of respondents linking feelings with pleasurable/displeasurable products (Jordan, 1998)

Figure 2.4 shows the results of his study that investigates properties associated with pleasurable or displeasurable products. From the figure, the contribution of a particular property dimension to both pleasure and displeasure can be seen. In Jordan's study, features issue was commonly mentioned in association with pleasurable products, helpful features supporting the operation of products; however products containing unnecessary or insufficient functions were perceived as displeasurable. Usability was a major issue, it would contribute to pleasure, and its absence might cause displeasure. In case of aesthetics issue, good aesthetics and appearance contributed to pleasure, both style and colour were important to users; whilst poor aesthetics contributed to displeasure. Performance issue refers to a product performing its primary task to a particularly high level; according to the level

of performance, products are found to be pleasurable or displeasurable. Reliability was found central to enabling users to form a bond with a product, it was indicated that people become attached to products which had given them years of good service. Convenience was associated with pleasure for products which are particularly appropriate for certain contexts of use.

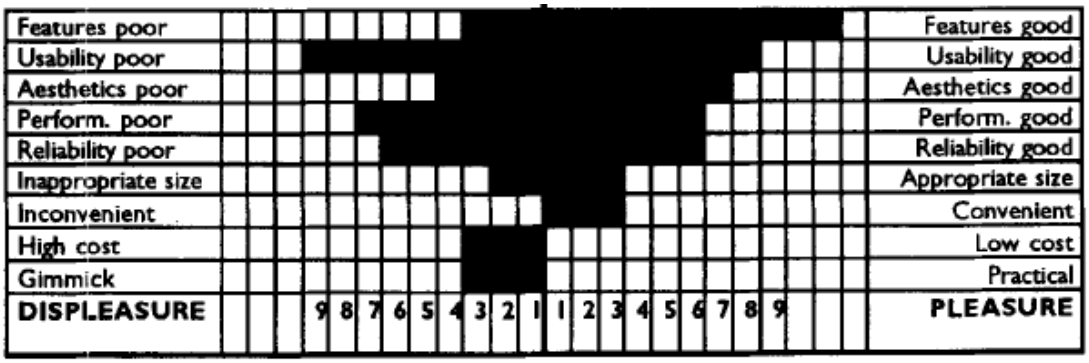



Figure 2.4 Number of respondents associating product attributes with pleasure/displeasure (Jordan, 1998)

Carroll and Thomas (1988) consider fun of use in interactive system design. Carroll (2004) describes the interaction with objects as fun when they attract, capture, and hold users' attention by provoking new or unusual perceptions, arouse emotions in contexts that typically arouse no emotions. Other preconditions of fun can be when objects surprise, when they do not feel like the way they look, when they do not sound like the way they feel, when they present challenges or puzzles to users as they try to make sense and construct interpretations. Draper (1999) discusses flow as another possible precondition of fun. Introduced by Csikszentmihalyi (1990), flow can be described as a mental state of operation in which the person is fully immersed in what he or she is doing, characterized by a feeling of energized focus, full involvement, and success in the process of the activity.

Moreover, in consideration of diverse qualities of emotions, other approaches focus on a general understanding of emotions in human-technology interaction. The categorization of emotions elicited by interactive products as part of the user experience proposed by Desmet (2003) was given in the previous part. The related five categories for emotional responses to products are: instrumental, aesthetics, social, surprise and interest. Regarding the elicitation process of emotions in

human-technology interaction, Desmet and Hekkert (2002; cited in Desmet, 2003) established a basic process model with three main parameters: appraisal, concern, and product (Figure 2.5). The three parameters, and their interplay, determine if a product evokes an emotion, and if so, which one. The central implication of the concept of appraisal is that not the event as such is responsible for the emotion, but the meaning the individual attaches to this event. Concerns can be regarded as points of reference in the appraisal process; they can be needs, preferences, instincts, motives, goals, and values. Thus, the significance of a product for our well-being is determined by a concern match or mismatch. Products that match users' concerns are appraised as beneficial, and those that mismatch their concerns are harmful. Desmet (2003) developed the classification of product emotions based on various different appraisal types, shown in Figure 2.6.

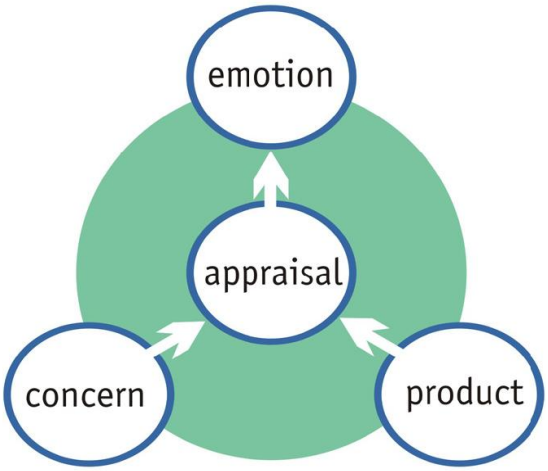



Figure 2.5 Basic model of product emotions (Desmet, 2003)

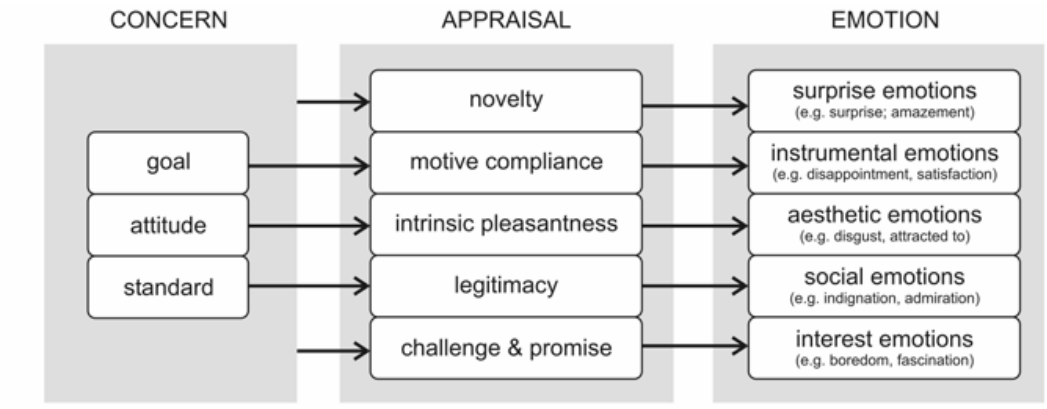



Figure 2.6 Classification of product emotions (Desmet, 2003)

Norman (2002, 2004) proposes a model (Figure 2.7) for the role of emotions in human-product interaction that defines three levels of information processing adapting from the model proposed by Ortony, Norman and Russell (2003). The visceral level is the automatic, prewired level. The behavioral level contains the brain processes that control everyday behavior. The reflective level is the contemplative part of the brain.

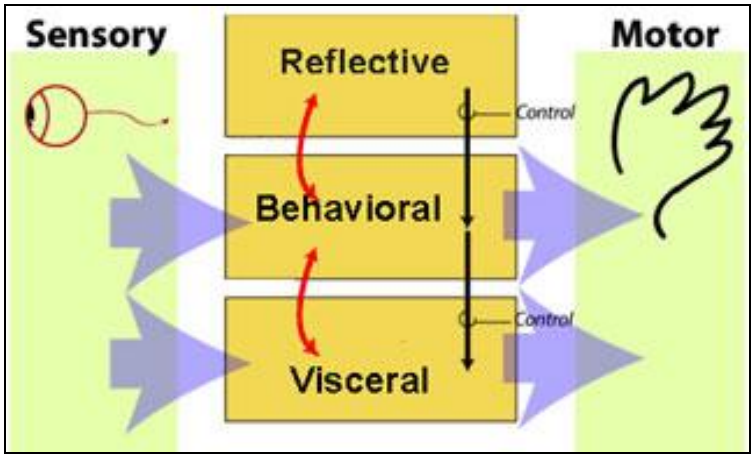



Figure 2.7 Three levels of processing: Visceral, Behavioral, and Reflective (Norman, 2004, p. 22)

According to Norman (2004), the visceral level marks the start of affective processing by making rapid judgments on what is good or bad. This is the level of fixed routines, where the brain analyzes the world and responds. Processes on the visceral level are biologically determined. The behavioral level is the site of most human behavior. The behavioral level in human beings is especially valuable for well-learned, routine operations. Its actions can be enhanced or inhibited by the reflective layer and, in turn, it can enhance or inhibit the visceral layer. While the reflective level does not have direct access either to sensory input or the control of behavior, it watches over, reflects upon, and tries to bias the behavioral level. At the highest evolutionary level of development, the human brain can think about its own operations. This is the home of reflection, of conscious thought, of the learning of new concepts and generalizations about the world.

Different aspects of emotions play a role on all three levels of information processing. The design requirements for each level differ widely. The visceral level

is pre-consciousness, pre-thought. This is where appearance matters and first impressions are formed. Visceral design is about the initial impact of a product, about its appearance, touch, and feel. The behavioral level is about use, about experience with a product. But experience itself has many facets such as function, performance, and usability. A product's function specifies what activities it supports, what it is meant to do; if the functions are inadequate or of no interest, the product is of little value. Performance is about how well the product does those desired functions; if the performance is inadequate, the product fails. Usability describes the ease with which the user of the product can understand how it works and how to get it to perform. If the person experiences confusion or frustration, negative emotions result. But, if the product does what is needed, if it is fun to use and easy to satisfy goals with it, then the result is warm, positive affect. It is only at the reflective level that consciousness and the highest levels of feelings, emotions, and cognition reside; the full impact of both thought and emotions are experienced. Interpretation, understanding, and reasoning come from the reflective level. The reflective level is the most vulnerable to variability through culture, experience, education, and individual differences. In addition, time is one other distinction among the three levels. The visceral and behavioral levels are about now, the feelings and experiences while actually seeing or using the product. But the reflective level extends much longer, through reflection person remembers the past and contemplates the future. Therefore, reflective design is about long-term relations, about the feelings of satisfaction produced by owning, displaying, and using a product. A person's self identity is also located within the reflective level. (Norman, 2004)

Russell (1980, 2003) puts forward the theory of affective quality to better understand the elicitation of emotions in the context of human-product interaction. According to Russell (2003), core affect (Figure 2.8) is a neurophysiological state that is consciously accessible as a simple, non-reflective feeling that is an integral blend of valence value (pleasure-displeasure, the extent to which one is generally feeling good or bad) and arousal or activation value (sleepy-activated, the extent to which one is feeling engaged or energized). On the other hand, affective quality is the ability to cause a change in core affect. Whereas core affect exists within the person, affective quality exists in stimuli. Objects, places, and events all have affective quality. Perception of affective quality is an individual's perception of an

object's ability to change his or her core affect. It is a perceptual process that estimates the affective quality of an object.

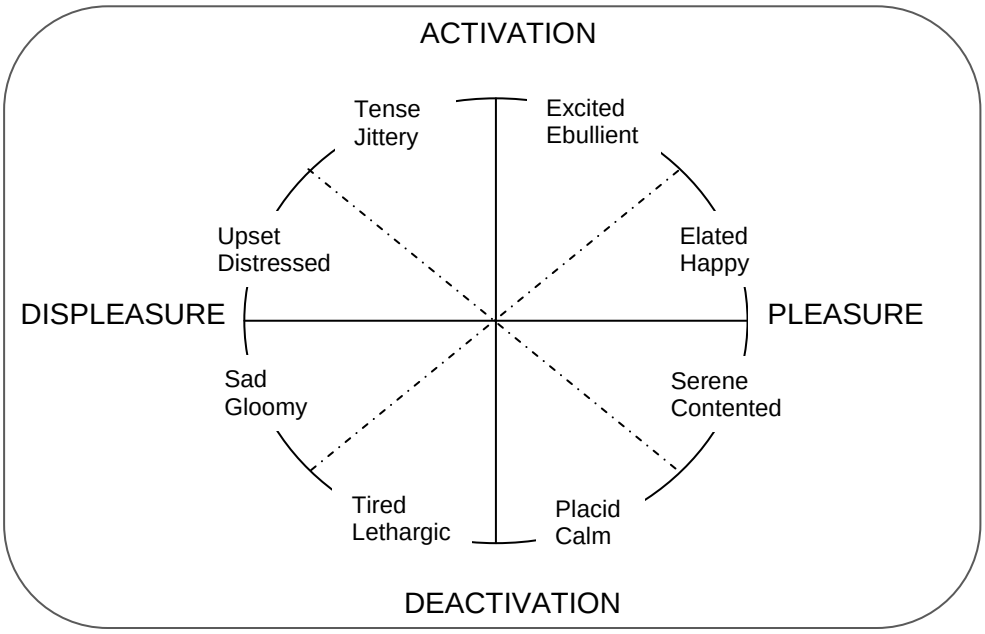



Figure 2.8 Core affect (Russell, 2003)

### 2.2.2 QUALITY-FOCUSED APPROACHES

In the studies of user experience of human-technology interaction, two categories of qualities are distinguished next to products' instrumental values: aesthetic and symbolic aspects; the quality aspects that result in more positive emotions.

Liu (2003) proposes that a discipline of engineering aesthetics should address the question of using engineering and scientific methods to study aesthetic concepts in system and product design. Tractinsky (2004) argues that, in particular, visual aesthetics is relevant to interactive systems research and practice for three theoretical reasons. First, for many users other aspects of the interaction hardly matter anymore. Second, users' evaluations of the environment are primarily visual, and the environment is increasingly replete with information technology. Third, aesthetics satisfies basic human needs and human needs are increasingly supplied by interactive systems.

Leder, Belke, Oeberst and Augustin (2004) propose an information-processing stage model of aesthetic processing. According to the model, aesthetic experiences involve five stages: perception, explicit classification, implicit classification, cognitive mastering, and evaluation. The model also differentiates between aesthetics emotion and aesthetic judgments as two types of outputs. Reber, Schwarz and Winkielman (2004) take an approach to understanding aesthetic pleasure based on the concept of processing fluency. They argue that aesthetic pleasure is a function of a perceiver's processing dynamics: the more fluently perceivers can process an object, the more positive their aesthetic response. They review variables known to influence aesthetic judgments such as figural goodness, figure-ground contrast, stimulus repetition, symmetry and prototypicality, and trace their ability to change processing fluency. They propose that aesthetic appreciation is grounded in the processing experiences of the perceiver, which are only in part a function of stimulus properties. Hekkert, Snelders and van Wieringen (2003) argue that typicality and novelty of a product are joint predictors of aesthetic preference. According to them, products with an optimum combination of both aspects are preferred.

According to Hassenzahl and Tractinsky (2006), user experience is a consequence of the interaction between three major elements: the user's internal state (predispositions, expectations, needs, motivation, mood), the characteristics of the designed system (complexity, purpose, usability, functionality) and the context (or the environment) within which the interaction occurs (organisational/social setting, meaningfulness of the activity, voluntariness of use).

Hassenzahl (2003) proposes a complex model that defines key elements of user experience and their functional relations (Figure 2.9). This multidimensional model explicitly links product attributes with needs and values. Specifically, it aims at addressing aspects, such as the subjective nature of experience, perception of a product, emotional responses to products in varying situations.

A product has certain features which are content, presentational style, functionality, and interactional style, and with these features the product conveys a particular character. A character is a high-level description. It summarizes a product's attributes, like novel, interesting, useful, and predictable. These attributes, which constitute the product character, can be thought of in two groups: *pragmatic* and *hedonic* attributes.

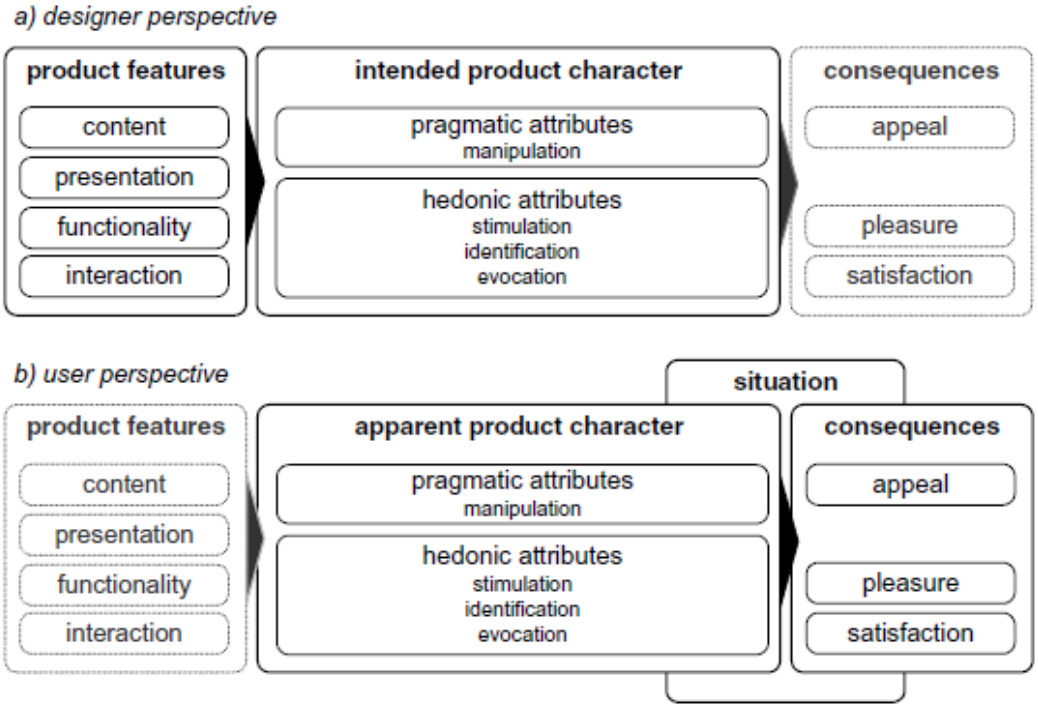



Figure 2.9 Key elements of the model of user experience from (a) a designer perspective and (b) a user perspective (Hassenzahl, 2003)

Product features are chosen and combined by a designer to convey a particular, intended product character. But, this intended character is subjective, there is no guarantee that users will actually perceive and appreciate the product the way designers wanted it to be perceived and appreciated. When individuals come in contact with a product, a process is triggered. First, people perceive the product's features. Based on this, each individual constructs a personal version of the product character, which can be called the apparent product character. It is a user's personal reconstruction of the designer's intended product character. People construct the apparent product character based on the particular combination of product features and their personal standards and expectations. A personal standard most likely consists of other objects the product can be compared to. Variations of the character between individuals can be explained by differing standards. Additionally, the apparent character can also change within a person over time. This change is due to increasing experiences with the product. Second, the apparent product character leads to *consequences* such that: a judgment about the product's *appeal* (e.g., "It is good/bad"), *emotional consequences* (e.g., pleasure, satisfaction) and *behavioural consequences* (e.g., increased time spent

with the product). However, the consequences of a particular product character are not always the same. They are moderated by the specific *usage situation*.

In order to distinguish the groups of attributes that construct the product character, the major functions of products may be considered. Products basically enable people to manipulate their environments, to stimulate personal development (growth) and to express identity. Moreover, a product can provoke memories and, thus, has a symbolic value. Manipulation of the environment requires relevant functionality (utility) and ways to access this functionality (usability). Hassenzahl (2003) calls this group of product attributes as *pragmatic*. Pragmatic attribute examples are ‘clear’, ‘supporting’, ‘useful’, and ‘controllable’. A pragmatic product is primarily instrumental. It is used to fulfill externally given or internally generated behavioural goals. Hassenzahl calls all other remaining product attributes as *hedonic*. Whereas pragmatic attributes emphasize the fulfillment of individuals' behavioural goals, hedonic attributes emphasize individuals' psychological well-being. Typical hedonic attributes of the products are ‘outstanding’, ‘impressive’, ‘exciting’ and ‘interesting’. Further, the hedonic function of products can be subdivided into three categories, which can be summarized as providing *stimulation*, communicating identity (*identification*), and provoking valued memories (*evocation*). Individuals strive for personal development, enhancement of knowledge and development of skills. To do so, products have to be stimulating. They have to provide new impressions, opportunities, and insights. Individuals express their self through physical objects, through their possessions (Prentice, 1987; cited in Hassenzahl, 2003). This self-expressive function is entirely social. Individuals want to be seen in specific ways by relevant others. To be socially recognized and to exert power over others is a basic domain of human motives (Schwartz & Bilsky, 1987; cited in Hassenzahl, 2003). To fulfill this need, a product has to communicate identity. Products can provoke memories. In this case, the product represents past events, relationships or thoughts that are important to the individual (Prentice, 1987; cited in Hassenzahl, 2003). Souvenirs are a whole product category that provides only symbolic value by keeping memories of a pleasant journey alive. Some products’ value only comes from triggering memories of the good old days. As a summary, a product may be perceived as pragmatic because it provides effective and efficient means to manipulate the environment. A product may be perceived as hedonic because it provides stimulation, identification or provokes memories.

Hassenzahl (2003) views pragmatic and hedonic attributes of the product as independent of each other. In combination they are the product character. If we take into account that peoples' perception of pragmatic and hedonic attributes can be either weak or strong, four types of product characters will emerge (Figure 2.10).

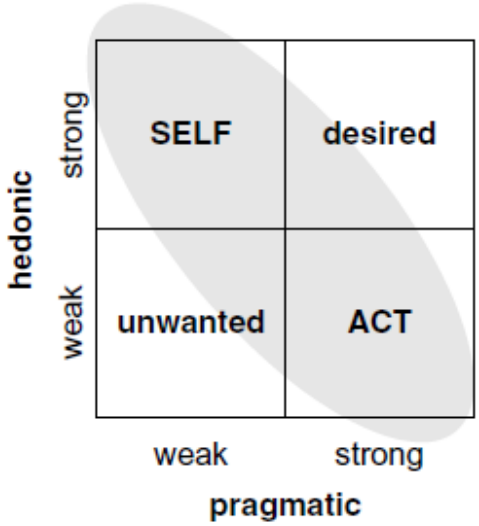



Figure 2.10 Product characters emerging from specific combinations of pragmatic and hedonic attributes (Hassenzahl, 2003)

The combination of weak pragmatic and weak hedonic attributes is simply unwanted. It is a character implying that a product that is neither able to satisfy pragmatic nor hedonic needs of potential users. The combination of strong pragmatic and strong hedonic attributes signifies the desired product. An uncompromising combination of both is the ultimate design goal. Most likely, both attribute groups will be not in balance. Hassenzahl (2003) calls a primarily pragmatic product (strong pragmatic/weak hedonic) an ACT product as well as a primarily hedonic product (weak pragmatic/strong hedonic product) a SELF product. The ACT product is inextricably linked to its users' behavioural goals. These goals may vary according to the situation, and the user, himself. They can be externally given by others or internally generated by the individual. Moreover, they can be of different importance to the user. On the contrary, the SELF product is inextricably linked to users' self, which includes their ideals, memories, and relationships.

Experiencing a product with a certain character will have the following consequences: *satisfaction, pleasure and appealingness*. There have been many definitions on these items in the literature as long as features of products in a human centered context have been considered. Ortony, Clore and Collins (1988) define satisfaction as being pleased about the confirmation of the prospects of a desirable event. In other words, if people hold expectations about the outcome of using a particular product and these expectations are confirmed they will feel satisfied. In contrast to satisfaction, joy or pleasure requires no expectations. It is defined as being pleased about a desirable event. The more unexpected the event is, the more intense will be the pleasure. In other words, if people use a particular product and experience desired deviations from expectations, they will be pleased. Briefly, satisfaction is linked to the success in using a product to achieve particular desirable behavioural goals, whereas pleasure is linked to using a product in a particular situation and encountering something desirable but unexpected. Other than the values satisfaction and pleasure, if a product is able to trigger positive emotional reactions, it is regarded as appealing. Appealingness is a group of product attributes such as good, sympathetic, pleasant, attractive, motivating, desirable, and inviting. Appealingness weights and integrates perceptions of product attributes by taking particular situations (contexts) into account. Appealingness integrates experiences with and feelings towards a product in a particular situation into an evaluative judgment.

Hassenzahl (2003) emphasizes the importance of different situations for understanding the judgements of appealingness and emotional reactions. A usage situation combines the perceived product character with a particular set of aspirations, such as specific behavioural goals or need for stimulation. In order to overcome problems for predicting emotional reactions or appealingness in particular usage situations, Hassenzahl proposes to focus on the mental state of the user by defining different *usage modes*, a goal and an action mode. Usage always consists of behavioural goals and actions to fulfill these goals. In goal mode, goal fulfillment is in the fore. The current goal has a certain importance and determines all actions. The product is therefore just ‘a means to an end’. Low arousal is preferred and experienced as relaxation. If arousal increases, it is experienced as mounting anxiety (frustration). On the contrary, in action mode, the action is in the fore. The current action determines goals, and the goals are volatile. Using the product can be an ‘end in itself’. Effectiveness and efficiency do not play an important role. High

arousal is preferred and experienced as excitement. If arousal decreases, it is experienced as increasing boredom. The particular usage mode is triggered by the situation itself. Principally, usage modes can be taken as psychological states and every product can be experienced in either state. The perception of a product character as primarily pragmatic or hedonic will not be influenced by usage modes. However, appealingness and emotional reactions depend on the product's momentary fit to the usage mode. Thus, usage modes become the moderator between the product character and consequences.

### 2.2.3 FRAMEWORKS INCLUDING EMOTION AND QUALITY ISSUES

Mahlke (2007) proposes a framework that conceptualizes user experience as a phenomenon consisting of instrumental and non-instrumental quality perceptions as well as emotional user reactions (Figure 2.11)**.** The model defines instrumental and non-instrumental quality perceptions as well as emotional reactions as the three central components of the user experience. Characteristics of the interaction impact these three components. Interaction characteristics primarily depend on system properties, but also user characteristics and context parameters can play an important role. The consequences of the user's experience of an interaction are the user’s overall judgments of a product, usage behavior or user’s choice between alternatives (preferences). These are the outcomes of all three central components of the user experience.

System properties are classified into four categories as functionality, presentation, dialogue and appearance in order to manage the complexity of possible system properties. First, the functionality of the product is about its utility values. The whole internal logic of the interface can be called dialogue. Another level seems to be the presentation of user interface objects. Aspects of product form, size and weight of the product, product’s color and other surface properties like a metallic or plastic look, hardness, roughness, etc., the geometry of the product and its details are all the appearance attributes of the system that have to be considered as a fourth category.

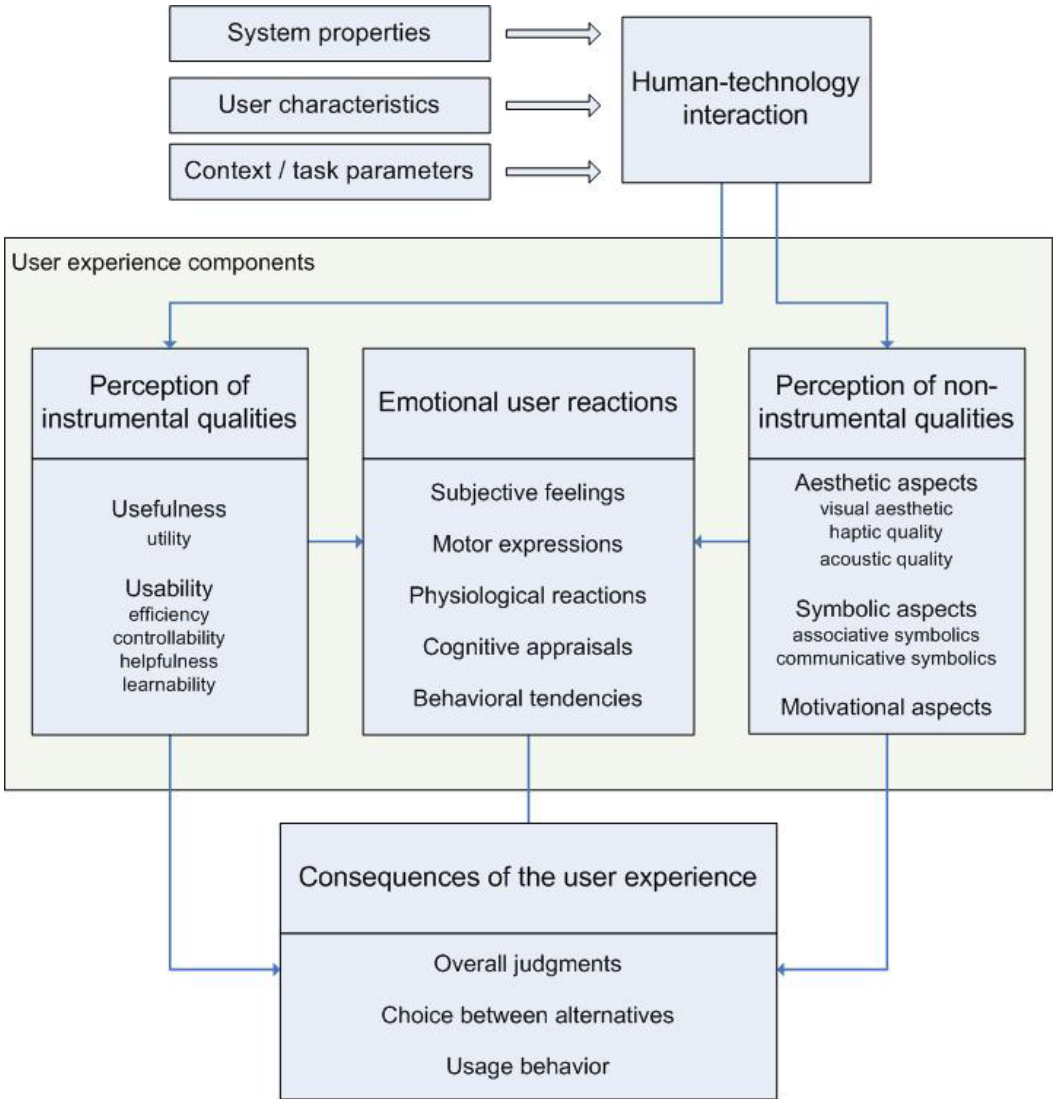



Figure 2.11 User experience research framework (Mahlke, 2007)

User characteristics consider all attributes of the person. User characteristics mentioned by Hassenzahl and Tractinsky (2006) are predispositions, expectations, needs and motivations of the user. Age, gender, memory capacity, verbal ability and personality can be seen as predispositions. Differences between users regarding expectations and needs result in variations in preferences. Differences in cultural background and centrality of visual product aesthetics, which can be seen as an important moderator of the relevance of the aesthetic value of products (defined by Bloch, Brunel and Arnold, 2003; cited in Mahlke, 2007), are examples for user characteristics.

Context/task parameters include all aspects of the situation in which a product is used. Hassenzahl and Tractinsky (2006) mention organizational and social setting, meaningfulness of the activity and voluntariness of use as examples of context parameters. Also Crilly *et al.* (2004) discuss situational and environmental factors as influencing variables. The user's degree of motivation to interact with an interactive product in particular has the potential to influence their response. Hassenzahl (2003) discusses the importance of usage modes, which was mentioned in the previous part. He defines usage modes as psychological states and argues that every product can be experienced in different usage modes: goal or action.

Mahlke's framework considers perception of instrumental qualities, emotional user reactions, and perception of non-instrumental qualities as the components of user experience. Perception of instrumental qualities about an interactive system is related to the tasks and goals, which the user wants to accomplish with a given interactive system. Shackel (1991; cited in Mahlke, 2007) defines utility and usability as the two instrumental values of an interactive system that influence system acceptance. According to his definition, utility refers to the match between user needs and product functionality, while usability refers to the ability to utilize the functionality in practice.

Perception of non-instrumental qualities is related with the needs that go beyond the mere instrumental value of a product. Mahlke, Lemke and Thüring (2007; cited in Mahlke, 2007) propose a model of non-instrumental qualities with three categories: aesthetic aspects, symbolic aspects and motivational aspects. Aesthetic aspects of non-instrumental quality are divided into various dimensions related to the human senses. Visual aesthetics of products can be defined as the extent to which sensory (colors) and formal (shapes) attributes of a product provide positive visual experiences for the user (Lang, 1988; cited in Mahlke, 2007). Haptic quality of products can be defined as the extent to which sensory (materials) and formal (forms) attributes of a product provide positive haptic experiences for the user (Ashby & Johnson, 2002; cited in Mahlke, 2007).

Mahlke (2008) distinguishes two aspects for symbolic qualities: communicative and associative. Communicative aspects are related to the messages that a product communicates. They can relate to the expression of unique aspects of either one's personality or group membership as described in Crilly *et al.* (2004). So-called self-

expressive symbolism relates to individual qualities, values and attributes and serves to differentiate the consumer from others. The categorical symbolism associated with products, on the other hand, allows the expression of group membership, including social position and status. Both self-expressive and categorical aspects are summarized in the dimension of communicative symbolism and can be defined as the extent to which communicative attributes (personal values, group membership) of a product provide positive experiences for the user. Associative aspects, on the other hand, are concerned with personal memories as described by Norman (2004). These personal memories can be related to a specific product or only to properties of a product (form, materials, etc.) that were already experienced. For example, the use of wood may evoke images of craftsmanship, while the use of metal may be associated with precision. Associative symbolism can be defined as the extent to which a product's associative attributes (personal memories) provide a positive experience for the user.

The third category of non-instrumental qualities focuses on motivational aspects. Motivational qualities can be defined as the perceived ability of a product to motivate the user. It includes non-instrumental qualities like described in Hassenzahl's (2003) concept of stimulation, namely the new impressions, opportunities, and insights provided by products.

Emotional user reactions are modeled with five different categories in Mahlke's framework: subjective feelings, motor expressions, physiological reactions, cognitive appraisals, and behavioral tendencies. In order to find out subjective feelings, dimensional approaches which define a number of dimensions to describe emotional qualities and generate a dimensional space that includes all possible emotions can be used. For example, Russell (1980) defines valence and arousal as two basic dimensions that describe the quality of an emotion.

Although previous empirical studies have shown an influence of visual aesthetics on perceptions of usability (Tractinsky *et al.*, 2000), Mahlke (2008) suggests that in the user experience framework, no direct link between instrumental and non-instrumental quality perceptions can be found. The findings of his studies demonstrate that it is possible to manipulate groups of system properties, which either influence instrumental or non-instrumental quality perceptions. In his studies, the properties associated with information presentation had an impact on the

perception of usability, and system properties related to product appearance determined users' perceived visual aesthetics. The studies also show the relevance of perceived visual aesthetics for emotional user reactions and consequences of user experience.

Desmet and Hekkert (2007) propose a framework for product experience that applies to all affective responses that can be experienced in human-product interaction. Three distinct components or levels of product experiences are discussed: aesthetic experience, experience of meaning, and emotional experience (Figure 2.12). The aesthetic level involves a product's capacity to delight one or more of people's sensory modalities. The meaning level involves people's ability to assign personality or other expressive characteristics and to assess the personal or symbolic significance of products. The emotional level involves those experiences that are typically considered in emotion psychology and in everyday language about emotions, such as love and anger, which are elicited by the appraised relational meaning of products.

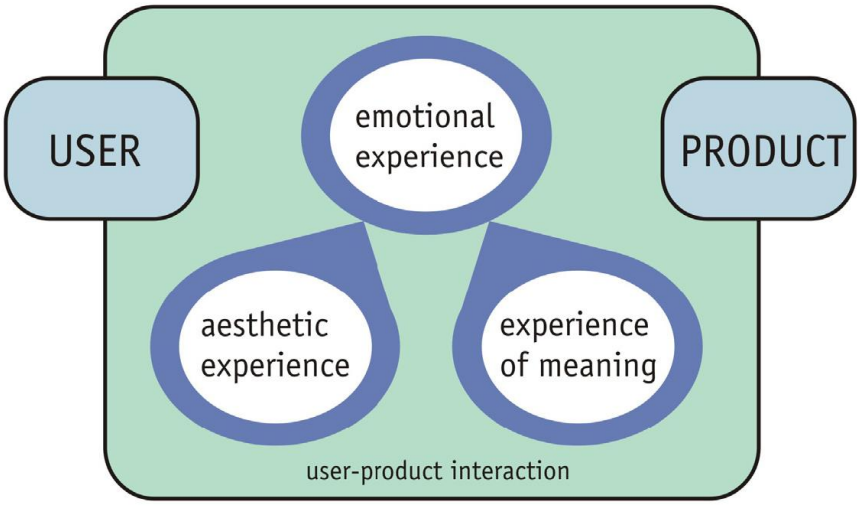



Figure 2.12 Framework of Product Experience (Desmet and Hekkert, 2007)

Desmet and Hekkert use 'product experience' to refer to an experience that is affective. Experience is shaped by the characteristics of the user (e.g., personality, skills, background, cultural values, and motives) and those of the product (e.g., shape, texture, colour, and behaviour). All actions and processes that are involved,

such as physical actions and perceptual and cognitive processes (e.g., perceiving, exploring, using, remembering, comparing, and understanding), will contribute to the experience. In addition, the experience is always influenced by the context (e.g., physical, social, economical) in which the interaction takes place. All possible experiences involved in the user-product interaction can be described in terms of core affect, which was introduced by Russell (1980).

Aesthetic experience is related to the degree to which all senses are gratified, the degree to which a perceptual system manages to detect structure, order, or coherence and assess a product's novelty or familiarity. A product can be beautiful to look at, make a pleasant sound, feel good to touch, smell nice. For experience of meaning, cognition comes into play. Through cognitive processes, like interpretation, memory retrieval, and associations, people are able to recognize metaphors, assign personality or other expressive characteristics, and assess the personal or symbolic significance of products. Examples of experiences of meaning are luxury and attachment. The experience of luxury represents a symbolic value of a comfortable lifestyle that is associated with particular consumer products, while the experience of attachment is represented by products that have some profound and sustained meaning to the user.

The three conceptually separated components of product experience are very much intertwined and it is often difficult to distinguish in everyday experiences. The relationship between the emotional component and the two others seems to be hierarchical: experiences of meaning and aesthetic experiences can elicit emotional experiences. At the level of meaning, metaphors, personality or other expressive characteristics are recognized and personal or symbolic significance of products are assessed. A car model can resemble a shark; a teddy bear can represent a nostalgic value; and a laptop can be exclusive, masculine, old-fashioned, elegant, etc. This meaning component of experience can elicit emotions, because product meaning can be appraised as beneficial or harmful for the individual's concerns. A person who feels that a stainless steel kitchen unit is modern and efficient may experience attraction, whereas a person who feels that it is cold and impersonal may experience dissatisfaction. An aesthetic experience can give rise to an emotional experience, because aesthetic experiences involve pleasure and displeasure. In addition Desmet and Hekkert explain that usability is not included as a separate level of experience in their framework because usability is not an

affective experience, and consider usability to be a source of product experience. Usability can generate and influence all three levels of product experience.

# CHAPTER 3

# USER PRODUCT INTERACTION STUDIES FOCUSING ON HUMAN RESPONSE AND BODY

## 3.1 HUMAN-PRODUCT INTERACTION

Products are created to serve for some special purposes such as getting from one place to another, cleaning the house, heating water, contacting someone, having fun, accessing information and the like. In order to use the products, people interact with products resulting in people's subjective experiences with them. Furthermore, the experiences do not only result from the interaction, but also accompany and guide the interaction, and thus affect the interaction. In sum, experience and interaction are fully intertwined and in order to explore people's experiences of products, the constituents or building blocks of human–product interaction should be understood (Schifferstein & Hekkert, 2008).

Schifferstein and Hekkert (2008) provide a human-product interaction model (Figure 3.1) including three perspectives: the human beings with their systems and skills, the interaction itself with its different components and a product (domain) with its specific properties. They explain the interaction model elements with many ideas mentioned below:

Humans are biologically equipped with a number of systems that make it possible for them to interact with their environment: a motor system to act upon the environment, sensory systems to perceive changes in the environment, and a cognitive system to make sense of the environment and to plan actions. Products are part of this environment. The motor capacities are needed to explore products, interact with them, and operate them. Sensory systems allow people to perceive a

product and assess what kind of product it is. They provide feedback on people's actions. Furthermore, they tell a person whether a sensation (visual, auditory, tactual, olfactory, or gustatory) is pleasurable or should be avoided. Cognitive capacities link perceived information to stored knowledge to interpret the incoming information, they elicit memories of previous usage and evoke associations with other products. Finally, people are born with a limited set of instincts, which make them explore the world to try to satisfy basic needs. Through interaction with an environment, all these human capacities gradually develop into skills, expertise, and concerns (such as goals, intentions, and preferences).

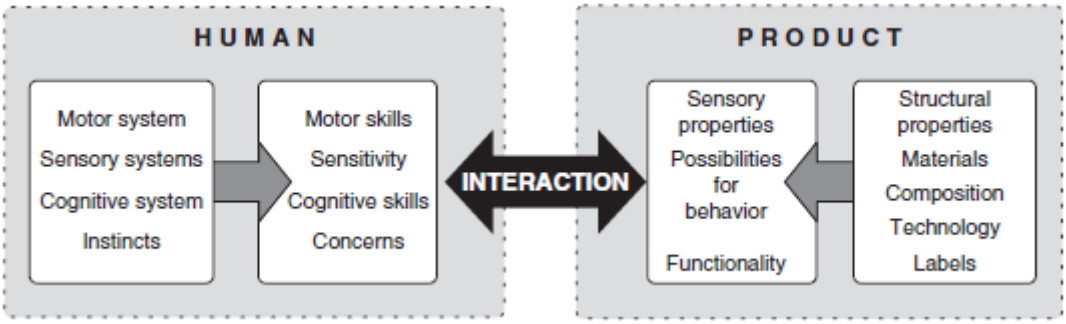



Figure 3.1 Model of human–product interaction (Schifferstein & Hekkert, 2008)

A product perceived in isolation has a number of structural or formal properties, such as its size, weight, and shape. Physical products are made of materials with specific technical characteristics (e.g. chemical constitution, heat conductivity, elasticity). In addition, more and more products make use of embedded technology (electronics, sensors, and other digital components) to operate them; and all kinds of labels (e.g. brand name, usage information, price information) may be attached to the product.

But, in the interaction with people, products obtain their meaning. On the basis of what is perceived sensorially (e.g. softness, freshness, loudness) products reveal cues of how to use them, and they reveal their function. Product experiences depend on the way in which a person interacts with a product. Although phenomenologically experienced as a whole, at least three major components can be distinguished in product experiences (Desmet and Hekkert, 2007). The aesthetic response is characterized by feelings of (dis)pleasure that are based on the sensory

perception of the object; the object looks beautiful, feels pleasurable, or sounds nice. In addition, people try to understand how a product must be operated or which actions it affords, and people attribute all kinds of expressive, semantic, symbolic, or other connotative meanings to it. The interactions with a product can help a person to reach a goal or can obstruct him or her in attaining that goal, and thereby lead to various emotional responses. Together these components shape the overall product experience.

## 3.2 HUMAN RESPONSE TO DESIGN

According to Bloch (1995), product form may elicit a variety of psychological responses including both cognitive and affective components. Cognitive response includes product-related beliefs and categorization. Product form may create or influence beliefs pertaining to such characteristics as durability, dollar value, technical sophistication, ease of use, sex role appropriateness, and prestige. Bloch assumes that product related beliefs derive from both Gestalt and atomistic processing: the product may first be perceived as a whole; if the form warrants further processing, then individual elements may become salient. Categorisation, the other type of cognitive response, is based on the perceived similarity between a given product and exemplars of various product categories and sub-categories. Product forms with a moderate degree of incongruity with respect to existing form elicit more positive cognitive responses than forms with low or high levels of incongruity. Affective response, the other type of psychological response, includes aesthetic and other positive responses and negative affect. Aesthetic responses are typically associated with positive affect and pleasurable experiences; however, the possibility of negative affective reactions to product form perceptions must also be recognized. The intensity and valence of affective reactions to a product are a function of its perceived form.

Bloch mentions that psychological responses to design lead in turn to behavioral responses. Those can be described as either approach or avoidance. Approach behaviors reflect an attraction to a design and include spending time and exploring it; whilst avoidance behaviors represent the opposite of approach responses. The stronger the positive psychological responses to a product's form, the greater the propensity to approach the product is; likewise, the stronger the negative psychological responses, the greater the propensity to avoid.

Crilly, Moultrie and Clarkson (2004) discuss consumer response to product visual form within the context of an integrated conceptual framework (Figure 3.2) and study consumer response in a similar way to Bloch's (1995) proposal. Emphasis is placed on the aesthetic, semantic and symbolic aspects of cognitive response to design. The accompanying affective and behavioural responses are also discussed and the interaction between cognitive and affective response is considered.

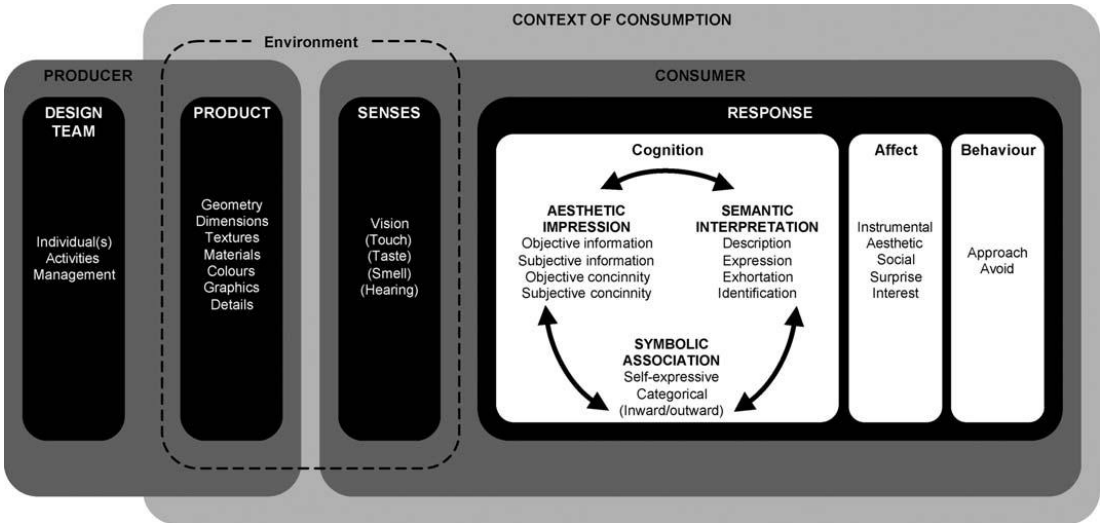



Figure 3.2 Framework for design as a process as communication with expanded cognitive response (Crilly *et al.*, 2004)

The physical product may be characterized by its geometry, dimensions, textures, materials, colours, graphics and detailing. Aspects such as the perceived novelty, style and personality of products are not considered to be characteristics of the product because they are not objective qualities of the design. Instead, they are aspects of the consumers' psychological response to the product. The signal transmitted by the product is received by the physiological senses. With regard to the perception of product form, vision is of primary importance. Other sensory aspects of design, touch, taste, smell and hearing, come next.

Cognitive response refers to the judgements that the user or consumer makes about the product based on the information perceived by the senses. These judgements include evaluation of the products' perceived qualities. Aesthetic impression, semantic interpretation and symbolic association are discussed as the components of cognitive response. Aesthetic impression is defined as the sensation that results

from the perception of attractiveness (or unattractiveness) in products. Semantic interpretation is defined as what a product is seen to say about its function, mode-of-use and qualities. Symbolic association is defined as the perception of what a product says about its owner or user: the personal and social significance attached to the design. These are all aspects of cognition driven by both the perception of tangible stimuli and pre-existing knowledge.

Affective response is about emotional responses that products elicit. Crilly *et al.* mention Desmet's (2003) categories for the emotional responses that products elicit: instrumental, aesthetic, social, surprise and interest, those were discussed in the previous chapter. For behavioural response, Bloch's (1995) 'approach' and 'avoid' terms are referenced in the framework. A consumer's psychological response (comprising cognition and affect) influences the way in which they behave towards the product. Approach responses may be associated with further investigation of the product, product purchase and product use. Avoid responses may be associated with ignoring the product, failure to purchase and product abuse.

Crilly *et al.* analyze the cognitive response components as stated in the following part. *Aesthetic impression* is taken in relation with information and concinnity perceived in a product. In addition to the combination of lines, colours, textures and details that comprise the product's visualform, the consumer's familiarity with other products, entities and concepts also influence aesthetic impression. Objective information may be regarded as the amount of contrast that a design presents against its background and within itself. This is determined by the way in which certain design elements are combined. Subjective information may be regarded as the novelty perceived in the design. This is largely determined by the extent to which the product deviates from forms with which the consumer is already familiar. Objective concinnity may be regarded as the order perceived in the design. This is determined by the application of design principles such as the Gestalt Rules. Subjective concinnity may be regarded as the extent to which the design appears to make sense to the viewer. This is determined by the consumer's personal, cultural and visual experiences that assist them in understanding the product.

In the framework, *semantic interpretation* is described as the evaluation of a design's apparent utility and perceived qualities. Product semantics is limited to what the product appears to communicate about itself. The extent to which products

are seen to reflect the identity of their owners is taken separately in the third component of cognitive response (symbolic association). Semantic interpretation is discussed with four sub-headings: description, expression, exhortation, identification. Description refers to the way in which the outward appearance of a product presents its purpose, mode-of-operation and mode-of-use. Expression refers to the properties that the product appears to exhibit. Exhortation refers to the requests or demands that a product appears to make of those perceiving it. Identification principally refers to the extent that the origin and affiliation of a product are conveyed.

In addition to their apparent decorative and practical qualities almost all products are seen to hold some socially determined symbolic meaning. The culturally agreed meaning of objects allows individuals to communicate their identity through products; it allows them to project a desirable image to others, to express social status and to make visible their personal characteristics. Symbolic association is determined by what the product is seen to symbolise about its user, or the socio-cultural context of use. In the framework, symbolic qualities associated with products are divided into self-expressive and categorical meanings. The self-expressive symbolism allows the expression of unique aspects of one's personality. This includes individual qualities, values and attributes. On the other hand, the categorical symbolism associated with products allows the expression of group membership, including social position and status.

## 3.3 THE BODY LANGUAGE OF OBJECTS

The affective aspects of a tactual experience with an object can be characterized as the experienced body language of the object. In physical interaction objects are experienced as expressing affective behavior through their physical reactions to user actions. Sonneveld and Schifferstein (2008) describe this affective behavior along a number of themes. According to Govers (2004; cited in Schifferstein & Hekkert, 2008), *product personality* can be defined as the set of human characteristics that people use to describe an object. People seem to transfer the perceived tactual qualities directly to the product personality. For example, a cold object expresses a cold personality, and a flexible product may be experienced as a flexible personality. Because products seem to have a personality, they seem to become social entities and, may evoke feelings and emotions that usually only apply

to the interpersonal domain, such as feelings of sympathy. For example, people may report that they feel sorry for an object that seems sad, because it has a broken part.

The way in which objects give *tactual feedback* is experienced as the integrity of the object. In interaction, an object provides people with information. On the one hand, it provides information about itself, for example about its properties, about what it is and what it is doing. On the other hand, it provides information about the physical world around it, about what is going on. Integrity is related to whether the object gives any feedback at all: Products can be rich or poor in tactual information. For example, touch screens do not let the user feel what they are actually doing, whereas other interfaces, such as steering wheels of cars, let the driver know exactly what is going on.

When touching an object, people are in contact with that object, but their attention is not necessarily directed towards the object. The theme '*transparency'* refers to the capacity of the object to allow people to feel through the object, to incorporate it, and to direct their attention to something else in their environment. For example, when riding a bicycle, the road surface id felt through the handle-bars and through the saddle. However, an annoying tactual sensation can create 'tactual noise' that reduces the degree of transparency, for example, when the handles get sticky they will attract the majority of attention and, thereby, divert the attention that was first directed towards the road. In this context, virtual products' transparent behaviour can be discussed against totally physical products. Newly designed iPhone is an example of products' transperency with its characteristics providing many different virtual features that are independent from its simple physical body. The emprical study conducted in this thesis investigates automobiles' and iPhone's behaviours with a comparison study, and related issues are discussed in detail in Chapter Six.

## 3.4 MULTISENSORY PRODUCT EXPERIENCE

People use all of their senses in order to explore the world around them. Under everyday conditions the senses all work together to create the overall product experiences. Whenever using a product, people perform actions with that product and senses provide feedback regarding how the product, or the environment, reacts to those actions. By now, many different studies have suggested that the greater the

number of sensory modalities that are stimulated at any one time, the richer the experiences will be (Schifferstein & Spence, 2008). As a consequence, increasing the number of modalities of sensory input presented in a virtual environment can help to increase people's sense of presence and also increase their memory for objects placed within the virtual environment (Washburn et al., 2003; cited in Schifferstein & Hekkert, 2008). In order to design products that will more effectively stimulate the senses of the consumer, and lead to more pleasurable and memorable multisensory product interactions; it is important to know what kind of actions people will perform with a product, how they will perceive it during these interactions, and how the consumer's senses work together to deliver rich and varied multisensory experiences.

**Importance of Sensory Modalities**

Schifferstein (2006) propose a study on the perceived importance of sensory modalities in product usage and discusses that the relative importance of the different modalities is likely to depend on the type of product and on the task performed. Schifferstein's study showed that averaged over products and evaluation types, vision was the most important sensory modality for product evaluations, followed by touch, smell, audition, and taste. However, for about half of the individual products, the importance ratings for vision were lower than for one of the other modalities. In his study, respondents judged how important they found vision, audition, touch, smell, and taste during the usage of 45 different products. Results show that the perceived importance of the sensory modalities is product-dependent. For instance, the usage value of lamps, vases and pictures is determined mainly by their visual appearance. For CD players and TVs, the sounds they produce are equivalent in importance to their appearance. For simple tools and utensils such as a hammer, and a computer mouse, the tactual characteristics are of primary importance, followed by their appearance. For products associated with cleaning and with personal care, their smell generally plays an important role, often in combination with their visual and tactual properties. For food products the taste is judged to be most important, generally followed by the smell, the visual appearance and tactual properties. Going through the list of products, both examples of products for which the usage experience depends mainly on one modality (lamp, picture), and also products for which four or more modalities are important (car, apple) can be found.

In Schifferstein's second study, respondents rated the importance of the various sensory modalities for the evaluation of three product aspects with relevance for almost any product: safety, ease of use, and enjoyment. Importance ratings for the sensory modalities were highest when enjoyment was rated, intermediate for ease of use, and lowest for safety. In comparisons of the modalities, the highest importance ratings were given, on average, to vision, followed by touch, smell, audition, and taste. In addition, the importance of taste and of audition wss independent of scale type; however, the importance of vision and smell seemed relatively large for product enjoyment, whereas the importance of touch seemed relatively large for ease of use.

**Sensory Dominance**

When a person interacts with a product, the inputs from the various senses should be integrated in order to give rise to a unified multisensory product experience. Sensory dominance is the relative importance of different sensory modalities for product experience. Fenko, Schifferstein and Hekkert (2010) investigated the shifts in sensory dominance between various stages of user–product interactions: while buying a product, after the first week, the first month, and the first year of usage. The data suggest that the dominant sensory modality depends on the period of product usage. At the moment of buying, vision is the most important modality, but during the usage the other sensory modalities gain importance. The roles of the different modalities during usage are product-dependent. Averaged over 93 products analyzed in their study, after one month of usage touch becomes more important than vision, and after one year vision, touch and audition appear to be equally important.

Results of the semantic analysis of the situations in which the most pleasant and unpleasant product experiences occur showed that pleasant experiences were most often connected to the everyday usage of a product (making coffee, cooking). The second source of pleasure consisted of pleasant sensory experiences (products look beautiful; have good smell, pleasant sound). About one sixth of the respondents mentioned the first interaction with their product as the most pleasant and exciting experience. The unpleasant product experiences were most often connected to unpleasant sensations (bad smell, annoying noise). The sudden dysfunction of a product or accidents that happened during usage (the engine broke down, users burnt their fingers) formed the second source of unpleasant

experiences with products. The third reason for disappointment was bad design (the screwdriver that is too big for small spaces). Fenko *et al.* also investigated the relative importances for the sensory modalities for pleasant and unpleasant experiences separately (Figure 3.3). For both of the pleasant and unpleasant experiences, the effect of modality was significant. Vision was mentioned most often as the dominant modality for pleasant experiences, followed by touch, audition, smell and taste. Touch was dominant for unpleasant product experiences, followed by vision, audition, smell and taste.

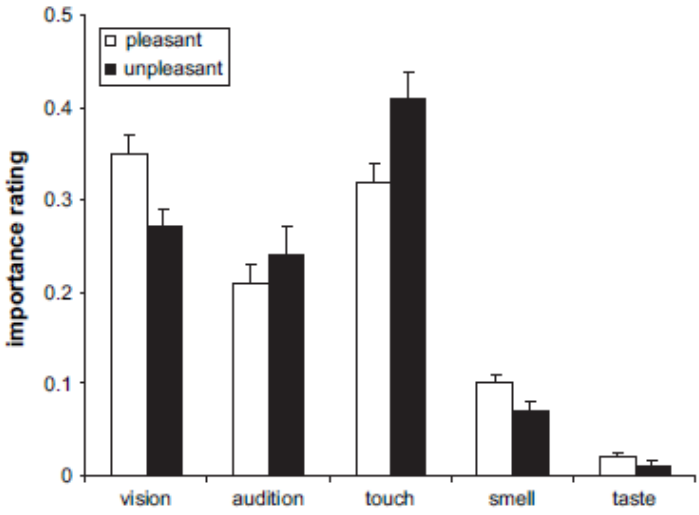



Figure 3.3 Importance rating for sensory modalities for pleasant and unpleasant experiences (Fenko *et al.,* 2010)

**Sensory Incongruity**

In some cases, the information people obtain from a product through the different senses conflicts, which may lead to a surprise reaction. Experiencing incongruent sensory information and the resulting surprise reaction in a product is expected to have an effect on product evaluation. Ludden, Schifferstein and Hekkert (2006) studied incongruent sensory information in products, by investigating the effects of visual-tactual, visual-auditory and visual-olfactory incongruity on surprise, product expression and product liking. As described by Ludden *et al*. (2006), the senses can be divided into two groups: the distance senses, which are audition, vision and olfaction; and the proximity senses, which are taste and touch. People are capable of seeing, hearing and smelling objects from a distance, but to touch or taste

something people have to be in physical contact with the object. Therefore, it is more likely that a person will perceive an object through vision, audition or olfaction first. In addition, between visual-tactual, visual-auditory and visual-olfactory incongruity, visual-tactual incongruity takes a special place, because the same product attributes can be perceived through both these senses: people can both see and feel a shape or a texture. Visual-auditory and visual-olfactory incongruities always involve multiple product attributes: people cannot see an odor or a sound. However, when someone sees a small product, he or she may expect it to make a soft sound, and when someone sees a pink object, he or she may expect it to have a sweet smell. Visual-olfactory and visual-auditory incongruities probably occur through cognitive association rather than through direct perception.

Results of their studies show that surprise is evoked by visual-tactual incongruity, but not by visual-auditory or visual-olfactory incongruity. Furthermore, studies show that the influence of visual-auditory and visual-olfactory incongruity on the evaluation of the expression of the product and on product liking should not be overestimated. For example, a sound that is incongruent with the appearance of a product only slightly influences the experience of the product suggests that participants paid more attention to the appearance of a product than to the sound. Similarly, the effects of odors on product expression and product liking seem to be negligible compared to the effect of the product's appearance. For certain products, depending on how the sensory incongruity influences their functionality and on the context in which the product is used, creating sensory incongruity can be an effective strategy to design more interesting or amusing products. For example, products that people generally use in situations when they are bored (e.g., waiting room benches) and products that people use or encounter in public environments (e.g., table ware in a restaurant), could very well benefit from sensory incongruity. Considering the results from the experiments, it seems most likely that creating surprise through visual-tactual incongruity is an effective strategy.

## 3.5 COMMUNICATION IN PRODUCT CONTEXT

Clarkson (2008) defines communication such that someone that sends some information, and someone that receives and interprets it. Communication can occur

through speech and text, but may also include non-verbal communication such as visual and iconic messages, together with sounds and gestures. In the context of product design, communication refers to the process of interaction between a person and a product. This involves the person's perception of the product, and also their ability to perform actions such as pushing buttons. A person's ability to communicate depends on their educational level and social skills.

An interaction with a product (Figure 3.4) typically involves several cycles of perceiving, thinking and acting. Both perceiving and acting are high level functions that may involve the combination of several lower level functions such as vision and dexterity. Although these functions are considered separately in order to understand their relations, in reality they are all combined during cycles of product interaction.

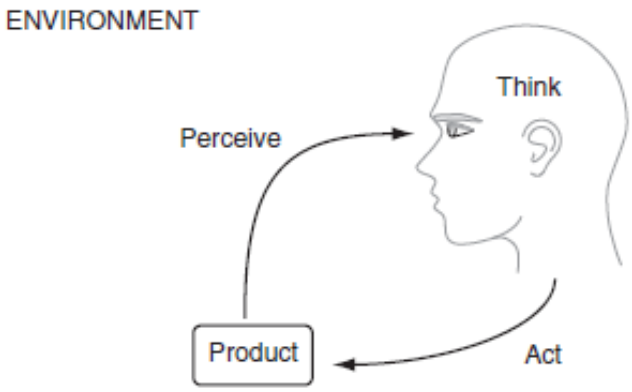



Figure 3.4 A model of product interaction (Clarkson, 2008)

Perceiving is the ability to comprehend information, which can be in forms such as speech, text, sounds, shapes or images. In addition to these specific outputs from a product, consumers are strongly influenced by the device's general character. The form, color, and style of the product all influence the user's assessment of its aesthetic, symbolic and practical value. Thinking is the intellectual functioning, mostly occures in the brain. The brain organizes incoming sensory information, processes it in the light of conscious awareness and attention, and initiates responses in the form of actions. The most significant functions for product design carried out by brain are: working memory, attention and performance, visual-spatial thinking, learning, recall and long-term memory. In the context of product communication, acting refers to the ability to transfer information to a product,

through the correct manipulation of its interface. Acting can be categorized according to whether the action is physical or symbolic. Physical actions refer to the manipulation of a control to achieve a prescribed physical effect. Such controls include discrete controls (power and light switches) and analog controls (brake pedals). Symbolic actions refer to those that confer no physical effect, but can control a product after being interpreted. Such actions include selecting menu options, using touch screens or clicking on icon, and using a keyboard to enter text or speaking to a product. Symbolic actions can provide much more diversity than physical ones, yet must be carefully thought out by designers to ensure that they remain simple to use and provide an equivalent level of feedback (Clarkson, 2008).

## 3.6 BODILY EXPRESSION AND EXPERIENCE

Without doubt, body language is the most basic form of expression. Varying from facial expressions to bodily postures, the ways in which people express themselves through their 'body language' are numerous.

### Bodily Basis of Product Experience

Products of today's world are not only supposed to function in a strict utilitarian sense, they also influence the way people experience their material environment. Although these experiences change constantly under the influence of context factors, such as trends and technological developments, designers are able to influence these experiences in a desired direction by manipulating a product's expression. Despite the extensive knowledge available for establishing the behavior of materials, technology, etc., determining the way a product's expression will be understood is less straightforward. In establishing a product's expression, designers often have to rely on subjective knowledge, personal views, and (cultural) values (Rompay, *et al.*, 2005).

With their study, Rompay, Hekkert and Muller (2005) argue that part of product experience is rooted in bodily interactions between people and their environments. They base their study on Lakoff and Johnson's (1980, 1999; cited in Rompay *et al.*, 2005) image shemas theory. Lakoff and Johnson convincingly demonstrated that repeated bodily interactions of a similar kind lead to the formation of image schemas guiding people's understanding of verbal expressions. Image schemas ae spatial-

relational structures manifest in everyday interactions. Rompay *et al.* propose that the same underlying principles also govern people's understanding of the expression of products.

According to Lakoff and Johnson, repeated bodily interactions lead to the formation of image schemas determining the way people understand the world. The image schemas make up the basis for people's categorizing capabilities and order perceptual and sensorimotor experiences; structure understanding of expressions of all kind, whether linguistic or nonlinguistic. Rompay *et al.* argue that these schemas also structure people's understanding of a product's expression. Depending on the nature of its spatial and material manifestation, specific schemas supposedly play a role in the way a product's expression is understood by its users. They discuss which expressions may have been structured by the same underlying image schemas, regarding four 'basic' schemas that are presumed to be highly relevant in the realm of product experience.

The 'container' schema arises from bodily interactions with insides and outsides. Lakoff and Johnson (1999; cited in Rompay *et al.*, 2005) present a large range of day-to-day activities dealing with moving in and out of spaces. According to Rompay *et al.*, in interacting with insides and outsides, one may have particular experiences, depending on the container's degree of enclosure. The main reason for building houses and shelters is to be secure and safe from forces acting on the outside, and to engage in activities for which protection is required. One may propose that expressions related to safety, like safe and secure, and expressions related to informal and emotional behavior, like involved, informal, emotional and agreeable, are structured by the same underlying schema, and should therefore be strongly related.

The 'balance' schema is about attaining erect position in space and crucial for bodily functioning. Without balance, people would not be able to stand, move, or to function at all. In the cases of spatial, bodily balance, the vertical is the reference. The balance schema is not only related to the sense of external balance, but also to the sense of internal balance. For instance, one may experience an imbalance within the body as a result of excessive amounts of blood sugars. In addition, balance and motion are closely related with each other. Expressions presumably structured by the balance schema are related to positioning in space, like stable,

still, and balanced, and expressions metaphorically reflecting a sense of (in)stability or (a lack of) movement, such as trustworthy and lifeless.

The ‘size’ schema arises from bodily measurementsreferences for making judgments of size. As all humans experience their growing up as undergoing an increase in size, they are very perceptive to relative differences in size of all things around. Size may also be related to luxury in that an increase in size creates more freedom and opportunities, as living in a big house enables one to move freely around in a large number of spaces. However, in other cases, smallnesscan be associated with refinement, as in the experience of relatively small, technologically controlled details in a design. Whereas expressions like impressive, luxurious or coarse are most likely not only related to the size of people or things, the size schema is, at least to some degree, expected to underlie these expressions.

The ‘in back of-in front of’ schema is related to the fact that people’s bodies have inherent fronts and backs. Humans see from the front and normally move in the direction of the front faces. Places in the front will be reached in the near future, while places behind have been crossed in the past. All interactions involving movement from some place to another share the same structural features: a path on which the destination is ‘located’ in the future, and the part of the path left behind in the past. Expressions reflecting a sense of being behind or ahead, such as advanced, modern, and futuristic, are therefore presumably related to the ‘in back of-in front of’ schema. Table 3.1 shows the four image schemas and related expressions mentioned in the study of Rompay *et al.* (2005).

In the study, Rompay *et al.* predicted ratings of expressions based on the same schema to be highly correlated, and analysis partly confirmed the expected clustering of the expressions. The findings point at a schema based structuring of (product) form expression. Designed objects may indeed embody schemas, and as such manifest similarities with bodily interactions of which the schema is the resultant. By virtue of these similarities, products may be understood as expressing characteristics related to bodily experiences.

Table 3.1 Schemas and related expressions (Rompay *et al.*, 2005)

| | |
|---|---|
| Inside-outside (Container schema) | Secure<br>Safe<br>Involved<br>Agreeable<br>Emotional<br>Informal |
| Balance | Balanced<br>Trustworthy<br>Stable<br>Still<br>Lifeless |
| Size | Luxurious<br>Impressive<br>Coarse |
| In back of-in front of | Modern<br>Futuristic<br>Advanced |

**Bodily Experience**

Klemmer, Hartmann and Takayama (2006) introduce aspects of human embodied engagement in the world with the goal of inspiring new interaction design approaches and evaluations that better integrate the physical and computational worlds. Since physical bodies of people play a central role in shaping human experience in the world, understanding of the world, and interactions in the world, they draw on theories of embodiment, from psychology, sociology, and philosophy, synthesizing five themes that are particularly salient for interaction design: thinking through doing, performance, visibility, risk, and thick practice. The first, thinking through doing, describes how thought (mind) and action (body) are deeply integrated and how they co-produce learning and reasoning. The second, performance, describes the rich actions human bodies are capable of, and how physical action can be both faster and more nuanced than symbolic cognition. The first two themes primarily address individual corporeality; the next two are primarily concerned with the social affordances. Visibility describes the role of artifacts in collaboration and cooperation. Risk explores how the uncertainty and risk of physical co-presence shapes interpersonal and human-computer interactions. The final theme, thickness of practice, suggests that because the pursuit of digital

accuracy is more difficult than it might seem, embodied interaction is a more prudent path.

Rozendaal and Schifferstein (2010) investigated the varieties of pleasantness in bodily experience in order to advance the aesthetics of interaction. Respondents were asked to describe pleasant experiences for sight, audition, smell, taste, touch, action and thought. A phenomenological reduction performed on the interview transcripts resulted in seven pleasantness themes: sociality, aesthetics, comfort, agency, associations, vitality and progression. These themes in relation with their prominent clusters are shown in Table 3.2.

Table 3.2 List of pleasantness themes in relation to their prominent clusters (Rozendaal & Schifferstein, 2010)

| Theme | Main clusters |
|---|---|
| 1. Sociality | (a) Empathy, (b) Social connectedness, (c) Benevolence |
| 2. Aesthetics | (a) Variety, (b) Simplicity, (c) Harmony |
| 3. Comfort | (a) Cherishment, (b) Freshness, (c) Satiation, (d) Tranquility |
| 4. Agency | (a) Competence, (b) Autonomy, (c) Discipline |
| 5. Association | (a) Fantasy, (b) Nostalgia, (c) Recognition |
| 6. Vitality | (a) Whole, (b) Firm, (c) Energetic, (d) Sentimental |
| 7. Progression | (a) Learning, (b) Insight, (c) Challenge, (d) Discovery |

Rozendaal and Schifferstein mention that everyday experiences of pleasantness can be considered complex phenomena rooted in bodily functioning. Given a prominence of certain pleasantness themes for certain bodily faculties, it should be possible to determine the conditions that produce certain types of pleasantness. In Figure 3.5, the themes are mapped in relation to four bodily functions: sensing, feeling, thinking and doing. In this categorization, the sensing faculty provides a combination of the sensations perceived by vision, audition, smell and taste, whereas the feeling faculty mainly refers to the sense of touch. For example, the comfort and vitality themes were often mentioned in relation to touch and are, therefore, placed near feeling and the sociality theme is placed in the center of this schema since many faculties were addressed for this theme.

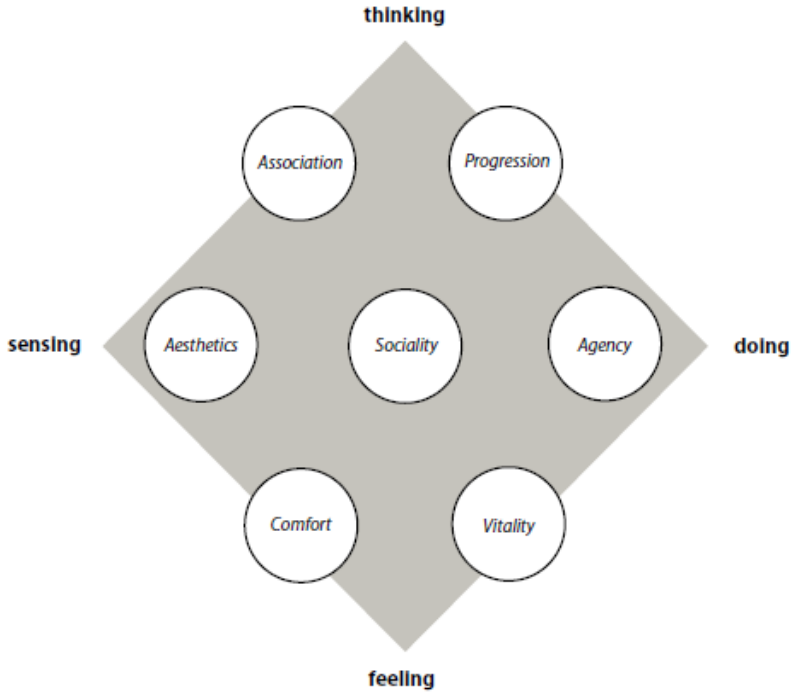



Figure 3.5 Figure showing the seven pleasantness themes mapped in relation to four bodily functions (Rozendaal & Schifferstein, 2010)

Many topics that were addressed during their studies involved pleasantness that had a social origin. This pleasantness included feelings of respect, helpfulness, pride, admiration, etc. in which many bodily faculties played a role. Social interactions involved touch, in many social encounters (handshake) as well as affective interaction (pat on the shoulder), while action captures the inherent moral dimension of behavior (helping others). This indicates that in everyday life sociality has a strong bodily impact, and has a dominant influence on perceived pleasantness and personal well being. Sensory experience was found to be another main source of pleasantness and was labeled as the aesthetics theme. Pleasantness included feelings of harmony, rhythm and elegance based upon the sensory experiences of taste and sight and audition. The association theme captures pleasantness experienced in meanings and, from a psychological perspective, relates to theories on cognitive schemata and imagination.

The role of the body in pleasantness is addressed in both the comfort and vitality theme. This involved feeling cherished and tranquil for the comfort theme and feeling alive and sentimental for the vitality theme. From a psychological perspective, the comfort theme relates to pleasantness experienced on a visceral

level caused by environmental factors. The vitality theme involves experienced pleasantness of visceral sensations in relation to the self and has both physiological and psychological constituents (Ryan & Deci, 2008; cited in Rozendaal & Schifferstein, 2010). While comfort refers to bodily feelings allowing for relaxation, vitality can be seen as a means for activation. Pleasantness in agency and progression both involve action and thought as prominent faculties. In design, agency is captured in Hassenzahl's (2004) pragmatic quality, namely the perceived aspects of a product that either support or obstruct goal attainment, but also covers personalization issues. Pleasantness for the progression theme involves situations in which individual potentials can be or have been actualized.

# CHAPTER 4

# MEASURING AND ASSESSING PERCEPTION AND UNDERSTANDING OF USERS

## 4.1 MEASURING INSTRUMENTAL QUALITY PERCEPTIONS

The Technology Acceptance Model (TAM) introduced by Davis (1989) is a theory that models how users come to accept and use a technology. The model suggests that when users are presented with a new interactive system, especially two factors influence their decision about how and when they will use it: perceived usefulness and perceived ease-of use. Perceived usefulness is defined as the degree to which a person believes that using a particular system would enhance his or her job performance. This follows from the definition of the word useful: capable of being used advantageously. Perceived ease-of-use, the other factor, is defined as the degree to which a person believes that using a particular system would be free from effort. This follows from the definition of ease: freedom from difficulty or great effort. Final measurement scales for perceived usefulness and perceived ease-of-use of Davis' studies are shown in Figure 4.1.

Additionally, several questionnaires have been developed to measure user satisfaction with focus on instrumental qualities. Three of the most common questionnaires are: the System Usability Scale (Brooke, 1996), the Questionnaire for User Interaction Satisfaction (Chin *et al.*, 1988), and the Subjective Usability Measurement Inventory (Kirakowski, 1996).

The System Usability Scale (SUS) is a simple, ten-item attitude scale giving a global view of subjective assessments of usability (Brooke, 1996). As an example, SUS Statements are shown in Table 4.1.

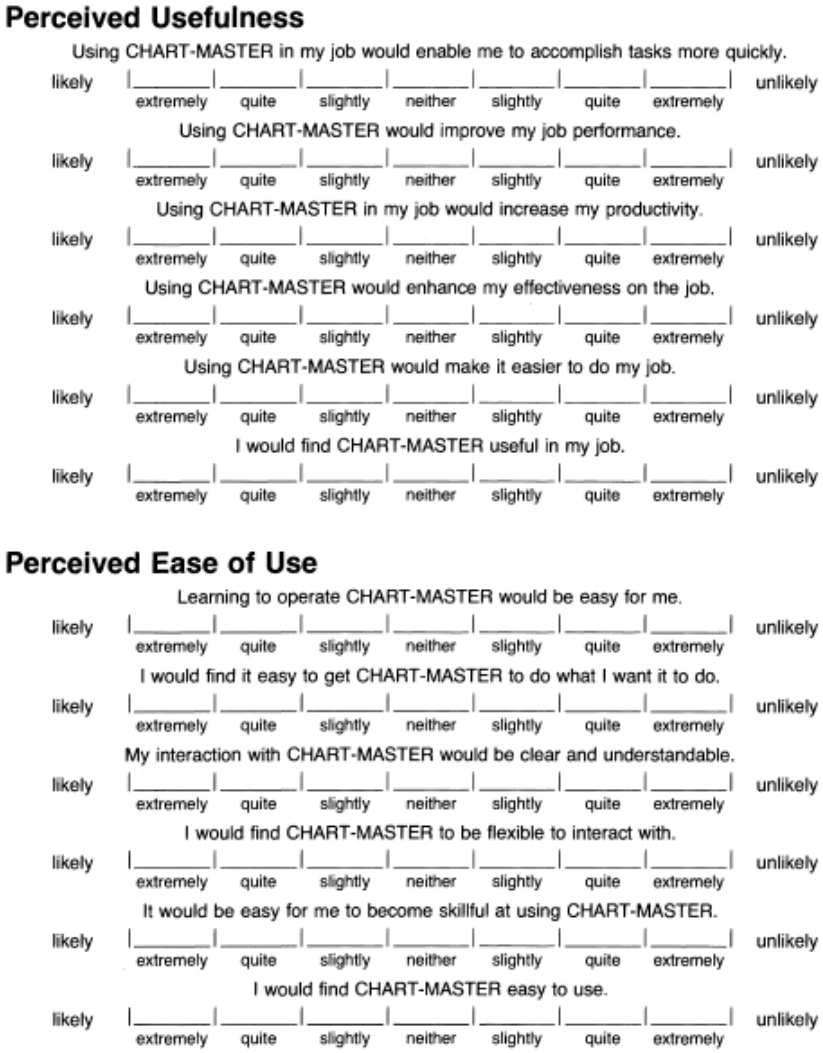



Figure 4.1 Final measurement scales for perceived usefulness and perceived ease of use (Davis, 1989)

Table 4.1 The System Usability Scale statements (Brooke, 1996)

| **Original SUS Statements** |
|---|
| I think that I would like to use this system frequently |
| I found the system unnecessarily complex |
| I thought the system was easy to use |
| I think that I would need the support of a technical person to be able to use this system |
| I found that the various functions in this system were well integrated |
| I thought that there was too much inconsistency in this system |
| I would imaging that most people would learn to use this system very quickly |
| I found the system very cumbersome to use |
| I felt very confident using the system |
| I needed to learn a lot of things before I could get going with this system |

The five subscales of Subjective Usability Measurement Inventory (SUMI) are efficiency, helpfulness, control, learnability and affect. A sixth dimension measures an overall satisfaction value. The aim of this measurement tool is to measure the perceptions and feelings of a typical user (Kirakowski, 1996). Each sub-scale consists of ten items answered according to the alternatives agree-undecided-disagree. Efficiency is a measure of the user's perception of temporal efficiency and mental workload caused by the interaction. The items cover the salience of actions, compatibility with the user's expectations, suitability to the user's tasks and the experienced length of sequences. Helpfulness refers to the perceived quality of the messages the system provides. The messages are characterized by perceived amount, salience, clarity, understandability, and usefulness of help dialogues, but also by the corresponding qualities of labeling and instructions during normal use. Control addresses the responses the product gives to the user's actions. This diverse scale ranges from perception of reliability through error handling, willingness to discover alternatives, flexibility, speed of performance, length of sequences and ease of navigation. Learnability refers to the perceived effort of learning, memorability and quality of documentation. At last, affect refers to the user's positive feelings like good, warm, happy or the opposite as a result of interacting, it is independent of operational aspects and about plain feelings.

## 4.2 MEASURING NON-INSTRUMENTAL QUALITY PERCEPTIONS

Non-instrumental qualities are defined as quality aspect of a product or a system that addresses user needs beyond efficient task accomplishment. Instrumental quality perceptions can be taken mainly according to aesthetic and symbolic aspects.

### 4.2.1 Aesthetic Aspects

Visual aspects of products have often been stated as most relevant for users' aesthetic response (Bloch, 1995). Various approaches have been used to assess the visual aesthetics of products. For example, Kleiss and Enke (1999) used 18 pairs of bipolar attributes such as "stylish-functional", "revolutionary-established", exciting-boring", to assess the visual appearance of automotive audio systems. Nonetheless, like in other approaches, some of the items also represent

instrumental and symbolic qualities. Schenkman and Jönsson (2000) used seven variables to assess visual aesthetics: complexity, legibility, order, beauty, meaningfulness, comprehension, and overall impression. However, each variable is only represented by one item and the names of the concepts seem somewhat ambiguous.

Lavie and Tractinsky (2004) present the most validated approach to the measurement of visual aesthetics in human technology interaction. They developed a questionnaire based on four empirical studies that consists of two main dimensions of visual aesthetics, which they named 'classical aesthetics' and 'expressive aesthetics'. The classical aesthetics dimension pertains to aesthetic notions that emphasize orderly and clear design, and are closely related to many of the design rules advocated by usability experts The expressive aesthetics dimension is manifested by the designers' creativity and originality and by the ability to break design conventions. To measure each of the dimensions they give a five-item scale. The dimension of classical aesthetics can be considered as one validated dimension to measure visual aesthetics in human-technology interaction. To constitute an example, items used in their study are given in Figure 4.2.

1. Admirable
2. Original[b]
3. Clean[a]
4. Pleasing
5. Sophisticated[b]
6. Breathtaking
7. Clear[a]
8. Fascinating[b]
9. Organized
10. Creative[b]
11. Enjoyable
12. Uses special effects[b]
13. Beautiful
14. Artistic
15. Skilfully designed
16. Colourful
17. Energetic
18. Modern
19. Pleasant[a]
20. Professional
21. Includes pictures
22. Symmetrical[a]
23. Challenging
24. Intriguing
25. Aesthetic

([a,b]) denote items that were retained for the final classical and expressive scales, respectively.

Usability
1. Convenient*
2. Easy orientation*
3. Satisfactory
4. Efficient
5. Easy to use*
6. Easy to navigate*
7. Confusing

Playfulness (I feel ...)
1. Spontaneous
2. Imaginative
3. Creative
4. Happiness
5. Original
6. Innovative

Pleasure (I feel ...)
1. Joyful*
2. Pleasure*
3. Gratified*
4. Satisfied
5. Relaxed

Service quality
1. The site is reliable*
2. The site provides reliable information*
3. The site makes no mistakes*
4. There are no unnecessary service delays
5. The site helps in solving users' problems

(* denotes items that were retained for the final scales)

Figure 4.2 Items used in the Study (Lavie & Tractinsky, 2004)

Haptic quality was defined as a second aspect of aesthetic quality of interactive products. Jordan (2000) introduced the concept of physio-pleasure that focuses mostly on haptic aspects of product perception. He proposed a couple of items like, the product make feel good in the hand, the buttons make feel good to touch, or the product that is comfortably carried. These recommendations can be used to measure haptic quality of interactive products.

### 4.2.2 Symbolic Aspects

Symbolic aspects represent the meanings or associations a product elicits in a user. Hassenzahl, Burmester and Koller (2003) developed an online questionnaire "AttrakDiff" that assesses three dimensions of product qualities: pragmatic (instrumental) quality, hedonic quality of stimulation and another hedonic quality of identification. Additionally, they included a measure for overall attractiveness of the product. The questionnaire is based on the user experience framework of Hassenzahl (2003), but leaves out a third hedonic quality aspect, evocation. The questionnaire uses randomly presented bipolar word pairs, such as "inviting-rejecting", "likable-disagreeable", "confusing-clear" or "exceptional-common". Multiple items are combined to one of the three quality measures.

Tractincky and Zmiri (2006) built a questionnaire assessing three dimensions: aesthetics, symbolism and usability. The scale mixes associative ("the product represents likeable things", "creates positive associations") and communicative ("the product communicates a positive message about use", "communicates desirable image", "fits personality") aspects of symbolism. To give idea about their study, factor matrix of responses to items reflecting usability, aesthetics, and symbolism is given in Figure 4.3.

| *Items* | *Factor 1* *Aesthetics* | *Factor 2* *Symbolism* | *Factor 3* *Usability* |
|---|---|---|---|
| Artistic design | .877 | .314 | -.036 |
| Creative design | .860 | .390 | -.031 |
| Admirable design | .819 | .445 | -.061 |
| Beautiful design | .727 | .462 | .129 |
| Positive message about user | .067 | .862 | .122 |
| Communicates desirable image | .433 | .828 | .069 |
| Represents likeable things | .525 | .757 | .020 |
| Creates positive associations | .319 | .747 | .282 |
| Fits personality | .423 | .743 | .113 |
| Simple design | -.747 | -.034 | .295 |
| Convenient to use | -.013 | .144 | .924 |
| Easy to learn | -.032 | .112 | .924 |
| Clear functionality | -.137 | .086 | .834 |

Figure 4.3 Rotated factor matrix of items reflecting usability, aesthetics, and symbolism (Tractincky and Zmiri, 2006)

Hassenzahl (2003) introduced the concept of hedonic quality. He distinguishes two dimensions of hedonic quality: identification and stimulation. Identification can be seen as a symbolic quality that is associated with communicative aspects. On the other hand, stimulation is described as a motivational quality aspect. The dimension of stimulation can be seen as an example of motivational qualities. He defines stimulation as the product's ability to satisfy human needs for novelty and curiosity. In his study (2004) to find out the interplay between user-perceived usability (i.e., pragmatic attributes), hedonic attributes (e.g., stimulation, identification), goodness

(i.e., satisfaction), and beauty, he applied a questionnaire consisting of twenty-one 7-point items with bipolar verbal anchors (i.e., a semantic differential, Figure 4.4).

| Scale | Original Anchors | Translated Anchors |
|---|---|---|
| Hedonic quality–identification (HQI) | | |
| HQI_1 | Isolierend—verbindend | Isolating—integrating |
| HQI_2 | Laienhaft—fachmännisch | Amateurish—professional |
| HQI_3 | Stillos—stilvoll | Gaudy—classy |
| HQI_4 | Minderwertig—wertvoll | Cheap—valuable |
| HQI_5 | Ausgrenzend—einbeziehend | Noninclusive—inclusive |
| HQI_6 | trennt mich von Leuten—bringt mich den Leuten näher | Takes me distant from people—brings me closer to people |
| HQI_7 | Nicht vorzeigbar—vorzeigbar | Unpresentable—presentable |
| Hedonic quality–stimulation (HQS) | | |
| HQS_1 | Konventionell—originell | Typical—original |
| HQS_2 | Phantasielos—kreativ | Standard—creative |
| HQS_3 | Vorsichtig—mutig | Cautious—courageous |
| HQS_4 | Konservativ—innovativ | Conservative—innovative |
| HQS_5 | Lahm—fesselnd | Lame—exciting |
| HQS_6 | Harmlos—herausfordernd | Easy—challenging |
| HQS_7 | Herkömmlich—neuartig | Commonplace—new |
| Pragmatic quality (PQ) | | |
| PQ_1 | Technisch—menschlich | Technical—human |
| PQ_2 | Kompliziert—einfach | Complicated—simple |
| PQ_3 | Unpraktisch—praktisch | Impractical—practical |
| PQ_4 | Umständlich—direkt | Cumbersome—direct |
| PQ_5 | Unberechenbar—voraussagbar | Unpredictable—predictable |
| PQ_6 | Verwirrend—übersichtlich | Confusing—clear |
| PQ_7 | Widerspenstig—handhabbar | Unruly—manageable |
| Evaluational constructs | | |
| Beauty | Hässlich—schön | Ugly—beautiful |
| Goodness | Schlecht—gut | Bad—good |

Figure 4.4 Bipolar Verbal Anchors for Each Attribute Group, Beauty, and Goodness (Hassenzahl, 2004)

## 4.3 MEASURING EMOTIONAL USER REACTIONS

To assess subjective feelings, there exist many different affect inventories: verbal descriptions of an emotion or emotional state, rating scales, standardized checklists, questionnaires or semantic and graphical differentials. Subjective ratings are based on the assumption that people to some degree are aware of their emotions and are able to describe them (Mehrabian, 1995; cited in Zimmermann, 2008).

One self-assessment technique emerged from research on the measurement of meaning is the Semantic Differential Scale by Osgood (1957). The semantic differential was developed for the investigation of the linguistic meaning of words. Osgood divided language into three main dimensions of meaning: evaluation, potency and action. On those dimensions, different simple bipolar keyword couples are placed. Individual profiles are made by asking people to rate the object of interest with those bipolar word couples on the three dimensions. The semantic differential can be adapted by using different word lists. A wide variety of questionnaires and interview techniques exist.

Lang (1980) introduced The Self-Assessment-Manikin scales (SAM) is designed to assess the dimensions of valence, arousal and dominance/control directly by means of three sets of graphical manikins for each dimension. The manikins for valence and arousal dimensions are shown in Figure 4.5. The manikins represent five states from happy to unhappy, excited to calm and controlled to control. Individuals rate their feeling either on a manikin or in the space between two manikins, which results in nine graduations per dimension.

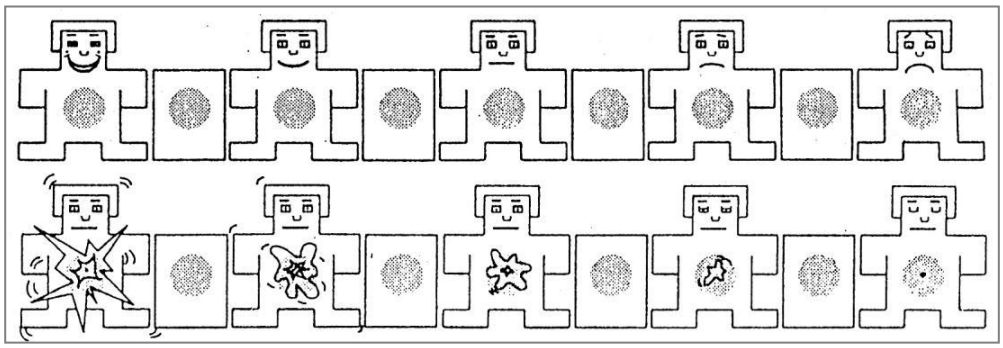


Figure 4.5 The scales valence (top) and arousal (bottom) of the Self-Assessment-Manikin (Lang, 1980)

The affect grid (Russell, Weiss, & Mendelssohn, 1989) is another semantic questionnaire to assess emotional states. It is a single scale questionnaire. It consists of a 9 x 9-matrix that is surrounded by eight adjectives describing emotions. Additionally, the adjectives are arranged by the dimensions valence and arousal, like the ones in Russell's circumplex model of emotion (Russel, 1980). Individuals

are instructed to rate their emotional state by setting a cross in one field of the matrix.

Desmet (2002) presented an extended adaptation of self assessment manikin scales (Figure 4.6). It builds on the premise that emotions elicited by product design are typically of low intensity and have a mixed character. The PrEmo tool depicts 14 animations of a cartoon character. The character expresses seven positive emotions, namely inspiration, desire, satisfaction, pleasant surprise, fascination, amusement, admiration; and seven negative emotions, namely disgust, indignancy, contempt, disappointment, dissatisfaction, boredom, and unpleasant surprise. The non-verbal assessment is supposed to reduce intercultural differences, especially those that result from semantic verbalizing of emotions.

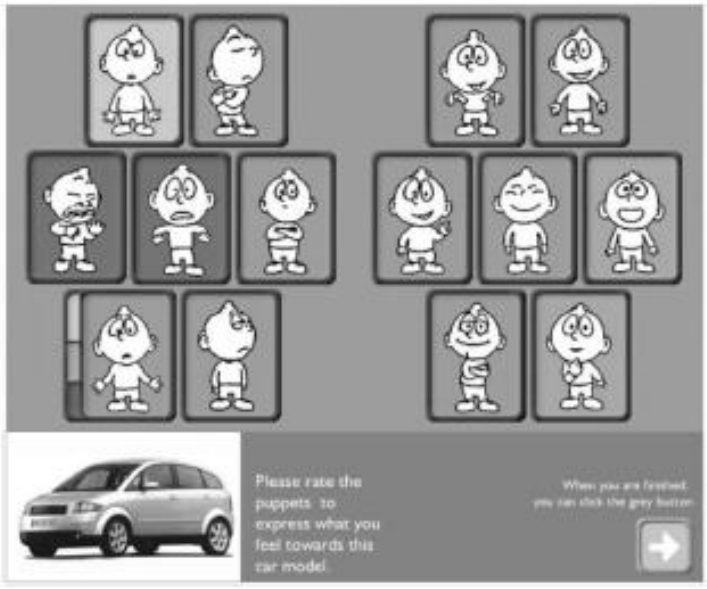



Figure 4.6 The PrEmo measurement tool (Desmet, 2002)

The majority of existing research uses some form of questionnaire to assess the emotional state of subjects. Either a verbal or a graphical differential with one or more items, or statements indicating an affective state that is rated as how much it applies to the current state of the subject. Several studies have also used open-ended questions where subjects could indicate their affective state in their own words. Data is analyzed qualitatively in these cases (Zimmermann, 2008).

# CHAPTER 5

# HUMAN FACTORS AND QUALITY RELATED STUDIES FOR AUTOMOBILE INTERIORS

At its early stage, an automobile was regarded as a means of transportation. The main interest of consumers at that time was its functionality and performance. Over the years, people are no longer only interested in cars as means of transportation; they are more and more interested in the usability aspect. Furthermore, Jordan (1998) pointed out that examining the utilitarian performance of a product was not enough, and emotional user needs are important as well. In the case of vehicle interiors, usability aspects include ease of handling, ease of use, durability, cleanability, and reachability (Karlsson, Aronsson & Svensson, 2003). As Liu (2003) states, product functionality and reliability is a basic qualifying 'ticket' for the product to enter the market, while usability and aesthetics often separate the winners and losers. It can be seen that, as the manufacturing technology becomes more developed and the market becomes more sophisticated, like many other product categories, vehicle design is experiencing a tremendous change, from function and usability to aesthetics. A vehicle must meet consumer's expectations for look, feel, comfort, and pleasure in order to be a sales success in today's marketplace.

Vehicle packaging design includes both vehicle interior and vehicle exterior designs. These two designs are related such that design decisions on one may need inputs from the other (Lin and Zhang, 2006). As exterior design is often dominated by technical constraints such as the air drag coefficient, interior design often allows designers to use more individual and aesthetically justified designs (Karlsson *et al*., 2003). Vehicle interiors consists of design objects that are exposed to the driver, including instrument cluster, steering, instrument panel, centre console, pillars, seats, windshield and roof, and disposition of instrument panel.

**Integrating Aesthetics in Vehicle Interiors**

In their study of integrating function, usability and aesthetics into design of vehicle interiors, Lin and Zhang (2006) brought together several ideas about aesthetic design as a software environment in order to advance automobile interior aesthetic design technology. They focus on aesthetic quality, which is a qualitative product attribute that is perceived by a consumer through visual inspection and comparison. It may be closely defined as the 'look' of the product (Maxfield *et al.*, 2002; cited in Lin and Zhang, 2006). Lin and Zhang use a working definition of aesthetics. Aesthetics is a discipline about pleasantness that a human can perceive while he or she interacts with his or her environments. Aesthetics is for pleasure, while usability is for comfort. Significance of aethetics to vehicle interiors is related with the impact of interiors on the behaviours of drivers in terms of handling performance, mental workload (usability or comfortableness), and feeling (pleasure).

Lin and Zhang (2006) review design processes incorporating aesthetics and evaluation techniques for aesthetic responses such as Kansei engineering, semantic environment description, fuzzy logic and propose an integrated design process model. They argue that in Kansei engineering method's approach, the design elements of functions (size, mechanical function, etc.) are directly related to feelings, while these elements are also related to functions and ergonomics. Their proposition is that a philosophy called 'design for X' should be applied, which means to design a functional product for comfort (ergonomics) and for pleasure (aesthetics). In their integrated design process model, a design entry point can be at any one of the trinity (function, usability, and aesthetics). Figure 5.1 shows three decision-making engines (F-E, function engine; U-E, usability engine; A-E, aesthetic engine) that are responsible for the design from the three aspects of function, usability, and aesthetics. The layer called coordination module is responsible for resolving inconsistent designs resulting from the three engines. In resolving conflicts, the coordination module takes the philosophy function > usability > aesthetics, indicating that function takes a higher priority to usability and similarly usability takes a higher priority to aesthetics. The aesthetic engine is developed on building-blocks and hybrid synthesis concepts. Building blocks for aesthetics are classified into shape, space, surface texture, surface, pattern, colour, lighting and contrast.

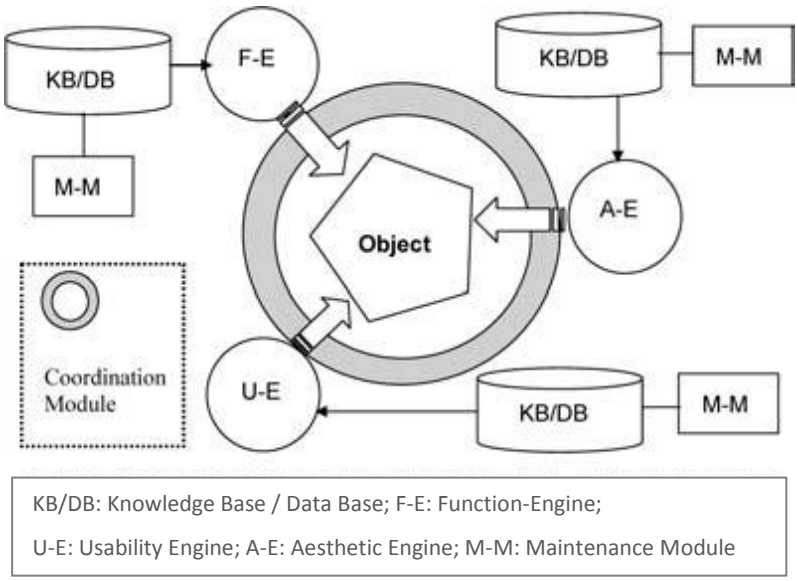



Figure 5.1 Integrated design process model (Lin and Zhang, 2006)

Leder and Carbon (2005) studied dimensions in the appreciation of car interior designs by conducting two experiments that investigate the interplay between stimulus properties and perceiver characteristics. The role of three design components, curvature, complexity and innovation, was investigated to affect design appreciation. Moreover, the specific effects of interest in art and design knowledge were investigated for the appreciation of car interior design.

Variables taken to affect aesthetic appreciation in Leder and Carbon's study are complexity, curvature and innovativeness. Variation of complexity in terms of design principles ranges from variation of physical stimulus properties to references of psychological grouping principles. The former include variation in the number of steering elements, number of colours and shapes. The latter include design principles such as symmetry and prototypicality which both affect the perceived complexity but are also known to affect aesthetic preference and cognitive appraisal of visual complexity and balance (Locher, Cornelis, Wagemans and Stappers, 2001; cited in Leder and Carbon, 2005). Expectations were that curvature would elicit higher positive emotional reactions because softer, curved shapes are more often associated with cuteness, beauty and approach, while sharp, straight designs are more related to technical, analytical and cold reactions. Innovation in design refers to unusual or indeed new aspects of design, that are unfamiliar to the perceiver. Some figures used in the experiments can be seen in Figures 5.2 and 5.3.

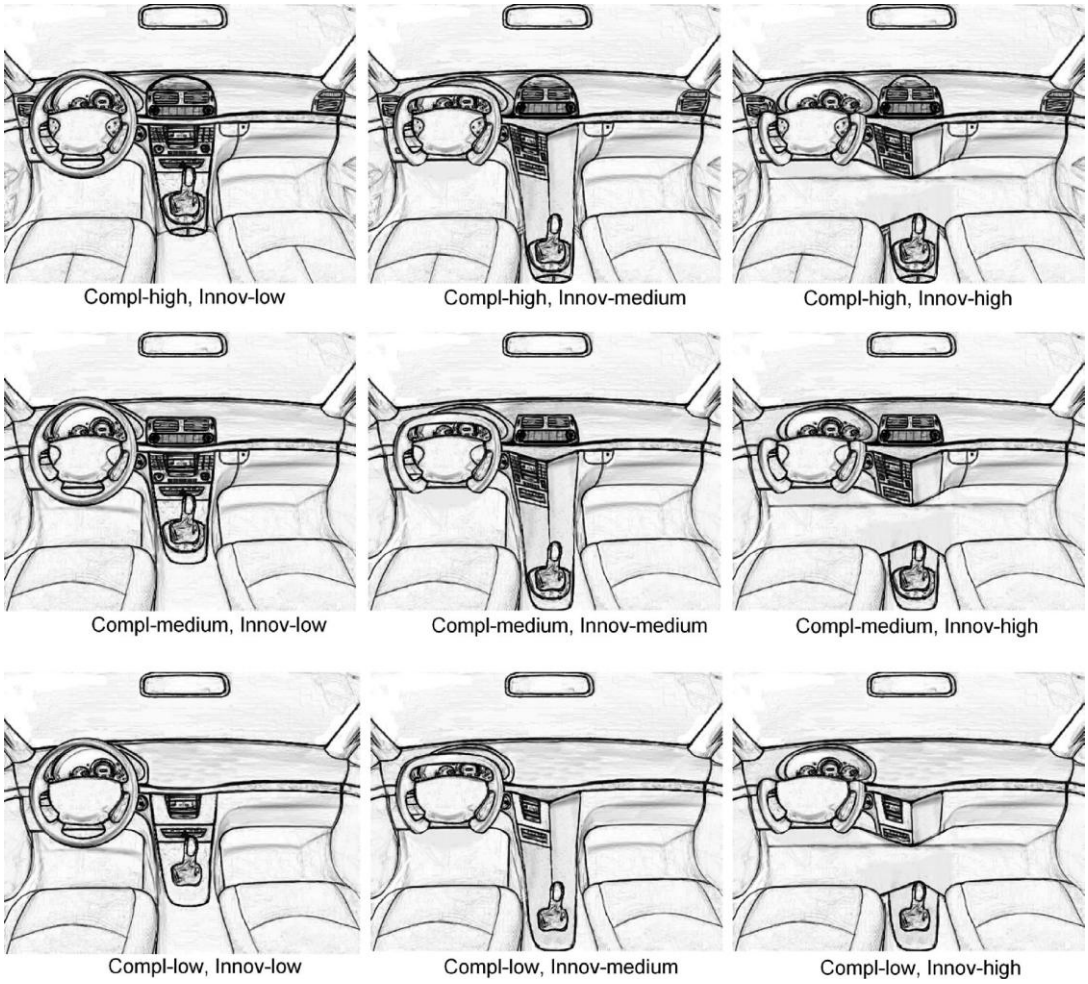



Figure 5.2 Examples of form-original stimuli used in Experiment 1. Three levels of complexity (Compl-low, Compl-medium, Compl-high), form (Form-straight, Form-original, Form-curved) and innovativeness (Innov-low, Innov-medium, Innov-high) were used. (Leder and Carbon, 2005)

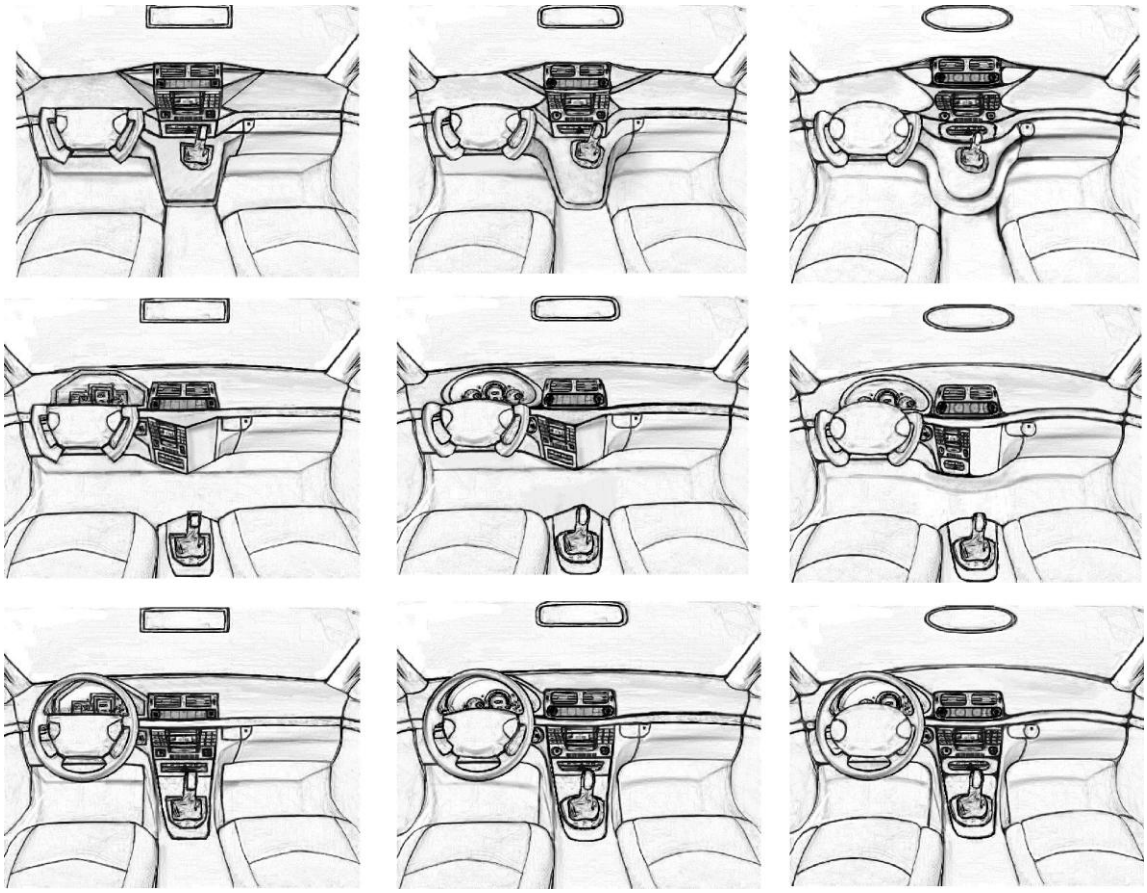


Figure 5.3 Examples of stimuli used in Experiment 2. The left column shows straight variants, the middle column shows original variants, the right column shows curved variants. From bottom to top row increasing levels of innovativeness (low, middle, high) are shown. (Leder and Carbon, 2005)

Results have shown that more curved and less innovative designs were seen as being particularly attractive. However, the effects of individual differences were much smaller than expected. Persons more interested in art and who revealed higher ratings in expertise were more sensitive to differences in curvature, and preferred curved design more than other people did, and judged innovative designs relatively faster.

**Semantic Environment Description Method in Vehicle Interiors**

In their study, Karlsson, Aronsson and Svensson (2003) use semantic environment description (SMB) method to measure the impression of a vehicle interior. Using this method, initially developed by Küller, Karlsson *et al.* measure the impression of a vehicle interior environment with eight factors: pleasantness, complexity, unity,

potency, social status, enclosedness, affection and originality. Complexity can be described as the environment's liveliness. It has to do with the amount of details in an environment. Unity is an assessment of how well the different parts seem to fit and function together (Küller, 1977; cited in Karlsson *et al*., 2003). Enclosedness is defined as the closedness and degree of demarcation of the space. It could be affected by the actual size of the car interior but also by colours and window sizes and the number of parts in the environment. Potency is the expression of strength and force. Social status is an economic and social evaluation of the environment and could be affected by many things like materials and colours. Affection is an age aspect as well as a feeling of the old and genuine. It is influenced by what is well-known to the participants. Originality is the unusual and surprising in the environment, and could be affected by colours and the participants' experiences of what is common or not common. Objects with high social status are often considered to be more original (Küller, 1975; cited in Karlsson *et al*., 2003). Pleasantness is about beauty and security which the individual experiences in the environment. It is affected by many things. It is hard to find general statements to explain and predict pleasantness. However, it can be said that the balance between complexity and unity could affect pleasantness. There should be a good balance between these two factors.

Like Kansei Engineering (Nagamachi, 1999; cited in Karlsson *et al*., 2003) and Product Semantic Analysis (Wikström, 2002; cited in Karlsson *et al*., 2003), the development and use of the SMB method includes three steps. First is the construction of semantic scales for product/environment evaluation, which includes collection of a large number of descriptive words for the product/environment, then grouping the words into categories that describe approximately the same thing, and from each category one or several words are chosen to represent the category and be used on a semantic scale in order to evaluate the product environment. Second step is the assessment with the semantic scales. Third step is the interpretation of semantic scale assessment. The SMB factors and related words are shown in Table 5.1. (Karlsson *et al.*, 2003)

Table 5.1 The SMB-factors and the included words in each factor. Adapted from Küller, 1991. (Karlsson *et al.*, 2003)

| *Factor* | *Adjective included in each factor* | |
|---|---|---|
| | positively correlated to the factor | negatively correlated to the factor |
| Pleasantness | stimulating, secure, idyllic, good, pleasant. | ugly, boring, brutal. |
| Complexity | motley, lively, composite. | subdued. |
| Unity | functional, of pure style, consistent, whole. | |
| Enclosedness | closed, demarcated. | open, airy. |
| Potency | masculine, potent. | fragile, feminine. |
| Social Status | expensive, well-kept, lavish. | simple. |
| Affection | modern, new. | timeless, aged. |
| Originality | curious, surprising, special. | ordinary. |

According to Karlsson *et al.* (2003), in car interior and driving environment it is also important to understand users' impressions from another point of view. A pleasant environment is associated with the feeling of security, which would contribute to an increase in calmness as well as to a reduction of aggressiveness (Küller, 1980; cited in Karlsson *et al*., 2003). Additionally, information rate, which is the balance between complexity and unity, affects how pleasant a person perceives an environment (Küller, 1977; cited in Karlsson *et al*., 2003). A driving environment should have an optimal information rate. It should not be over stimulating, neither should it be too monotonous. With the help of the SMB method, the overall impression of an environment can be evaluated. It can help to reveal how people assess their impression based on pleasantness and information rate.

### Kansei Engineering Method Applied to Vehicle Interiors

Kansei engineering is a method that was developed to find relationships between product experience and product properties, in order to use these properties to design products that elicit desired experiences.

The Kansei Engineering method was applied to evaluate the perception of the vehicle interior image, especially roominess and oppressiveness, by Tanoue, Ishizaka and Nagamachi (1997). In their interior image experimental investigation, the details of Kansei space 'roomy' and 'oppressive', and the feelings that they evoke, are studied and evaluated by factor analysis on a 5-level Semantic Differential scale, with the four adjective words roomy, oppressive, confined and relaxed. Their study has shown that colour and shape have a stronger influence than many other design elements. In the interior dimensional analysis, factors such as windshield rake angle, distance between head liner and hip point, and from driver to instrument cluster have turned out to be of great interest.

Jindo and Hirasago (1997) applied Kansei engineering method in evaluating the styling or design specification of passenger car interiors, especially regarding the speedometer and steering wheel of a passenger car. Quantification I method is used in Japan to examine the relationship between quantitative data and qualitative data. Two independent factors that appear to influence the static impression conveyed by automotive instrumentation are the design and a feeling of being easy to understand. According to Jindo and Hirasago, the car interior that is evaluated as ‘comfortable’ must have an ‘easy-to understand’ speedometer, not ‘oppressed’ dash pad, and ‘excellent’ seating.

**Satisfaction Models**

You, Ryu, Oh, Yun and Kim (2006) developed satisfaction models of automotive interior materials used for six parts including crash pad, steering wheel, transmission gearshift knob, audio panel, metal grain inlay, and wood grain inlay. The satisfaction models were used to identify relatively important design variables and preferred design features for the interior parts, and as a result it was found that they all varied depending on the interior part type. The obtained design variables are material type, material uniformity, hue, colour uniformity, brightness, shininess, embossing shape, embossing size, embossing distinctness, embossing density, embossing regularity, surface roughness, surface slipperiness, softness, and saturation; and different interior parts are affected by some of these design variables. It is desirable to consider both the visual (e.g., embossing shape and surface shininess) and tactile (e.g., surface roughness and softness) properties of interior materials because customer satisfaction with an interior material is determined by visual inspection as well as by touch. Additionally, they state that customers are placing high importance

on driving comfort, availability of convenience features (add-on features for convenience, such as automatic headlight on/off, anti-lockout device, and underseat storage), luxuriousness of materials, and quality of finish rather than engine power and fuel consumption rate.

**Comfort Model**

Hanson, Wienholt and Sperling (2003) describe a comfort model based on fuzzy logics, which provides the opportunity to model physical parameters from the human and the technical system together with human perceptions. They define the car interior as a complex man–machine interface, and add that poor interior design contributes to traffic accidents as well as discomfort and disorders in drivers. Car interior comfort besides safety is of great importance when designing cars, while comfort is a subjective feeling and hard to model mathematically. Keywords frequently mentioned when describing ergonomics are comfortable, pleasant as well as safe environments. In their study, drivers use such terms to define comfort experience: a well-designed seat, adjustable features, correct temperature, ease of reaching controls and pedals, enough space, low noise level as well as a vibration-free ride. Other factors, which may also affect comfort experience, are aesthetics, luminance, odour and styling aspects of the car interior.

**Safety Perception**

Dukic, Hanson, Holmqvist and Wartenberg (2005) have undertaken a research on the effect of button location on driver's safety perception. The visual time off road increased significantly as the angle increased between the normal line of sight and button location. Results for the button located close to the gear stick, with the highest eccentricity, produced a short time off road. Vehicle designers aim at designing a car that is safe and that drivers perceive as safe. Driver safety perception may depend, among other things, on the actual accident risk, the control of the vehicle and trust and understanding of the vehicle design, as well as trust in oneself as a driver and in other road users. Visibility is an important factor when designing a car cockpit and designers aim at maximizing the time during which the driver pays attention to the road, which is decisive for safe control of the car. At the same time, one tries to minimize visual attention needed for conducting secondary tasks inside the car cockpit (visual time off road), such as pushing a button in order to switch on the radio.

# CHAPTER 6

# METHODOLOGY OF THE RESEARCH

At the present day, creating successful products that people enjoy using is the big challenge for designers. So far, a primary goal of product design has been to provide useful functions and results. But now, for an amazing variety of goods, it is time to make sure that they are pleasurable as well. User centered design issues became more important for design thinking, and many researches have been conducted in order to investigate why people love some products but not the others, how people perceive product related qualities, what the perceptual characteristics of a product are, what a user's understanding of a product is, how a user experiences and uses a product, what the information communicated through a product is, what the users' wishes, needs and expectations from different products are, what the emotional responses that products elicit are, what the consequences of experiencing a product are, what the user responses to any kind of product are, and so on. All these questions are related with the ways, in which people interact with products, and try to find out the ways of designing products that result in positive responses, that are loved and preferred by the users.

In order to influence users' experiences in a desired direction by manipulating a product's expression, an understanding of people's subjective experiences that result from interacting with products, in other words, users' understanding of a product should be developed. From the literature review, it was seen that human-product interactions are shaped by the user with varied senses, capacities, personality characteristics, and concerns, and also by the properties of a product, embodying material properties, formal properties, and technology, as well as immaterial properties such as, functionality. Through interaction, people give value and meaning to the product, render it usable, and have an aesthetic or emotional experience. Furthermore, these aspects of human-product interaction are

continuously shaped and altered by the physical, social and cultural situation in which the interaction takes place. Finally, new technologies, such as new materials, connectivity and digitalisation, demand and facilitate new modes of interaction, shifting the boundaries of what products are (physical, virtual), what they offer (functionality), and how they do it (usability and experience).

To find out users' understanding about a product, many methods have been used which measure instrumental (utilitarian, pragmatic) quality perceptions, non-instrumental (non-utilitarian, hedonic) quality perceptions, and emotional user reactions. In literature, generally, questionnaires of measurement scales including many items according to specific dimensions associated with the related quality are used for measuring the perceptions of a user. Subjective assessments of users are gathered from their answers to the items of the scale according to the alternatives agree-undecided-disagree, or their ratings of many pairs of bipolar attributes related with specific dimensions of that scale. A variety of self-assessment scales are used for measuring subjective feelings in order to measure emotional user reactions. In many researches seeking answers for meanings and perceptual features, semantic differential scales are adapted by using many different word lists. From the literature review, it is seen that verbal descriptions of emotional states and perceived qualities, rating scales and semantic differentials are used frequently in user focused research.

From literature, it was shown that, perceived pragmatic and hedonic qualities, as well as emotional consequences, are important aspects and predictors of overall product quality and appeal of that product. Perceived pragmatic quality is related with utility, functionality and usability, whereas perceived hedonic quality is related with aesthetic and symbolic aspects. Pragmatic quality is about achieving behavioral goals, whereas hedonic quality is related to self well-being. Additionally, all these qualities and emotions are mostly assessed with direct verbal enquiries. Semantic differentials are used to measure people's reactions to stimulus words and concepts. They are applied either as ratings on bipolar scales defined with contrasting adjectives at each end, or as likert scales, which are response scales where respondents specify their level of agreement to a statement or term.

## 6.1 AIM OF THE RESEARCH

There are many studies related with perceived qualities and emotional consequences of human-product interactions, many of these investigate differences in perceptions and feelings for the same product range. The main aim of the research described in this chapter is to investigate differences in perceptual dimensions and emotional reactions for two different product groups: one product which involves more physicality (wholly physical product) offering an intense bodily experience, and another product which involves less physicality, offering a more virtual experience, though all the same through some physical interaction. We can talk about an imaginary axis where all designed products lie on; one end of the axis corresponds to a (wholly) physical product, whereas the other end corresponds to a (wholly) virtual product (Figure 6.1).


Figure 6.1 Imaginary Physical-Virtual Product Axis (Physicality Axis)

As the main focus of the literature review lay on automobile interiors and research conducted on interactions with their physical components and environment, for this particular research, automobiles and the iPhone are selected as two products to be compared in terms of perceptual dimensions and emotional consequences.

Automobiles are taken as an example of the wholly physical product, which offer multisensory experience. They are rich in stimulus and sensory modalities, and are perceived with the use of all senses. Additionally, they offer a spatial experience, and therefore are taken as one of the products lying on the physical end of the axis. On the other hand, iPhones are selected as an example for virtualized products, their functionality is independent of the physical properties of the product itself, and they serve for virtual experiences. They are different from mobile phones physically, they have only one control, and one specific form for the same series, and they have a tactile interface, which gives users the illusion of actually physically manipulating data with their hands (flipping through album covers, clicking links, stretching and shrinking photographs with their fingers, etc). Their success in the market can be linked to the richness of applications provided as well as the experience richness added by the illusion of physically manipulating data with the tactile interface. Perceived qualities for the virtual products are different and much more constructed when compared to physical products.

It is believed that looking at the differences in the perceptual dimensions and emotional consequences of two products close to the two ends of the physical-virtual product axis is an interesting case to investigate. It is suggested that, for products existing on the physical end, utilitarian properties are more important; these products have a primary function which is rather dominant. On the other hand, for products existing on the virtual end, it is suggested that utility loses its importance whereas pleasure and entertainment gain power; their primary function is not as dominant as for products in the physical end, and multi functionality stands out for these products.

Additionally, it is also interesting to look at the importance and contributions of bodily experience with products. It is believed that bodily experience, activating the senses, creating tactile, auditory, olfactory experiences in addition to visual experience, increases value attributed to that product, resulting in more positive consequences with that product, creating a valuable interaction between user and the product, and therefore eliciting much more affection with that product. With developing technology and improvements in electronics, more virtualized products have been produced, with more functions, but much less physicality. The bodily physical experience, and directing much more senses, enriches the interaction with a product. Automobiles are examples that people’s whole bodies interact with them. It is a valuable question

if diverging from physicality causes the product to lose credit. In this sense the iPhone is a fascinating example which has been enriched by attributing an illusion of actually physically manipulating data with users' hands, giving them somewhat an imaginary physical experience.

People interact with automobiles and iPhones on a daily basis, therefore they can be good examples for investigating interaction related issues with products. They have higher chances of becoming loved objects, and much more potential for meaning associations, because of their being used frequently in everyday life.

## 6.2 RESEARCH QUESTIONS

Questions related to this research are as follows:

- What are the differences in perceptual dimensions of the two product groups, automobiles and the iPhone, which differ according to the physicality content they involve?
    - Which words are relevant or irrelevant for the two different product groups in describing interaction with them? (Is it possible to talk about irrelevancy of some words being used in the literature for defining product related subjective evaluations, or relevancy of some words to all different product groups?)
    - What are the differences in the pragmatic and hedonic quality perceptions with these two different product groups?
    - What are the differences in the emotional content of the interaction with these two different product groups?

- How are meanings associated with the words, independent of the product groups or dependent on the product groups?

## 6.3 METHODOLOGY OF THE RESEARCH

A survey is conducted for this research, using Likert scale for the relevancy of bipolar word pairs, carried out with automobile and iPhone users. The survey asked the users, that are subjects of the research, to mark the scales in the questionnaire they, and while marking, open ended talks were carried out with them on their

answers, their perceptions and cognition about the words they evaluated. In order to prepare the bipolar word scales, firstly, words used in studies about product-user interactions in different researches in the literature, and in theses conducted in METU Department of Industrial Design have been collected and analyzed. Then, a preliminary survey was applied to gain ideas about users' understandings with the products, and gather more relevant words for the products of research, and new describing words used by users for interaction with products. The word pairs to be used in the main survey were, studied, some were eliminated and grouped. Lastly the word pairs were reviewed by two academics in the design field and a group of colleague engineers.

### 6.3.1 WORDS AND EXPRESSIONS FROM THE LITERATURE

In order to define a semantic space, many words and expressions that have been used in user related researches in the literature were collected.

The semantic spaces of pragmatic and hedonic quality perceptions (Table 6.1 and Table 6.2) are constructed from the previous studies of Davis (1989), Brooke (1996), Chin et al. (1988), Kirakowski (1996), Hassenzahl (2004), Lavie and Tractinsky (2004), Veyisoğlu (2010), Khalaj (2009), Bloch (1995), Schenkman and Jönsson (2000), Jordan (2000), Tractincky and Zmiri (2006), Mahlke (2005), Väätäjä et al. (2009), and Hassenzahl et al. (2003).

Table 6.1 Words and Expressions for Pragmatic Quality Perceptions (uneliminated)

| Words-Expressions | | Word Pairs |
|---|---|---|
| Usefulness | Understandable | Technical - Human |
| Effectiveness | Mentally stimulating | Complicated - Simple |
| Efficiency | Frustrating | Impractical - Practical |
| Understandability | Familiar commands or operations | Cumbersome - Direct |
| Reliability | Flexible | Cumbersome - Straightforward |
| Flexibility | Complex | Unpredictable - Predictable |
| Learnability | Clear functionality | Confusing - Clear |
| Helpfulness | Clear | Confusing - Clearly structured |
| Easy | Well integrated functions | Unruly - Manageable |

Table 6.1(continued)

| | | |
|---|---|---|
| Ease-of-use | Organisation of information logical | Difficult - Easy |
| Easy orientation | Adequate messages | Challenging - Effortless |
| Easy to learn | Expecting | Illogical - Logical |
| Learn to use quickly | Inconsistent | Unreliable - Reliable |
| Cumbersome to use | Speed of performance | Needs guessing - Intuitive |
| Feel confident while using | Fast enough | Useless - Useful |
| Convenient to use | Responds too slowly | Professional - Unprofessional |
| Attractive presentation | Noise | Not durable - Durable |
| Awkward | Control | |
| Economic | Affect | |

Table 6.2 Words and Expressions for Hedonic Quality Perceptions (uneliminated)

| Words | Word Pairs | |
|---|---|---|
| Aesthetic | Isolating - Integrating | Amateurish - Professional |
| Clear | Alienating - Integrating | Cheap - Valuable |
| Clean | İsolating - Connective | Cheap - Premium |
| Symmetric(al) | Rejecting - Inviting | Expensive - Cheap |
| Fascinating | Takes me distant from people - Brings me closer to people | Insignificant - Important |
| Use of special effects | Brings me closer to people - Separates me from people | Unpresentable - Presentable |
| Sophisticated | Noninclusive - Inclusive | Unconvincing - Credible |
| Artistic | Discouraging - Motivating | Raises trust - Lowers trust |
| Modern | Stimulates learning - Prevents learning | Lowers professional image - Promotes professional image |
| Intriguing | Limits creativity - Enables creativity | Contemporary - Old fashioned |
| Designed with skill | Restricts development - Offers challenges | Gaudy - Classy |
| Good feeling | Weak – Strong | Conservative - Innovative |
| Colorful | Cautious - Courageous | Inventive - Conventional |
| Energetic | Bold - Cautious | Typical - Original |
| Enjoyable | Dull - Captivating | Not original - Original |
| Organized | Dull - Interesting | Standard - Creative |

Table 6.2 (continued)

| | | |
|---|---|---|
| Admiration | Not interesting - Interesting | Unimaginative - Creative |
| Admirable | Good - bad | Common - Exclusive |
| Simple | Unpleasant - Pleasant | Commonplace - New |
| Impressive | Pleasant – Irritating | Extraordinary - Normal |
| Positive message about user | Repelling - Appealing | Novel - Ordinary |
| Communicates desirable image | Unattractive - Attractive | Undemanding - Challenging |
| Represents likeable things | Ugly - Attractive | Easy - Challenging |
| Creates positive associations | Likeable - Disagreeable | Restricting - Inspiring |
| Fits personality | Stylish - Tacky | Frustrating - Exciting |
| | Not stylish - Stylish | Exciting - Boring |
| | Beautiful - Ugly | Lame - Exciting |
| | Serious - Relaxed | Funny - Lame |

The semantic space of emotional reactions (Table 6.3) is constructed from the previous studies of Desmet (2003), Crilly et al. (2004), Cila (2008), and Karahanoğlu (2008).

Table 6.3 Words and Expressions for Emotional Reactions (uneliminated)

| | |
|---|---|
| Admiration/Awe (fascination, wonder) | Happiness (cheerfulness, delight, enjoyment) |
| Amusement (humor, playfulness) | Hatred |
| Anger (furious, madness, resentment) | Hope (optimism) |
| Anxiety (nervous, worried) | Humility |
| Being touched | Interest/Enthusiasm |
| Boredom | Irritation (annoyance) |
| Compassion (empathy, pity) | Jealousy |
| Contempt | Joy (elation, exhilaration) |
| Contentment (satisfaction) | Lust |
| Desire | Nostalgia |
| Desperation (hopeless) | Pride |
| Disappointment (disenchantment, frustration) | Pleasure |

Table 6.3 (continued)

| | |
|---|---|
| Disgust (aversion, detest, dislike, loath) | Relaxation/Serenity (peacefulness, tranquility) |
| Dissatisfaction | Relief |
| Distress | Sadness (grief, melancholy, sorrow) |
| Envy | Shame (embarrassment, humiliation) |
| Fear (afraid, fright, panic) | Satisfaction |
| Gratitude (thankfulness) | Surprise (amazement, astonishment) |
| Guilt (blame) | Tension/Stress (discomfort) |

### 6.3.2 PRELIMINARY SURVEY

An interview containing open ended questions was designed and applied in order to gather opinions of automobile and mobile phone users for describing their interaction with their products (Appendices A.1 & A.2). The survey questions were designed in order to cover as many aspects as possible related with interaction issues, ranging from purpose of use, frequency of use and ease of use, to satisfying and pleasurable aspects of usage. Mobile phone users were not constrained to iPhone users, in order to gather a more general understanding of mobile phones, and to see if there is an obvious difference in perceptions regarding iPhones. The survey was conducted at two automobile showrooms and three electronic markets, with individuals looking for new automobiles and mobile phones. But in electronic markets, no iPhone users were encountered, therefore iPhone users were found from among circle of friends.

Twenty-one automobile users participated in the study, including eight females and 13 males. They were between 23 and 56 years old (M=34.5, SD=10.7). 16 of them were university graduates, five of them were holding master degrees. Most of them were driving every day regularly, only three of them were driving two or three days a week. They had an average of 11 years (SD=9.7) of driving experience.

Twenty-two mobile phone users participated in the study, including seven females and 15 males. Four of them were iPhone users. All the participants were between 20 and 40 years old (M=29.4, SD=6.5). Three of them were high school graduates, 16 of them were university graduates, and three of them were holding master degrees. All of them were using mobile phones every day, between 15 minutes and

2 hours, but iPhone users answered for continuous usage, at any moment. They had an average of 11 years (SD=2) of experience with mobile phones, whereas average of two years of experience with iPhones.

**Results and Analysis of Preliminary Survey:**

Each participants' answers to the survey questions were investigated by sentence and keywords were picked and listed to be used as the basis for analysis. Since the study was carried out in Turkish, all keywords were translated into English. The keywords to each question were content analyzed and grouped under three main subject headings: pragmatic qualities, hedonic qualities, and emotions. Synonymous keywords were defined with the use of the one expression which was mostly used. All keywords were listed with the numerical data of how many participants mentioned them in order to find out the hierarchy between them. After analyzing answers to each question separately, the keywords from all questions were gathered together in order to create a pool of expressions used by the participants. Table 6.4 shows the keywords within a hierarchy according to how many times those were mentioned by participants.

Table 6.4 Words and Expressions from Preliminary Survey

| Automobile Survey | | Mobile Phone Survey | |
|---|---|---|---|
| speedy, fast, high acceleration response, reckless | 41 | dimensions, small, huge, compact, large, slim design, thin | 45 |
| robust, not breaks down easily, durable, not creates problems | 39 | easy to use, comfort of use, ease of use, useful, user friendly | 40 |
| reliable, secure, safety, confidence, safe travel | 38 | listening music, music player, video features, photography, television, radio | 34 |
| comfortable, driving comfort, driver comfort, comfortable seat | 37 | robust, robustness, durable, not breaks down, unbreakable, durable to water | 32 |
| economical, economic fuel consumption, fuel consumption rate | 33 | high quality, average quality | 29 |
| high quality, manufacturing quality, material quality, workmanship quality, quality of the interior | 31 | easy access, easy usage, easy to understand menu, easy call, ease of access to functions | 26 |
| air conditioner, digital air conditioner, with air conditioner | 25 | elegant, plain, simple appearance, aesthetics, elegant appearance | 26 |

Table 6.4 (continued)

| | | | |
|---|---|---|---|
| seat adjustments, driver seat comfort, leather seat, soft seat, heated seat | 23 | pleasant appearance, pleasant form, exterior appearance, pleasing | 24 |
| elegant, aesthetic, plain, sporty, beautiful appearance, beautiful design, presentable | 22 | internet, internet surfing, access to internet | 22 |
| gear, automatic gear, comfortable gear, easiness of gear, manual gear | 21 | communication, calling, communicate with lovings | 21 |
| features related with security: air bags, ASR, ESP, ABS, NCAP tests etc. | 20 | long lasting battery, durable battery, long battery life | 20 |
| technology, high technology, new technology, technologic structure | 19 | screen, touch screen, large screen, resolution of screem | 19 |
| steering wheel, comfortable steering wheel, light steering wheel, soft steering wheel | 19 | menu, easily understood menu, easy to use menu | 19 |
| easy to use, makes life easier, ease, ease of use, ease of driving | 17 | satisfactory, perfect, like it, beautiful | 18 |
| colour, black is royal, dark colours, bright colours, shining, striking, more colourful | 16 | speedy, fast, speed access, fast processor, connection speed, unbelievable speed | 17 |
| ergonomics, ergonomic seat design | 14 | entertainment, games, applications, playing games | 16 |
| powerful, power, powerful engine | 14 | technology, high technology, superior technology, easy technology, new tech. | 15 |
| indispensable, cannot do without it, freedom, addiction, feeling of freedom | 13 | button, button dimension, easy to use buttons | 15 |
| excitement, adrenalin, attractive, peace, cheerful | 12 | comfortable use, ease, comfort | 15 |
| quiet, cabin insulation, noise isolation | 12 | addiction, cannot do without it, necessity | 12 |
| largeness, interior roominess, dashboard design, relief, relief interior space | 11 | shining, shiny, aesthetics surface, smooth surface, bright colour, dull surface , black | 12 |
| performance, high performance, driving performance | 11 | dangerous, radiation, harmful, beneficial | 11 |
| music system, cd/mp3 player, beautiful music system | 11 | gratification, satisfaction | 11 |
| curved design, sharp lines, like an egg | 8 | light, lightness, light structure | 11 |
| show off, prestige, charisma, imposing | 7 | functional, practical | 10 |
| road handling, road holding, high road handling | 7 | reliable, unreliable | 9 |
| gratification, satisfaction, happiness | 5 | ergonomics, ergonomic | 8 |
| pleasurable, pleasure drive, pleasure | 5 | | |

### 6.3.3 MAIN RESEARCH

**Content of the survey:**

For the empirical study, a survey using Likert scale was constructed with the bipolar word pairs gathered from the literature review and finalised by the help of the preliminary survey results, according to the hierarchy of the resulting expressions. Some new words resulting from the preliminary survey and found meaningful for the context were also added to the final word pairs list. Expressions having very close meanings were eliminated in order to reduce the number of pairs to create a moderate applicable list. Since the survey was conducted in Turkish, words and expressions from the literature were translated into Turkish, with the help of theses conducted in METU Department of Industrial Design in case they covered the same words. Other than the bipolar word pairs that were gathered from the literature, additional bipolar pairs were constructed from some of the singular words and expressions.

The Likert scale used in the survey is about the relevancy of bipolar word pairs, consisting of five levels of agreement to the relevancy of word pairs and the research object. One end of the scale corresponds to extreme relevancy, whereas the other end corresponds to total irrelevancy. The word pairs (103 pairs in total), have been grouped into three main parts which are:

- pragmatic qualities (Table A1: word pairs related to function, Table A2: word pairs related to usability),
- hedonic qualities (Table B1: word pairs related to symbolism, Table B2: word pairs related to aesthetics),
- emotional reactions (Table C: word pairs related to emotional reactions) .

The bipolar word pairs' English and corresponding Turkish versions can be found in Appendix B.1.

Additionally, the survey included an introductory part for demographic information and an open ended question that asks users to define their automobile/iPhone and their experience with them. The aim of this question is to find out words or expressions (phrases) that are found most relevant for the two different product groups. In addition, after every main word pair groups, a blank chart was given in case the user wanted to add a new word pair that was not available in the chart but

he/she found relevant. The same lists of word pairs were graded by the respondents: automobile and iPhone users. The questionnaires can be seen at Appendix B (B.2 and B.3 Turkish versions, B.4 and B.5 English versions).

Additionally, two sets of the same questionnaires (for automobile and iPhone users) were prepared, where the order of the word pairs within the same groups was varied. This was done to reduce the error margin that could be caused because of the inattentiveness of the respondents while proceeding, and the effect of order of word pairs onto the resulting scores, all for providing more homogenous and objective resulting scores.

**Sampling of participants:**

Sixty individuals (30 automobile users, 30 iPhone users) participated in the study. Since the research is about collecting ideas of users about their products and experiences, it was necessary to find subjects having substantial amount of experience with the related product, and using the product above average. Additionally, the survey required time for participants to fill in the questionnaire and to talk about their cognition processes. Therefore sampling group was constructed from among people having close or distant relationships with the author (Table 6.5 and Table 6.6).

It was preferred to have a face-to-face interview with the participants while filling the questionnaire, but for the cases this could not be possible, the questionnaire was sent to the participant via e-mail, and a telephone interview was done while the subject was seeing the questionnaire from his/her computer screen (Table 6.5 and Table 6.6).

For the automobile survey, 17 of the respondents were male, while 13 of the respondents were female. The average age of the respondents was 34.9 (SD=9.1). And the respondents had an average of 12.9 (SD=8.2) years of driving experience. For the iPhone survey, 16 of the respondents were male, while 14 of the respondents were female. The average age of the respondents was 33.2 (SD=6.6). And the respondents had an average of 1.5 (SD=0.8) years of experience with iPhones.

Table 6.5 Information on Participants of Automobile User Survey

| NO | AGE | GENDER | PROFESSION | INCOME | SURVEY METHOD | QUESTIONNAIRE SET |
|---|---|---|---|---|---|---|
| 1 | 44 | male | health official | 1000-2000 TL | face to face | 1.set |
| 2 | 44 | male | laboratory technician | 1000-2000 TL | face to face | 1.set |
| 3 | 36 | female | environmental engineer | 4500- TL | with telephone | 1.set |
| 4 | 40 | male | environmental engineer | 4500- TL | with telephone | 1.set |
| 5 | 30 | male | government officer | 3000-4500 TL | face to face | 1.set |
| 6 | 38 | male | laboratory technician | 2000-3000 TL | face to face | 1.set |
| 7 | 40 | male | laboratory technician | 1000-2000 TL | face to face | 1.set |
| 8 | 45 | female | electronic engineer | 2000-3000 TL | with telephone | 2.set |
| 9 | 23 | male | mechanical engineer | 1000 TL | face to face | 2.set |
| 10 | 24 | male | civil engineer | 1000 TL | face to face | 2.set |
| 11 | 45 | male | petroleum engineer | 4500- TL | face to face | 2.set |
| 12 | 50 | male | teacher | 2000-3000 TL | face to face | 2.set |
| 13 | 26 | female | auditor | 1000-2000 TL | face to face | 2.set |
| 14 | 26 | female | lawyer | 2000-3000 TL | face to face | 2.set |
| 15 | 48 | male | business manager | 4500- TL | face to face | 2.set |
| 16 | 21 | male | university student | - | face to face | 2.set |
| 17 | 28 | male | government officer | 2000-3000 TL | face to face | 2.set |
| 18 | 25 | female | geneticist | 1000 TL | face to face | 1.set |
| 19 | 45 | female | biologist | 2000-3000 TL | face to face | 1.set |
| 20 | 41 | female | house wife | - | with telephone | 2.set |
| 21 | 45 | female | retired banking staff | 1000-2000 TL | with telephone | 2.set |
| 22 | 36 | female | economist | 4500- TL | with telephone | 1.set |
| 23 | 26 | female | aircraft engineer | 2000-3000 TL | with telephone | 1.set |
| 24 | 27 | female | sales marketing | 2000-3000 TL | with telephone | 2.set |
| 25 | 29 | female | industrial engineer | 2000-3000 TL | face to face | 2.set |
| 26 | 26 | male | electronic engineer | 3000-4500 TL | face to face | 1.set |
| 27 | 50 | female | retired teacher | 1000-2000 TL | with telephone | 1.set |
| 28 | 32 | male | electronic engineer | 3000-4500 TL | with telephone | 1.set |
| 29 | 28 | male | lawyer | 1000-2000 TL | with telephone | 1.set |
| 30 | 30 | male | mechanical engineer | 3000-4500 TL | with telephone | 2.set |

Table 6.6 Information on Participants of iPhone User Survey

| NO | AGE | GENDER | PROFESSION | INCOME | SURVEY METHOD | QUESTIONNAIRE SET |
|---|---|---|---|---|---|---|
| 1 | 30 | female | nurse | 1000-2000 TL | face to face | 1.set |
| 2 | 42 | female | financial controller | 4500- TL | face to face | 1.set |
| 3 | 45 | male | petroleum engineer | 4500- TL | face to face | 1.set |
| 4 | 24 | male | civil engineer | 1000 TL | face to face | 2.set |

Table 6.6 (continued)

| | | | | | | |
|---|---|---|---|---|---|---|
| 5 | 41 | male | mechanical engineer | 4500- TL | with telephone | 1.set |
| 6 | 36 | female | economist | 4500- TL | with telephone | 2.set |
| 7 | 42 | male | machine technician | 1000-2000 TL | face to face | 1.set |
| 8 | 21 | male | university student | | face to face | 2.set |
| 9 | 30 | male | architect | 3000-4500 TL | face to face | 2.set |
| 10 | 35 | male | tradesman | 4500- TL | face to face | 2.set |
| 11 | 28 | male | architect | 1000-2000 TL | face to face | 2.set |
| 12 | 29 | male | advertising | 1000-2000 TL | face to face | 1.set |
| 13 | 27 | female | professional coaching | 3000-4500 TL | with telephone | 1.set |
| 14 | 50 | male | doctor | 4500- TL | with telephone | 1.set |
| 15 | 35 | female | nurse | 2000-3000 TL | with telephone | 1.set |
| 16 | 39 | female | geology engineer | 1000-2000 TL | with telephone | 1.set |
| 17 | 27 | female | lawyer | 2000-3000 TL | with telephone | 2.set |
| 18 | 32 | female | manager assistant | 1000-2000 TL | with telephone | 1.set |
| 19 | 29 | female | government officer | 3000-4500 TL | with telephone | 2.set |
| 20 | 27 | male | research assistant | 2000-3000 TL | with telephone | 2.set |
| 21 | 27 | male | trainer | 2000-3000 TL | with telephone | 2.set |
| 22 | 30 | male | mechanical engineer | 3000-4500 TL | face to face | 1.set |
| 23 | 34 | male | mechanical engineer | 4500- TL | face to face | 1.set |
| 24 | 33 | female | academics | 3000-4500 TL | with telephone | 1.set |
| 25 | 35 | female | human res. specialist | 3000-4500 TL | face to face | 2.set |
| 26 | 41 | male | business manager | 4500- TL | with telephone | 2.set |
| 27 | 34 | female | journalist | 2000-3000 TL | with telephone | 1.set |
| 28 | 29 | male | mechanical engineer | 3000-4500 TL | face to face | 2.set |
| 29 | 28 | female | public relations | 2000-3000 TL | with telephone | 2.set |
| 30 | 35 | female | pharmacist | 3000-4500 TL | face to face | 2.set |

**Method of application:**

Participants were required to fill the Likert scales in the questionnaire. They were requested to answer the question: How much are the word pairs relevant in connoting your automobile/iPhone and your experience with your automobile/iPhone. In order to answer the question, participants filled the Likert scales, that have “Extremely Relevant” on one end and “Totally Irrelevant” on the other end, for many different bipolar word pairs such as “Durable-Nondurable”, “Easy to use-Difficult to use”, “Exciting-Calm”, “Pleasant-Unpleasant”, “Gratification-Disappointment”. While participants were filling the questionnaire, interview was done with them on their answers, their perceptions and cognition processes related to the words they were answering. Some points of the dialogues were written down,

but for respondents open to talking, their voices were recorded for further research. It was impossible to talk on every word pairs' associated meanings because that would require an unreasonable time, and it was thought that the participants wouldn't be able to give the same attention to the following word pairs. Also, it is very difficult to talk about the cognition processes of all 103 word pairs one after another. Therefore, talking processes about their ratings to the scales were improvised according to the subject's mode and attitude. Duration of one respondent's completion of the survey differed from 20 minutes up to 1 hour respectively; average duration being about 45 minutes.

### 6.3.4 EVALUATION METHODOLOGY

Responses to the agreement levels of the subjects to the relevancy of specific word pairs and the related product groups were tabulated and assessments were done based on the constructed tables. Responses to the Likert scale elements have been multiplied by different numbers in order to reflect their weights to the resulting tables. The scale elements "extremely relevant" was multiplied by five (5) point, "much relevant" by four (4) point, "moderately relevant" by three (3) point, "slightly relevant" by two (2) point, and "totally irrelevant" by one (1) point while transferred to the tables.

After tabulating the result scores, firstly, mean average points and standard deviations for each word pair and word pair group were computed for automobiles and iPhones independently (Appendices C.1 & C.2). Then,

- for each of the two different product groups, the mean averages of word pair groups were compared,
- for each of the two different product groups, the irrelevant and relevant word pairs were decided according to the mean average and standard deviation results,
- the mean averages of word pair groups for automobiles and iPhones were compared with each other,
- the irrelevant and relevant word pairs of each product group were compared with each other, according to the relevancy-irrelevancy levels.

From the interview notes, and voice recordings, meanings associated with specific word pairs were collected and classified. Pairs that show a significant variance in the associated meanings were identified.

Finally, respondents' comments on the open-ended question for defining their product and experience were classified. Word pairs that respondents added on the blank charts were collected and classified.

## 6.4 RESULTS AND DISCUSSIONS

### 6.4.1 AUTOMOBILE SURVEY

#### 6.4.1.1 Relevancy and Irrelevancy of All Word Pairs

The mean average of all 103 word pairs' average scores was calculated as 3.52 point, with 60 word pairs standing above this mean (Appendix D.1). The score 3.00 connotes to "moderately relevant" word pairs, whereas point 4.00 to "much relevant" word pairs. It can be said that all the word pairs used in the study were found to be above *moderately relevant* to automobiles and automobile related experiences in average. Since the word pairs ranged from functional, usability issues to social values, personality characteristics and emotional reactions, the reasonably high average mean of all pairs can be explained by people's associations with automobiles; since they find them as an indispensible, necessary part of their everyday lives, people are not only interested in the utility function, they integrate automobiles with their personality, life styles, and the like.

In order to investigate the word pairs that are found mostly relevant for describing automobiles and automobile related experiences, first the pairs that are above the mean "3.52" were gathered and tabulated hierarchically. These pairs with the most relevant at the top, with decreasing relevancy levels, can be found in Table 6.7. We can argue about associated meanings with the word pairs, looking at their standard deviation scores, whether they create nearly same cognition processes for most of the participants, or their cognition differs significantly according to the participant. Also, with the help of standard deviation scores, we can decide on the consistency

of a word pair's score. Analyzing mean values with the standard deviation scores, the most relevant and consistent word pairs can be decided upon.

Table 6.7 Relevant word pairs for the case: automobile, with their means and standard deviations (deviations above mean are underlined)

| | ***Word Pairs*** | ***M*** | ***s.d.*** | ***Belonging Group*** |
|---|---|---|---|---|
| **1** | Safe-Dangerous | 4,80 | 0,61 | pragmatic quality |
| **2** | Reliable-Unreliable | 4,77 | 0,43 | pragmatic quality |
| **3** | Robust-Easily breaking down | 4,77 | 0,50 | pragmatic quality |
| **4** | Economical-Wasteful | 4,70 | 0,65 | pragmatic quality |
| **5** | Modern-Classic | 4,67 | 0,61 | hedonic quality |
| **6** | Comfortable-Uncomfortable | 4,63 | 0,56 | pragmatic quality |
| **7** | Quiet-Noisy | 4,57 | 0,63 | hedonic quality |
| **8** | High quality-Poor quality | 4,57 | 0,68 | pragmatic quality |
| **9** | High performance-Low performance | 4,53 | 0,82 | pragmatic quality |
| **10** | Aesthetic-Not aesthetic | 4,50 | 0,68 | hedonic quality |
| **11** | Luxurious-Modest | 4,33 | 0,76 | hedonic quality |
| **12** | Perfect manufacturing-Careless manufacturing | 4,33 | 0,84 | pragmatic quality |
| **13** | High class-Low class | 4,30 | 0,84 | hedonic quality |
| **14** | High technology-Low technology | 4,30 | 0,92 | pragmatic quality |
| **15** | Speedy-Slow | 4,30 | 0,99 | pragmatic quality |
| **16** | Relief-Distress | 4,27 | 1,01 | emotional reaction |
| **17** | Useful-Useless | 4,23 | 0,90 | pragmatic quality |
| **18** | Pleasant-Unpleasant | 4,23 | 0,94 | hedonic quality |
| **19** | Original-Ordinary | 4,23 | 1,04 | hedonic quality |
| **20** | Freedom-Addiction | 4,23 | 1,14 | emotional reaction |
| **21** | Sufficient functions-Insufficient functions | 4,20 | 0,61 | pragmatic quality |
| **22** | Confidence-Anxiety | 4,20 | 1,06 | emotional reaction |
| **23** | Contentment-Discontent | 4,20 | 1,10 | emotional reaction |
| **24** | Ease-Uneasiness | 4,17 | 0,99 | emotional reaction |
| **25** | Ergonomic-Not suitable to body dimensions | 4,17 | 1,21 | pragmatic quality |
| **26** | Proud-Humble | 4,13 | 0,78 | hedonic quality |
| **27** | Pleasure-Displeasure | 4,13 | 0,94 | emotional reaction |
| **28** | Beneficial-Ineffectual | 4,10 | 1,24 | pragmatic quality |
| **29** | Pleasurable-Tasteless | 4,07 | 0,91 | hedonic quality |
| **30** | Merry-Joyless | 4,07 | 1,17 | hedonic quality |
| **31** | Gratification-Disappointment | 4,03 | 1,22 | emotional reaction |
| **32** | Valuable-Cheap | 4,00 | 1,14 | hedonic quality |
| **33** | Light-Heavy | 3,97 | 1,03 | pragmatic quality |
| **34** | Creative-Standard | 3,97 | 1,10 | hedonic quality |
| **35** | Young-Old | 3,97 | 1,19 | hedonic quality |
| **36** | Prestigious-Not prestigious | 3,93 | 0,98 | hedonic quality |
| **37** | Entertainment-Boredom | 3,93 | 1,08 | emotional reaction |
| **38** | Efficient-Inefficient | 3,90 | 1,03 | pragmatic quality |
| **39** | Desire-Unwillingness | 3,90 | 1,06 | emotional reaction |
| **40** | Satisfaction-Dissatisfaction | 3,90 | 1,21 | emotional reaction |
| **41** | Powerful-Weak | 3,87 | 1,25 | pragmatic quality |
| **42** | Easy to use-Difficult to use | 3,87 | 1,17 | pragmatic quality |
| **43** | Innovative-Imitative | 3,87 | 1,11 | hedonic quality |
| **44** | Interest-Disinterest | 3,87 | 1,11 | emotional reaction |
| **45** | Practical-Impractical | 3,83 | 1,18 | pragmatic quality |
| **46** | Functional-Not functional | 3,77 | 1,22 | pragmatic quality |
| **47** | Manageable-Unruly | 3,77 | 1,25 | pragmatic quality |
| **48** | Charismatic-Unimpressive | 3,70 | 1,18 | hedonic quality |

Table 6.7 (continued)

| | | | | |
|---|---|---|---|---|
| **49** | Shiny-Dull | 3,67 | 1,18 | hedonic quality |
| **50** | Feminine-Masculine | 3,63 | 1,33 | hedonic quality |
| **51** | Heartwarming-Depressing | 3,63 | 1,13 | hedonic quality |
| **52** | Durable-Nondurable | 3,63 | 1,19 | pragmatic quality |
| **53** | Attraction-Disgust | 3,63 | 1,22 | emotional reaction |
| **54** | Stylish-Styleless | 3,63 | 1,27 | hedonic quality |
| **55** | Happiness-Unhappiness | 3,63 | 1,27 | emotional reaction |
| **56** | Compact-Large | 3,63 | 1,33 | hedonic quality |
| **57** | Attractive-Repulsive | 3,57 | 1,17 | hedonic quality |
| **58** | Elegant-Sloppy | 3,53 | 1,07 | hedonic quality |
| **59** | Sympathetic-Antipathic | 3,53 | 1,14 | hedonic quality |
| **60** | Simple-Complex | 3,53 | 1,43 | pragmatic quality |

**Word pairs with a score above 4.50: Extremely relevant word pairs**

Analyzing Table 6.7, the first ten pairs are found to be the *extremely* relevant pairs in the automobile case because of their scores above 4.50, and their relatively less standard deviations indicate that majority of the participants agree on their extreme relevancy in connoting automobiles and experiences with automobiles. Most of these pairs belong to pragmatic qualities, whereas the remaining three belong to hedonic qualities. At this point, it should be noted that the word pair “Quiet-Noisy” was grouped in the symbolism part of hedonic qualities, by relating these words to personality characteristics while designing the questionnaire. However, during the survey, the participants of automobile users associated this word pair to pragmatic qualities, with the noise of the engine and cabin insulation issues; they mentioned the noise difference of gasoline and diesel engines. Therefore, in the analysis of the top 10 relevant word pairs, “Quiet-Noisy” can be taken as belonging to pragmatic qualities, and conclude talking about the predominance of pragmatic qualities for the pairs that are found *extremely* relevant for automobiles (Figure 6.2).

It was an expected result to see rather pragmatic qualities in the *extremely* relevant word pairs group to automobile and automobile related experiences. First of all, apart from product categories, mostly people tend to explain their preferences accordingly logical reasons, and talk about the importance of utilitarian issues. Additionally, automobiles are basically means of transportation, they have a dominant instrumental function, and secondary functions are behind this utilitarian aspect. As they are used in traffic conditions, driving activity has close relationship with human life. People take precautions to accidents by improving their driving skills and also by giving importance to security issues related with the automobile

itself. Therefore, seeing the three word pairs “Safe-Dangerous”, “Reliable-Unreliable”, and “Robust-Easily breaking down” respectively on the top of all word pairs, is a reasonable result, and highlights the importance of security issues for the automobile case.

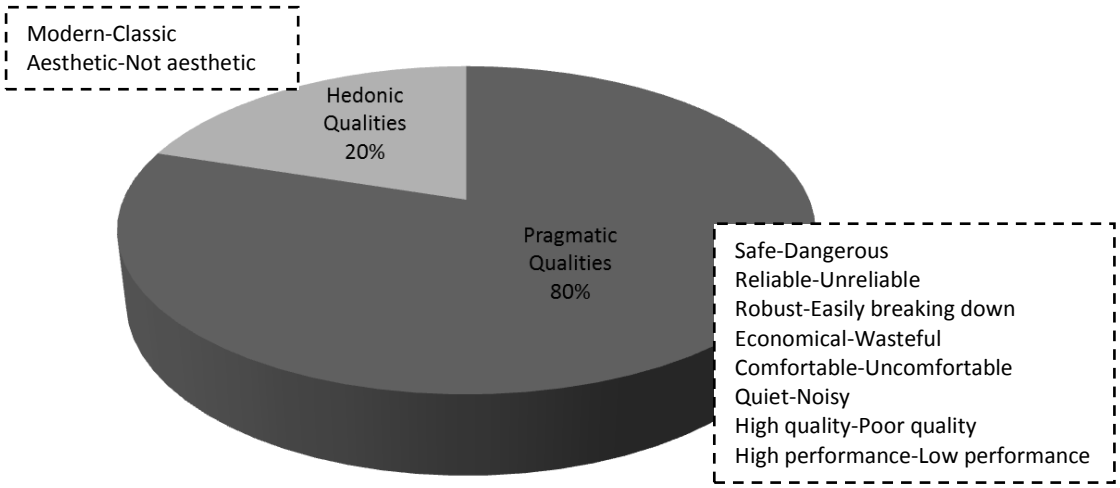



Figure 6.2 Extremely relevant word pairs for automobiles and related experiences

Economy with automobiles is mostly associated with fuel consumption rate and related expenses. After security and robustness issues, economy comes into consideration. Since people do not want to misspend their money on fuel, manufacturers have studied this issue; diesel engines, and automobiles with lower fuel consumption rates were developed and come to the market in recent years. Economy concept was found very connotative for automobile case, namely respondents have given meanings related to economy to many other words in the questionnaire. For example, “submissive” was explained with an automobile whose cost is not an inconvenience to its owner, “boredom” was associated with automobile related expenses, one respondent said that he will get angry when automobile runs on expenses, and so on.

The concept of comfort turned out to be a term mainly associated with automobiles; when the automobile was mentioned, the word “comfort” seemed to be the first that came to mind (Figure 6.5). Respondents found *the state of* being comfortable mostly related with automobile seats, interior roominess, air conditioner, automatic gear, sunroof, electrical windows, dampers and suspension. Besides, “Quiet-Noisy” word

pair was also associated with comfort; all respondents emphasized the importance of cabin insulation and noise of the engine, in order to have a comfortable journey.

Quality was mostly associated with life safety, which reemphasizes the meaningfulness of safety issues for automobile case. All the material quality, workmanship quality, equipment quality, and robustness are found significant for security by the respondents and were thought to be the basic components of quality concept. Additionally, brand, performance, and functions were found related to quality. Interestingly, one respondent mentioned the importance of odour for automobiles, and added that, for the interior of automobiles, firstly odour is perceived, then the front console's appearance and tactile properties of seats come respectively. He told that, once, he found an automobile's interior of low quality because of the poor plastic smell of the interior material.

Like the comfort concept, which is mainly associated with automobiles, it was mentioned that the concept of performance is also primarily related to automobiles. High performance was associated with engine power and speed. Most participants talked on feeling better with automobiles having high performances.

Additionally, the hedonic word pairs that were found *extremely* relevant are "Modern-Classic" and "Aesthetic-Not Aesthetic" respectively, for the automobile case. Since, according to their designs, styles and models, automobiles are classified as being modern or classic. Nobody argued over the irrelevancy of this word pair, and some respondents found the "Contemporary-Traditional" word pair also with the same meaning for the automobile case. It was mentioned that it is an individual preference and pleasure to prefer modern or classic ones. One remarkable point for this word pair is that, some people mentioned their preferences about the classical-traditional circular indicators, and big manual controls for adjusting air conditioner or radio, rather than digital ones, however modern the automobile is. Furthermore, aesthetics was associated with external appearance and interior design, and mostly taken as visual appeal. Almost all respondents talked about the importance of aesthetic appealingness and visuality on their preferences about automobiles. Some mentioned an individual liking of round organic lines and associated style of design with their aesthetical sensation.

**Word pairs with a score between 4.00 and 4.50: More than much relevant word pairs**

From Table 6.7, it is seen that 22 word pairs' scores stand between 4.00 and 4.50. These can be thought of as the *more than much relevant* word pairs for the automobile case. The average of standard deviations of all word pairs was found to be 1.19 point for the automobile survey (Appendix D.1). For this group, only three (3) word pairs' standard deviations are above the average; the relatively less standard deviations of the other word pairs indicate that majority of the participants agree on their relevancy level and connoted meanings. Additionally, for this group of word pairs, nearly a uniform distribution of pragmatic qualities, hedonic qualities and emotional reactions can be seen (Figure 6.3), which indicates that pragmatic qualities lose importance as we descend the relevancy list.

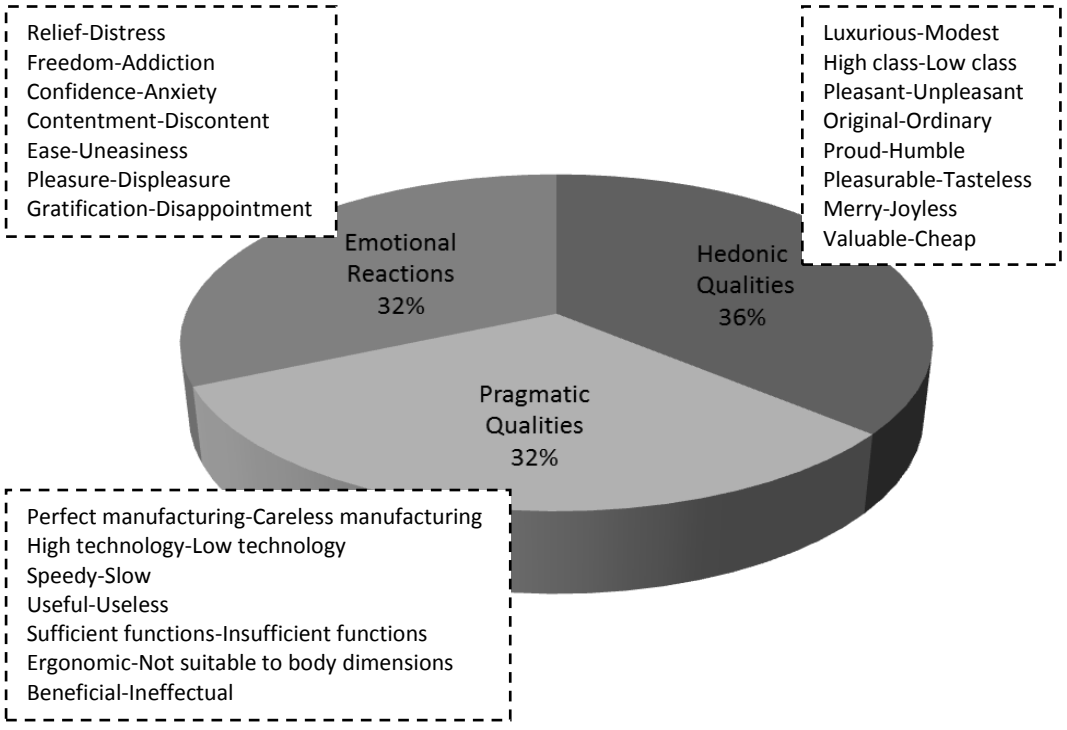



Figure 6.3 More than much relevant word pairs to automobiles and related experiences

Starting with pragmatic qualities, "Perfect manufacturing-Careless manufacturing" word pair was mostly associated with life safety and security issues, robustness and failure rate, whereas some subjects thought about appearance and quality;

“careless manufacturing can be understood by looking at the serigraphy” says one respondent. High technology was found related to safety, engine power and speed concepts respectively. While “Speedy-Slow” word pair was directly associated with automobiles, its’ relatively low average score in comparison with extremely relevant ones is dependent on some respondents’ low points with their saying that automobile’s speed is not much important for them and security comes first.

Usefulness connoted many different meanings from ease of using, comfort and ease provided by usage, to the usefulness of interior elements and accessories, or to the usefulness of small cars for city usage because of their easiness in parking situations, or to the suitability for large family usage. “Sufficient functions-Insufficient functions” pair was criticized by a statement which says that automobiles have one defined function of being robust and providing safe transportation, and all automobiles provide this function. Hence, sufficient functions are associated with interior elements’ functions, availability of interior compartments for keeping stuff, or how the engine is compatible with the automobile’s features.

The word pair “Ergonomic-Not suitable to body dimensions” has a relatively high standard deviation. This can be explained by some respondents’ incomprehension of the word “ergonomic”. But others have given much importance to this concept for the automobile case, and mentioned many different connotations. Most of participants associated ergonomics with seats, and some with the dimensions of the interior space. Subjects talked about size differences of automobiles which will be suitable for a little person or a fat and tall person. Ease of use, adjustments of seats and steering wheels, interior compartments for bags, keys and the like, and arm rests are all mentioned related to this word pair. Likewise, “Beneficial-Ineffectual” word pair has a relatively high standard deviation, because of different ideas about efficacy concept. Some subjects said that benefit of an automobile cannot be argued, its main purpose of automobiles is benefit, without question. But others talked about benefits of interior elements like airbags, or benefits of automobiles to their everyday life.

Looking at hedonic qualities that are found *more than much relevant*, “Luxurious-Modest” and “High class-Low class” come respectively on the top of the group. Subjects found luxuriousness associated with automobile classification, accordingly their equipment and price. For high-low class pair, participants talked on

classification of automobiles according to style, model, brand, price, and also on the social distinction of the users. It was argued that the class of an automobile shows the social class and income level of its user at the same time. Jeeps were found high class, and their impracticability in city life was criticized, their usage was found for show purposes only. These two word pairs belonging to hedonic qualities are related to symbolism. The other symbolism related word pairs in this group are “Proud-Humble” and “Valuable-Cheap”, which most participants found related to a person’s value and flourish in a social context. It was declared that automobiles add show off to people in society, and it would be absurd to see a general manager coming out of a small humble automobile. “Valuable-Cheap” pair was associated with price and luxuriousness of the automobile, namely with tangible value of the automobile. Some respondents expressed opinions on the consistency of the value of an automobile and value of its user. On the other hand, some subjects have taken value in an intangible context, and value of automobiles was related with the convenience provided by automobiles into living conditions. All hedonic word pairs mentioned in this paragraph can be taken in relation to identification, and individuals’ tendency to express their selves through automobiles they possess. A final remark is that, value related issues are important for automobiles, because of their connotations with the value and status of their owners in the society.

The other remaining hedonic word pairs in *more than much relevant* pairs group are “Pleasant-Unpleasant”, “Original-Ordinary”, “Pleasurable-Tasteless”, and “Merry-Joyless”. Pleasantness was mostly associated with aesthetics of appearance, and interior design. Originality connoted different understandings from originality of repair parts, and manufacturing, to novelty in design ideas, and features that cannot be found in other automobiles. “Pleasurable-Tasteless” pair was mostly associated with aesthetics of appearance and design, and also with the interior, whereas few subjects talked about pleasure of usage. “Merry-Joyless” pair was mainly associated with use, and driving comfort.

Lastly, emotional reactions found *more than much relevant* for automobiles and related experiences will be discussed. Seeing “Relief-Distress” as the first emotional reaction word pair for the automobile context is reasonable because it is well known that spatial experiences elicit relief and distress emotions. These emotions are related with the interior space, roominess and oppressiveness. Respondents mentioned the importance of roomy interior for comfortable driving. Bright colours in

interior design, seats and dashboard, wide windows, and sunroof are all to be found elements of a brighter interior. Many subjects emphasized user preferences for a comfortable, roomy interior.

“Freedom-Addiction” word pair comes next for the elicited emotions by automobiles. Freedom is highly associated with driving and automobiles, expressions of absolute freedom, unlimited freedom are highlighted especially. Automobiles transport one to wherever they want at any time, is the freedom motto of automobiles, told by many different respondents one after another. Automobiles are freedom because they take one to locations unreachable by mass transportation, and one can drive night and day, every time. Addiction to automobiles was mentioned by sayings like “you cannot do without it”, “my indispensable”, etc. Addiction to the easiness provided by automobiles, addiction to models and brands, are different explanations to addiction.

It is an expected result to see “Confidence-Anxiety” emotion pair taking place near the top, considering the importance of security related issues, which have been discussed previously. Confidence is associated with automobile safety, robustness, availability of many airbags, and hugeness of the interior for families. In addition, there are respondents who talked about confidence of possessing an automobile, knowing that they can go wherever and whenever they want in case of an emergency. Some subjects mentioned about feeling confident or anxious in relation to their driving skills and automobiles’ security in compelling traffic conditions.

“Contentment-Discontent” and “Gratification-Disappointment” are emotions of those having much the same meaning for every product group; they are about fulfilling the needs of users. This state was also emphasized by the respondents. One subject described gratification with “efficiency and comfort over price” for the automobile context. These emotions seem to have no associations unique to automobiles, but because of their meaningfulness in every kind of product-user interaction, they deserve high scores.

“Ease-Uneasiness” emotion pair comes next, which is about comfort provided by automobiles. Comfort, as mentioned before, has very close relationship with automobile concept, and can be thought of as one of the connotations of the word automobile. Feelings of ease and comfort are associated with seats, performance, security, and driving, whereas uneasiness with traffic. Finally, the emotion pair

"Pleasure-Displeasure" comes, which was mostly found related to driving experience. Almost all respondents talked about the pleasure of driving activity.

**Word pairs with a score between 3.50 and 4.00: Much relevant word pairs**

Table 6.7 shows 28 word pairs standing between points 3.50 and 4.00, which can be described as the *much relevant* word pairs for the automobile case. For this group, 12 word pairs' standard deviations are above the average (1.19), in other words nearly half of the word pairs of this group have high deviations, and the remaining also have relatively high deviations in comparison with the previous groups. Descending the relevancy list shows increases in standard deviations, indicating that majority of the participants do not agree on the pairs' relevancy levels or connoted meanings. In addition, for this group of word pairs, nearly half of the pairs belong to hedonic qualities (Figure 6.4), which indicates that hedonic qualities gain importance, while pragmatic qualities lose, descending the relevancy list.

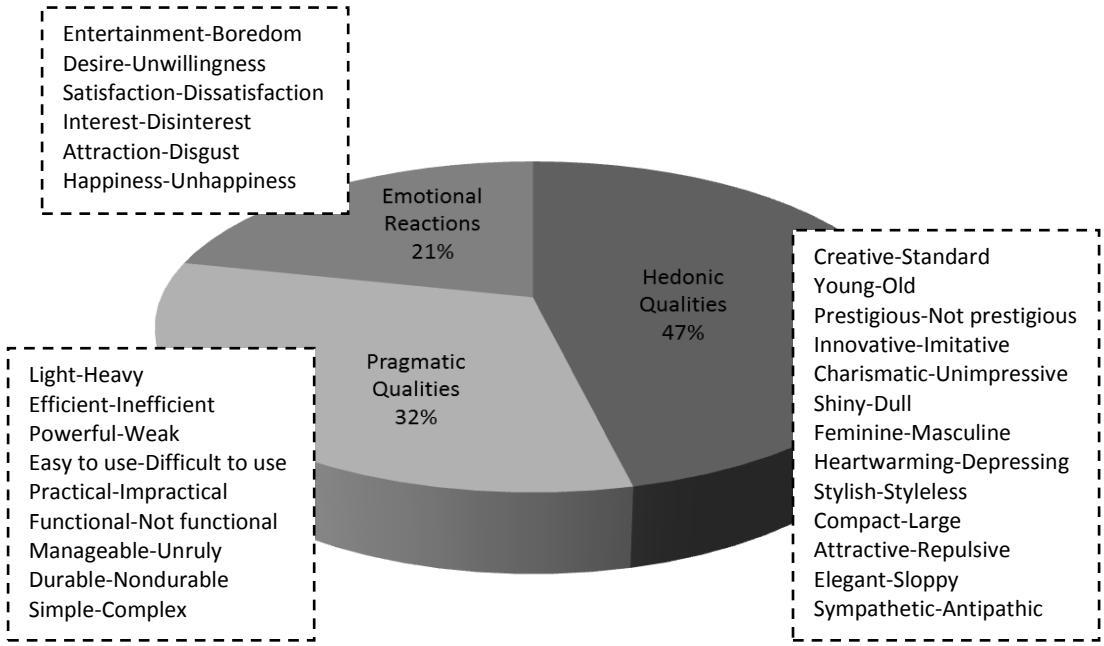



Figure 6.4 Much relevant word pairs to automobiles and related experiences

Some remarkable points related to *much relevant* word pairs are as follows. "Light-Heavy" word pair was associated with total weight of the automobile, and also with usage of the steering wheel. According to the participants, weight of the car is

important because it affects the stability, drift, speed, security, and fuel consumption. Regarding the “Efficient-Inefficient” word pair, efficiency was associated with fuel consumption economy and engine, while some subjects talked about practicality provided by automobiles for everyday life. For the “Powerful-Weak” word pair, power was mostly associated with engine power and performance, rarely with vehicle body’s robustness in case of an accident, whereas some respondents mentioned about feeling powerful while driving. “Easy to use-Difficult to use” word pair was associated with automatic gear, hydraulic steering wheel, and secondary function controls, while some subjects criticized this word pair saying that the use of all automobiles would be very similar.

For the “Practical-Impractical” word pair, practicality was associated with dashboard, layout and accessibility of the controls, and easy parking. For the “Functional-Not functional” word pair, functionality was associated with interior elements. As for the “Manageable-Unruly” word pair, manageability was associated with pedals, steering wheel, gear, ease of use, and establishing overall control of the vehicle. “Durable-Nondurable” was associated with the expected driving life of an automobile, while some subjects argued that automobiles should not be used after a reasonable time; or life of an automobile is not mainly related to the automobile itself, it is related to how the owner looks after his automobile. “Simple-Complex” pair was mostly associated with the simplicity and clearness of indicators, controls and dashboard; subjects highlighted the importance of simplicity of the interior for attention, but some subjects associated simplicity with aesthetics, visual design and appearance.

Hedonic qualities are very dominant for this group of word pairs, and some points related to them should be mentioned. Creativity (“Creative-Standard”) and innovativeness (Innovative-Imitative) were associated with new design ideas, technology, equipment, novel features, and so on. Some brands and models have been found imitative. Prestige (Prestigious-Not prestigious) and charisma (“Charismatic-Unimpressive”) are associated with social identities, added value and status by automobiles to their owners. “Young-Old” pair was associated with age and kilometers of the vehicle, while differences of design preferences of the young and old users were also discussed. “Shiny-Dull” pair was associated with colour and paint of the vehicle. “Feminine-Masculine” pair was given importance, and many respondents stated ideas about. They discussed differences in the preferences of female and male users in the design, dimensions, colour and style of automobiles.

In general, it was mentioned that females prefer rather small and circular designs, while males prefer rather big and sharper designs. Automobiles have sexuality depending upon their models. “Heartwarming-Depressing” pair was associated with roominess and relief of the interior, accordingly colour of the furnishings, window openness, etc. Style (“Stylish-Styleless”) was associated with automobile’s personality, while attractiveness (“Attractive-Repulsive”), elegance (“Elegant-Sloppy”) and sympathy (“Sympathetic-Antipathic”) with mostly appearance and aesthetics. Lastly, “Compact-Large” pair was criticized for traffic conditions, parking, male-female preference differences, and family usage.

Lastly, emotional reactions related word pairs for the *much relevant* word pair group will be looked over. “Entertainment-Boredom” was associated with entertainment of driving and boredom of traffic conditions or breakdown of automobiles. For “Desire-Unwillingness” and “Interest-Disinterest” word pairs, desire and interest was associated with driving, and for these, importance of traffic and city conditions were emphasized. Also interest was associated with maintenance and needs of automobiles. “Satisfaction-Dissatisfaction” pair was thought with fulfilling user needs, besides speed, efficiency, power and performance. “Attraction-Disgust” word pair was associated with drivers, or for people who see automobiles as living creatures. Happiness (“Happiness-Unhappiness”) was an emotion for driving the liked, beautiful automobile, or activities performed over automobiles, like going on a holiday, and the like.

#### 6.4.1.2 Specified words and expressions collected in the beginning of the survey

At the beginning of the study, before the respondents went through the word pair lists, they were asked to describe their automobiles and their experiences with their automobiles. Respondents’ answers to this open ended question show great consistency with the resulting word pairs’ relevancy levels. Answers are classified, grouped, and hierarchy between mentioned concepts has been identified (Figure 6.5).

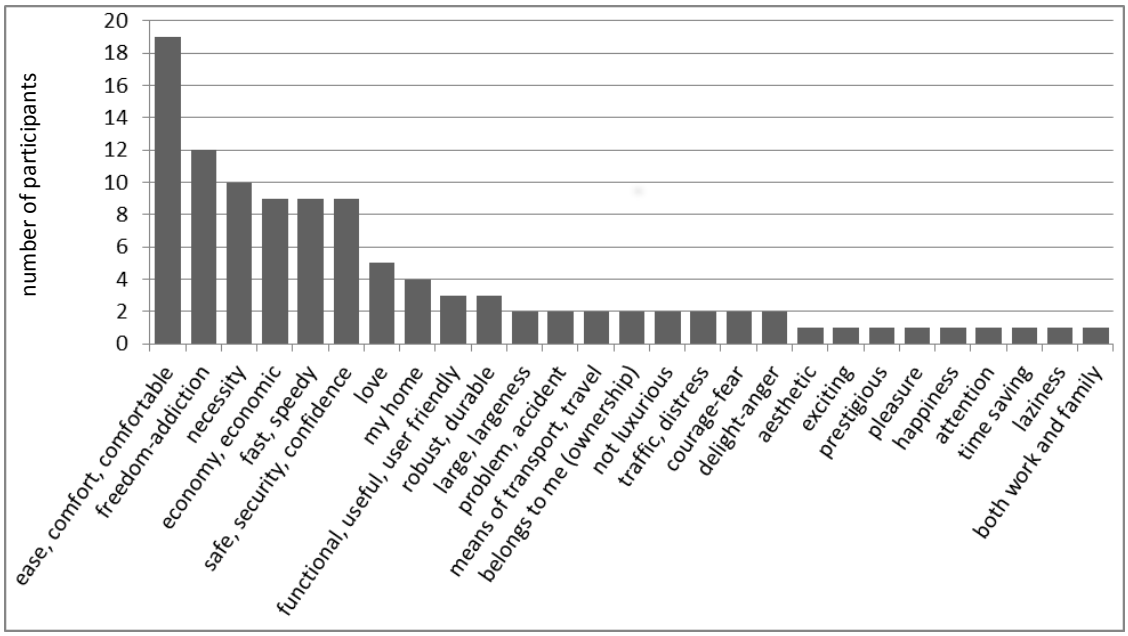



Figure 6.5 Words used to describe automobiles and experiences with automobiles

Comfort and easiness related concerns have the highest score, more than half of the participants talked about these. Automobiles are seen as providing ease to daily life, about transportation and time saving; they are means of transporting people to wherever they want and whenever, and many subjects define this situation as comfort. Following, freedom, addiction, and necessity concepts come respectively, those are also related to automobiles' benefit of transporting everywhere at any time. Just as economy and security related word pairs have been found extremely relevant in the previous analysis described above, these words also have high scores in this part. Speed, robustness, largeness are also emphasized by the respondents. People mentioned their empathy and emotional bond to their automobiles, and defined expressions like "my home", "my love", "my boy" in order to explain their relations. Hedonic quality related words like aesthetics, exciting, and prestigious; feelings and emotions like courage, fear, delight, anger, pleasure, and happiness are all specified by the respondents in order to define their automobiles and experiences.

### 6.4.1.3 Specified word and expression pairs given by respondents in the blank tables

Respondents have commented on the largeness of quantity of word pairs in the survey, and generally expressed that they do not want to add anything. A total of 10 respondents added words and expressions to the blank charts, seven of them added to the table after pragmatic qualities, one after hedonic qualities and two to the last blank table. Majority of the respondents have not given attention to the grouping of the word pairs, and meanings of the groups, therefore the used blank tables are not consistent with the meanings of the added words or expressions. The added expression pairs are about specific concerns, only a few pairs are more generalized adjectives. Added expressions and word pairs are as follows:

More generalized word pairs:

| |
|---|
| cool - uncool |
| wild - domestic |
| eye-pleasing - unsightly |
| peaceful - peaceless |
| personalizable - non personalizable |

Expression pairs that are related to size, baggage and interior compartments:

| |
|---|
| large baggage - small baggage |
| baggage taking lots of objects - baggage taking only a few objects |
| one-man vehicle - multi-personal vehicle (for extended family) |
| small that can easily parked - huge that has difficulty in parking |
| including secret compartments for stuff - not including stuff compartments |

Expression pairs that are related to performance and some features of automobiles:

| |
|---|
| high acceleration response - low acceleration response |
| drives up a hill without difficulty - drives up a hill with difficulty |
| having auto cruise control - not having auto cruise control |
| automatic gear - manual gear |
| having park sensor - not having parking sensor |

### 6.4.2 IPHONE SURVEY

#### 6.4.2.2 Relevancy and Irrelevancy of All Word Pairs

The mean average for all 103 word pairs was calculated as 3.31, with 54 word pairs standing above this mean (Appendix D.2). The score 3.00 connotes to “moderately relevant” word pairs, whereas 4.00 to “much relevant” word pairs. Looking at the overall mean average of 3.31 for the iPhone case, it can be said that all the word pairs used in the study were found more than *moderately relevant* to iPhones and iPhone related experiences in average. Since the word pairs ranged from functionality, usability issues to social values, personality characteristics and emotional reactions, the *more than moderate* average mean of all pairs’ relevancy can be explained by people’s associations with their iPhones, the importance and meaningful place of iPhones in their users’ lives.

For automobiles, the overall mean was calculated as 3.52, which is slightly higher in value, but there is not a remarkable difference between the overall means of automobile and iPhone surveys. This result can be ascribed to the meaning that the two different products have for their users; these products have an important part in the lives of their users.

In order to investigate the word pairs that are found mostly relevant for describing iPhones and iPhone related experiences, first the pairs that are above the mean 3.31 were gathered and tabulated hierarchically. These pairs can be found in Table 6.8 in order of relevancy scores. Associated meanings with the word pairs and the consistency of the word pairs will be discussed with the help of their standard deviation scores, whether they create nearly same cognition processes for most of the participants, or their cognition differs significantly according to the participant. The average of standard deviations of all word pairs is 1.22 (Appendix D.2), and word pairs having deviations above this mean are underlined in Table 6.8.

Table 6.8 Relevant word pairs for the case: iPhone, with their means and standard deviations (deviations above mean are underlined)

| | ***Word Pairs*** | ***M*** | ***s.d.*** | ***Belonging Group*** |
|---|---|---|---|---|
| **1** | High technology-Low technology | 4,77 | 0,50 | pragmatic quality |
| **2** | Sufficient functions-Insufficient functions | 4,73 | 0,52 | pragmatic quality |
| **3** | Useful-Useless | 4,73 | 0,58 | pragmatic quality |
| **4** | Easy to use-Difficult to use | 4,70 | 0,60 | pragmatic quality |
| **5** | Functional-Not functional | 4,60 | 0,56 | pragmatic quality |
| **6** | Practical-Impractical | 4,60 | 0,72 | pragmatic quality |
| **7** | Aesthetic-Not aesthetic | 4,50 | 0,63 | hedonic quality |
| **8** | High performance-Low performance | 4,37 | 0,85 | pragmatic quality |
| **9** | Entertainment-Boredom | 4,37 | 0,89 | emotional reaction |
| **10** | Innovative-Imitative | 4,37 | 1,03 | hedonic quality |
| **11** | Speedy-Slow | 4,33 | 0,88 | pragmatic quality |
| **12** | Creative-Standard | 4,33 | 0,99 | hedonic quality |
| **13** | Modern-Classic | 4,30 | 0,99 | hedonic quality |
| **14** | Original-Ordinary | 4,30 | 1,02 | hedonic quality |
| **15** | Pleasant-Unpleasant | 4,27 | 0,74 | hedonic quality |
| **16** | Robust-Easily breaking down | 4,23 | 0,90 | pragmatic quality |
| **17** | High quality-Poor quality | 4,23 | 0,94 | pragmatic quality |
| **18** | Beneficial-Ineffectual | 4,23 | 1,07 | pragmatic quality |
| **19** | Elegant-Sloppy | 4,17 | 1,05 | hedonic quality |
| **20** | Pleasurable-Tasteless | 4,13 | 1,07 | hedonic quality |
| **21** | Easily understood-Challenging | 4,10 | 1,06 | pragmatic quality |
| **22** | Satisfaction-Dissatisfaction | 4,07 | 1,14 | emotional reaction |
| **23** | Durable-Nondurable | 4,07 | 1,17 | pragmatic quality |
| **24** | Artistic-Functional | 4,07 | 1,28 | hedonic quality |
| **25** | Gratification-Disappointment | 4,03 | 1,25 | emotional reaction |
| **26** | Perfect manufacturing-Careless manufacturing | 4,00 | 0,95 | pragmatic quality |
| **27** | Admirable-The common run | 3,97 | 1,07 | hedonic quality |
| **28** | Professional-Amateurish | 3,97 | 1,16 | pragmatic quality |
| **29** | Merry-Joyless | 3,97 | 1,33 | hedonic quality |
| **30** | Futuristic-Nostalgic | 3,90 | 1,32 | hedonic quality |
| **31** | In fashion-Out of fashion | 3,87 | 1,38 | hedonic quality |
| **32** | Stylish-Styleless | 3,87 | 1,43 | hedonic quality |
| **33** | Freedom-Addiction | 3,87 | 1,50 | emotional reaction |
| **34** | Luxurious-Modest | 3,83 | 0,99 | hedonic quality |
| **35** | Interesting-Boring | 3,83 | 1,23 | hedonic quality |
| **36** | Simple-Complex | 3,80 | 1,06 | pragmatic quality |
| **37** | Ergonomic-Not suitable to body dimensions | 3,80 | 1,19 | pragmatic quality |
| **38** | Attraction-Disgust | 3,77 | 1,01 | emotional reaction |
| **39** | Proud-Humble | 3,70 | 1,15 | hedonic quality |
| **40** | Contemporary-Traditional | 3,70 | 1,37 | hedonic quality |
| **41** | Charismatic-Unimpressive | 3,63 | 1,16 | hedonic quality |
| **42** | Prestigious-Not prestigious | 3,63 | 1,25 | hedonic quality |
| **43** | Comfortable-Uncomfortable | 3,63 | 1,27 | pragmatic quality |
| **44** | Attractive-Repulsive | 3,63 | 1,27 | hedonic quality |
| **45** | Efficient-Inefficient | 3,60 | 1,33 | pragmatic quality |
| **46** | Valuable-Cheap | 3,60 | 1,40 | hedonic quality |
| **47** | Interest-Disinterest | 3,57 | 1,30 | emotional reaction |
| **48** | Contentment-Discontent | 3,57 | 1,38 | emotional reaction |
| **49** | Ornate-Plain | 3,53 | 1,11 | hedonic quality |
| **50** | Bringing closer to people-Separating from | 3,53 | 1,41 | hedonic quality |
| **51** | Reliable-Unreliable | 3,50 | 1,31 | pragmatic quality |
| **52** | Pleasure-Displeasure | 3,43 | 1,30 | emotional reaction |
| **53** | Manageable-Unruly | 3,40 | 1,35 | pragmatic quality |
| **54** | Light-Heavy | 3,33 | 1,35 | pragmatic quality |

**Word pairs with a score between 4.50 and 5.00: Extremely relevant word pairs**

Analyzing Table 5.8, the first seven pairs are found to be the *extremely relevant* pairs in the iPhone case because of their scores above 4.50. Their relatively less standard deviations indicate that majority of the participants agree on their extreme relevancy in connoting iPhones and their experiences with iPhones. Almost all of these pairs belong to pragmatic qualities, whereas only one pair belongs to hedonic qualities (Figure 6.6).

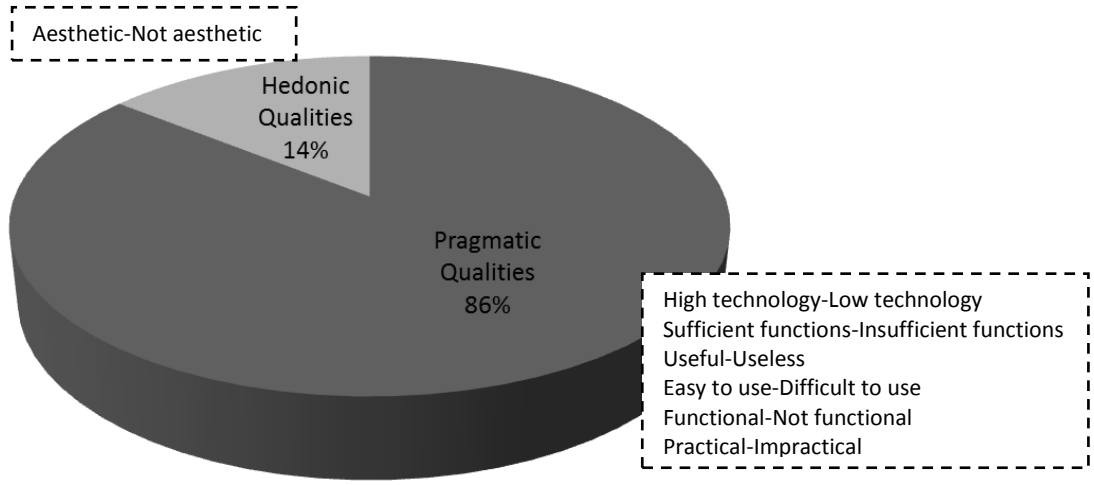



Figure 6.6 Extremely relevant word pairs to iPhones and related experiences

At the top of the relevancy list, seeing pragmatic qualities' superiority is an expected result independent of the product type, because of users' thoughts on importance of utilitarian concerns for product related preferences. The iPhone survey also supports this idea. All the respondents have commented on at least one of these pragmatic qualities during the survey: iPhone's new technology, easiness of using and richness in applications.

Users have complimented on iPhone's new technology of its user interface. It was mentioned that the touch screen technology introduced by Apple could not have been achieved by any other brand. It was interpreted that iPhone's interface is so much faster because its touch screen technology is very sensitive to any tiny movement of fingers, and it is sensitive to skin temperature therefore there is not

any chance of iPhone to be activated by any object while being carried in bags or pockets. Additional to touch screen technology, supplied richness in the variety of applications was also thought to be iPhone's high technology. One respondent's saying "IPhone has answers to everything" nicely explains how it is comprehended by the users. It is seen as a product that has broken new ground in technology by offering a new opportunity: immediate reach to every information in the world whenever one wants. All of these are enough to explain the highest score of "High technology-Low technology" (4.77) for iPhone case.

In the top pragmatic quality related word pairs, "Sufficient functions-Insufficient functions" word pair comes in the second order. It is very reasonable because the main interest of iPhone users was seen as the wide range of functions provided by the iPhone. Many respondents have found iPhone's functions more than sufficient. Functions were taken as the applications provided, and it was mentioned that every day new applications are introduced by the company. "Useful-Useless" pair was associated with iPhone's functions, assistance provided for many different fields of everyday life. IPhone is seen as minicomputer, easiness in following e-mails, immediate access to every kind of information like driving directions, traffic conditions, on duty pharmacies, airport boards, weather situation, and so on.

These word pairs are followed by the "Easy to use-Difficult to use" word pair. Ease of usage was also considered very important by iPhone users. Its touch screen technology and menu structure are seen as the components that make the use easier than any other electronic product. Subjects exemplified ease of use by telling that their small children or grandparents, who cannot use any other technical device, can use the iPhone easily. Functionality ("Functional-Not functional") was associated with multiplicity of provided functions, and iPhone was mentioned as a very functional product by many of the participants. Practicality (Practical-Impractical") was seen as one of the main characteristics of iPhones, and mostly associated with ease of use of its touch screen interface, menu, shortcuts, and the like, and with its ability to provide its practical profits for daily life.

The only one hedonic quality related word pair in the *extremely relevant* pairs group was "Aesthetic-Non aesthetic", which is related to appearance and aesthetic perception. Some respondents associated this word pair with iPhone's physical appearance, some with its menus and interior content. Some mentioned that they

have found iPhones more aesthetic in comparison to Blackberry, with a terrifying amount of buttons. While some subjects specified that iPhones are aesthetic with their simplified appearance, some mentioned that aesthetical appearance is not the talking point for iPhones, features and content is the point.

**Word pairs with a score between 4.00 and 4.50: More than much relevant word pairs**

Analyzing Table 6.8, it is seen that 19 word pairs' scores stand between 4.00 and 4.50, which can be considered as the *more than much relevant* word pairs for the iPhone case. The average of standard deviations of all word pairs is 1.22. For this group, only two (2) word pairs' standard deviations are above the average; the remaining have relatively less standard deviations indicating that majority of the participants agree on their relevancy level and connoted meanings. Additionally, for this group of word pairs, a uniform distribution of pragmatic qualities and hedonic qualities, with a less percentage for emotional reactions can be seen (Figure 6.7). Looking at this interval (4.00-4.50), it is possible to observe that pragmatic qualities lose importance and their superiority, while hedonic qualities gain importance. Different from the automobile survey, in the iPhone survey less emotional reaction related word pairs are observed for *more than much relevant* word pairs.

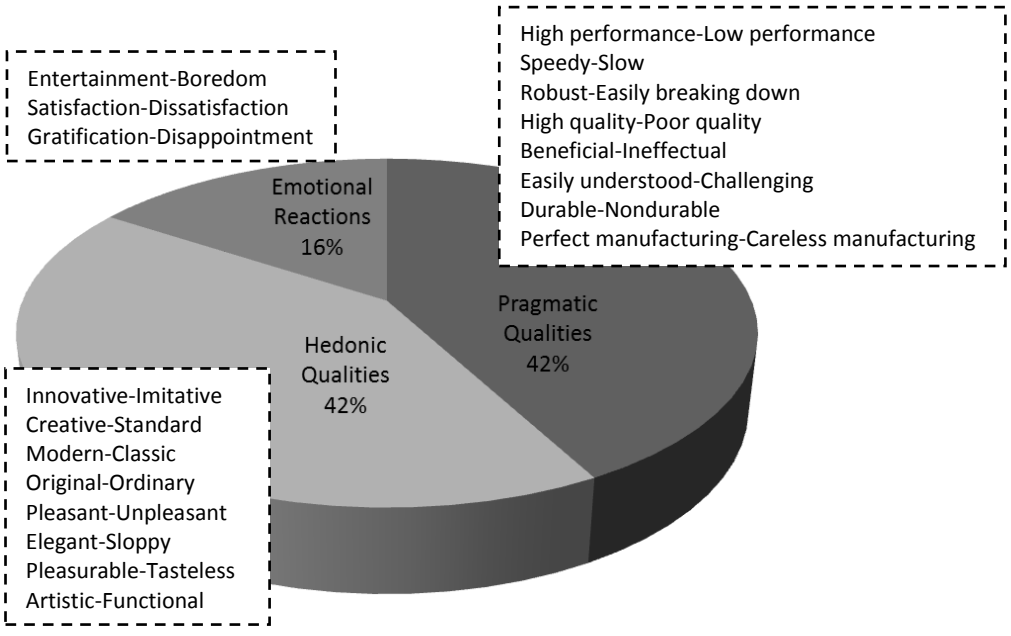



Figure 6.7 More than much relevant word pairs to iPhones and related experiences

Starting with pragmatic qualities, first comes “High performance-Low performance” word pair, and then “Speedy-Slow” pair. It was observed that participants have given importance to performance and speed concerns for iPhone, though they did not agree on whether it has high or low performance, or it is fast or slow. Most of the subjects indicated that it has a very high performance, because of its software it operates applications successfully; whereas some criticized that it has an average performance or it had high performance at the beginning, but then became an average because phone hardware stays the same while software is updated. Like performance, iPhone’s speed was not an agreed issue; some respondents found it very fast while some criticized its slowness. Speed was associated with technical speed, touch screen’s perception velocity of finger movement and response rate, passing speed through the menus, and the like. Most subjects mentioned that they find iPhone very speedy because their finger movements get response right away, everything opens very quickly and they don’t wait at any menu; whereas a few judged iPhone to be slow because of its software, or mentioned the difference of speeds for models iPhone three and four. In addition, some subjects explained their reason for finding the iPhone speedy with the speed in reaching any needed information and their e-mails. As a result everybody commented on the iPhone speed; it is a significant issue for the iPhone survey.

Robustness (“Robust-Easily breaking down”) was another issue that has taken different comments throughout the survey, but which gained attention overall. While some respondents argued that iPhone easily breaks down, sometimes seizes up, and gets locked with a small hit; some mentioned that they find it robust since they haven’t seen any problem of it. Quality (“High quality-Poor quality”) was a more agreed issue; some subjects talked on brand, some on new technology, and some on price, but eventually iPhone was found to be of high quality by almost everyone. “Beneficial-Ineffectual” pair was found meaningful by most of the participants; iPhone’s benefits were seen to be for every subject in daily life. However a number of participants added that most of the advantages are entertainment, music, games, and the like, and those may not be taken as beneficial concerns.

“Easily understood-Challenging” word pair was found meaningful for iPhone’s technological structure, and mostly made comments were on easily understood menu structure and that users do not get loss across the menus. “Durable-Nondurable” word pair was generally associated with iPhone’s battery life, and users

criticized short life of the battery. Some subjects also thought of bench life of the iPhone and expressed ideas about its durability associating it with its high quality. Additionally such reasons about iPhone's durability were also mentioned like with its new applications users discover new things every day, and its simplicity in appearance that does not bore users with the passing time. "Perfect manufacturing-Careless manufacturing" pair was associated with exterior appearance, structure and technological content. Many participants expressed ideas on the brand's high level manufacturing standards, while a few emphasized that no designed product can be perfectly manufactured, it is natural to see some defects.

All the hedonic quality related word pairs in the *more than much relevant* word pairs group are related to aesthetic concerns. It was a generalized idea that iPhone is an innovative ("Innovative-Imitative"), creative ("Creative-Standard"), modern ("Modern-Classic") and original ("Original-Ordinary") product. Subjects ideas about these issues are such: It has created a new technology, the touch screen technology and carried the sector to the future. Many other brands are trying to reach its high standards. IPhone's creativity comes from its technology and also all the applications it introduces, one imagines and iPhone makes real. It is so modern that it has created a new age in technology, it has private features that one can find in no other device. It is very suitable to modern-day standards of life in every sense, it provides easiness and practicability for human life, one accesses everything with any tiny finger movement. It is original because of its private technology, screen that perceives human skin, features and unlimited applications, and still it is the best and unique of its kind. All these concerns are about stimulation related aspects of hedonic qualities, iPhone's ability in providing new impressions, opportunities and insights for personal development.

Participants found iPhone pleasant ("Pleasant-Unpleasant") because of its technical abilities, and also because of its aesthetical appearance. Its characteristic of meeting a wide range of requirements was found pleasing, and participants declared that it is pleasing to spend time with iPhone. The simple appearance and its touch screen were thought to be elegant ("Elegant-Sloppy"). Its technical details, exterior design, design of menus and interior content were all thought to be pleasurable ("Pleasurable-Tasteless"). "Artistic-Functional" word pair was one of the pairs that attracted much attention for the iPhone case. While some participants found its functional aspect very powerful, many talked about its artistic aspect beside its

functionality. They mentioned that iPhone is also very artistic because of its aesthetic appearance, graphical content, interior content of pictures and images. A common declaration of some participants was that its applications and all content is for human, which makes it is artistic.

Lastly, the emotion related word pairs that were found *more than much relevant* for the iPhone case will be discussed. It is an expected result to see “Entertainment-Boredom” word pair at top of all the emotion related word pairs. IPhone was seen predominantly as an entertainment product, because of its software, applications, games, quick internet access, and musical abilities. Its wide range of applications appealing to everybody was thought to be its entertaining side, “at leisure, everybody can find something with it” was a general idea of the subjects. The other word pairs related to emotional reactions that were found to be *more than much relevant* are “Satisfaction-Dissatisfaction” and “Gratification-Disappointment”, those of which have great potential to take high points for every product group by their users. Evidently, iPhone survey also supports this situation. These emotions seem to have no associations unique to iPhone, but because of its capacity for fulfilling the needs of users, these word pairs stand on top of the relevancy list.

**Word pairs with a score between 3.50 and 4.00: Much relevant word pairs**

From Table 6.8, it is seen that there are 25 word pairs whose scores are between 3.50 and 4.00. These word pairs can be considered as the *much relevant* word pairs for the iPhone case. For this group, 16 word pairs’ standard deviations are above the average score of all 103 pairs (1.22); in other words, most of the word pairs of this group have high deviations, indicating that majority of the participants do not agree on pairs’ relevancy levels or connoted meanings. High standard deviations represent that there are much differences between every participant’s score; for the same word pair, participants evaluate the relevancy levels of the same word pair different from each other.

In addition, for this group of word pairs, more than half of the pairs belong to hedonic qualities (Figure 6.8), which indicates that in this interval (3.50-4.00) hedonic qualities gain importance, while pragmatic qualities lose, going downward through the relevancy list. We can talk about the superiority of hedonic qualities for the *much relevant* word pairs group of the iPhone case.

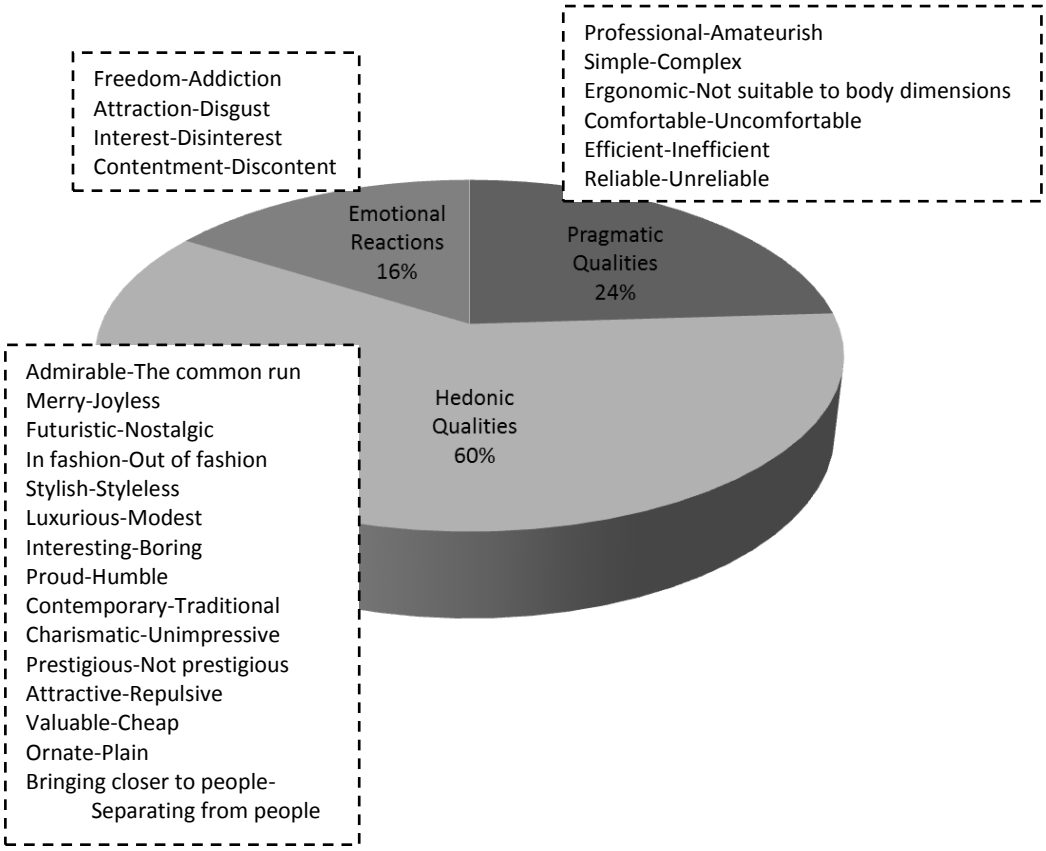



Figure 6.8 Much relevant word pairs to iPhones and related experiences

Some remarkable points related to *much relevant* word pairs will be discussed. The first pragmatic quality related word pair is “Professional-Amateurish”. Respondents have thought many different connotations for this pair, but mostly found relevant to the iPhone. Some different ideas are such that iPhone is professional for its high technology, applications provided for professionals, its user specific professionalizable characteristic, its ability to add a professional look to its user; whereas it is amateur with its easy usage characteristic, its applications for amateurs like games, its purpose that of entertainment and private life. “Simple-Complex” word pair was associated with iPhone’s menu language, usage characteristics, software, while some participants associated with the appearance rather than utilitarian qualities. Its menu language and usage found simple with its ability of making complex things simple; its appearance found simple with the only one button on it. Some subjects expressed ideas such that iPhone is a perfect mix of simplicity and complexity with its simple appearance and complex content.

“Ergonomic-Not suitable for body dimensions” word pair was generally understood correctly, there was not much people who argued the meaning of the word ergonomics. But, respondents have not agreed if the iPhone is ergonomic, or not. Some thought that it is not ergonomic, it is large that it cannot be carried in one’s pocket, it is suitable for carrying in bags only, it is not ergonomic that one cannot use it with full grasp; while some found it ergonomic since its screen dimensions are ideal for usability, its position in one’s hand is very comfortable. “Comfortable-Uncomfortable” word pair was one of a higher standard deviation that users have not agreed on the relevancy level, but many of them mentioned different opinions about comfort with the iPhone, they were interested in the comfort concept with various perspectives. Some found comfort as the quick internet access, additional features, easy use, performance, usability, portability, speed of perceiving one’s touch, and ergonomics; while some found the iPhone uncomfortable because of its large dimensions, and because one with big fingers can have difficulty in using. Some found comfort as the opportunity of making everything with such a small device, from finding ways, following news to entertainment, etc.; whereas some mentioned that comfort cannot be a concept to define a phone, rather it is relevant in describing a seat, a place one sits or lives in.

For the “Efficient-Inefficient” word pair there were many different ideas, from battery’s durability, speed in internet access, and performance, to userfriendliness and beneficialness for every matter. One respondent has defined efficiency as the relation between what you give and what you take, and criticized the nonexchangeable battery and battery’s short life. And last pragmatic quality in this group of word pairs is “Reliable-Unreliable”, which was mostly associated with brand, quality and robustness, by the respondents who find the word pair relevant.

For the *much relevant* word pairs group, hedonic qualities constitute the largest percentage. “Admirable-The common run” word pair was associated with performance, manufacturing, quality, besides the design idea, usability and applications. “Futuristic-Nostalgic” and “Contemporary-Traditional” word pairs were generally associated with iPhone’s new technology. “In fashion-Out of fashion” word pair was commented differently, some participants thought the iPhone to be trendy, that many people buy it for its being in fashion situation, while some criticized fashion concept and the iPhone, and defined that it is above the fashion concept, such that it will not be out of fashion with passing time.

“Merry-Joyless” word pair was interpreted to internet, music, applications, games, television, news, and the like. “Interesting-Boring” word pair was mostly associated with the new applications, everyday new discoveries with the iPhone. Style (“Stylish-Styleless”) was associated with the iPhone’s elegancy, its design, its brand’s design and software understanding, or revealing the user’s personality. Some subjects commented that it was stylish but recently everybody has one, and it is not possible to talk about its style, one can create his own style with covers only. “Attractive-Repulsive” word pair was associated with the iPhone’s aesthetics, appearance reflecting technical predominance, and interface. “Ornate-Plain” word pair has taken a smaller standard deviation, majority of the respondents agreed on the plainness of the iPhone, its plane appearance. Some added that one can make it ornate with covers, or buy ornate iPhones with Swarovski crystals.

“Luxurious-Modest”, “Proud-Humble”, “Charismatic-Unimpressive”, “Prestigious-Not prestigious” and “Valuable-Cheap” word pairs all were generally associated with the iPhone’s price, its characteristics of adding charisma and prestigious to its user. Some subjects have mentioned that it was prestigious, proud, charismatic or luxurious before, but today it is not, because everybody can possess one. People carry an iPhone because of their status in society although they do not use the technical content and abilities, was a general idea of the respondents.

“Bringing closer to people-Separating from people” word pair was connoted to two main different understandings, one is that iPhone separates from people, alienates users in crowd because the user pays attention to iPhone, games, etc. and became isolated from social surroundings, the other is that the iPhone brings closer to people by constituting an iPhone users committee such that users communicate with each other about novelties, their discoveries, and play with each other.

Lastly, for the emotional reactions related word pairs for this group, “Freedom-Addiction” pair comes first. Respondents have different ideas about this issue, such that iPhone is freedom because it provides internet access everywhere and every time, its applications are freedom but one must pay for the applications he likes and thus he becomes an addict, the user finds everything easily with iPhone and becomes addicted to using, the iPhone spares people from computer addiction, the software creates addiction and do not free the users, iPhone is like a drug, and so on. All in all, the iPhone is both freedom and addiction for most of the respondents,

and these concerns have been found very meaningful for the iPhone survey. “Attraction-Disgust” word pair was associated with applications, usage, provided facilities; one subject expressed that the soul of iPhone creates attraction, not the appearance. “Interest-Disinterest” pair was mostly associated with the interest created by new applications and to discover new abilities of the iPhone. “Contentment-Discontent” emotion pair is about fulfilling user needs, and has no unique associations to the iPhone case. For iPhone, contentment was associated with usage, while discontentment with battery and applications’ price.

#### 6.4.2.2 Specified words and expressions collected in the beginning of the survey

At the beginning of the study, before the respondents went through the word pair lists, they were asked to describe the iPhone and their experiences with their iPhones. Respondents have written many different expressions to this part. Most of the answers are classified, grouped, and hierarchy between mentioned concepts has been identified (Figure 6.9). However some unique words and expressions are left out of the classification so as not to remove them from their original meanings. These are given as a list below (Table 6.9).

Table 6.9 Other words used to describe the iPhone and experiences with iPhones

| | | |
|---|---|---|
| attractive | high resolution | very much plusses |
| futuristic | reminder | success |
| masculine | communication | personalizable |
| aesthetic | multimedia | design |
| reliable | online shopping | portability |
| interesting | way finder in traffic | sufficiency |
| prestige | | richness of applications |
| modern | | like gold mine, at any time discovery |
| expensive | slipperiness | |
| sexy | softness | |
| skillful | | |
| novelty | | |
| colourful | | |

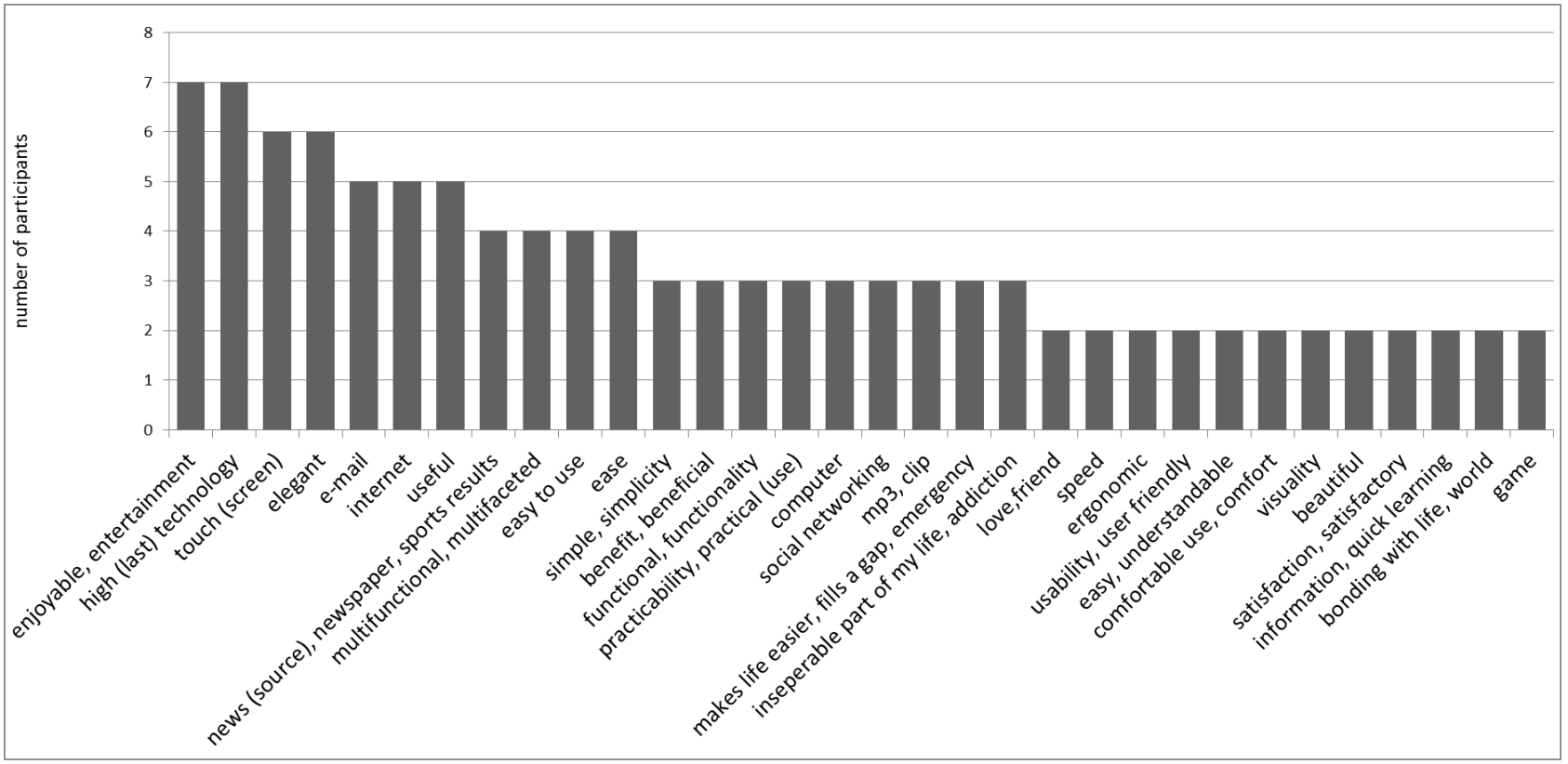



Figure 6.9 Words used to describe iPhones and experiences with iPhones

The collected words show a great variety and richness for the iPhone case. If Figure 6.9 is analyzed, it is seen that entertainment and technology have taken the highest scores, consistent with the word pairs' relevancy levels specified in previous section. The new interface, touch screen technology and characteristics of touch screen use like slipperiness and softness have taken interest, thereby points as expected. All these words in order to define usability related aspects such that useful, easy to use, ease, simple, practical, ergonomic, user friendly, comfortable were grouped separately in order not to lose different expressions of respondents; but as seen from the figure, all these cover the greatest percentage of the answers. As can be predicted, multifunctional, functional, beneficial words and functions like e-mail, internet, computer, social networking, news, mp3 player, information, games and the like have taken many scores. Elegant and beautiful were used for aesthetics side, whereas love, addiction, satisfaction and different expressions like filling a gap, emergency, bonding with life are all mentioned for defining related experiences.

### 6.4.2.3 Specified word and expression pairs given by respondents in the blank tables

Respondents have commented on the largeness of quantity of word pairs in the survey, and complained that they couldn't find new word pairs to add. A total of only six respondents added words and expressions to the blank charts, one is added to the table after pragmatic qualities, three after hedonic qualities and two to the last blank table. Majority of the respondents have not given attention to the grouping of the word pairs, and meanings of the groups, but the added pairs did not show inconsistency with the added chart. Added word and expression pairs are as follows:

More generalized word pairs:

| |
|---|
| close friend - enemy |
| provoking curiosity - of no effect |
| unique - regular |
| bringing world closer - alienating from world |
| indispensable - dispensable |
| expensive - cheap (2 times) |

Expressions related to protecting and accessories:

| |
|---|
| with accessories - without accessories |
| with casing - without casing |
| problematic for protecting - problem-free for protecting |

### 6.4.3 COMPARISON OF AUTOMOBILES AND IPHONES

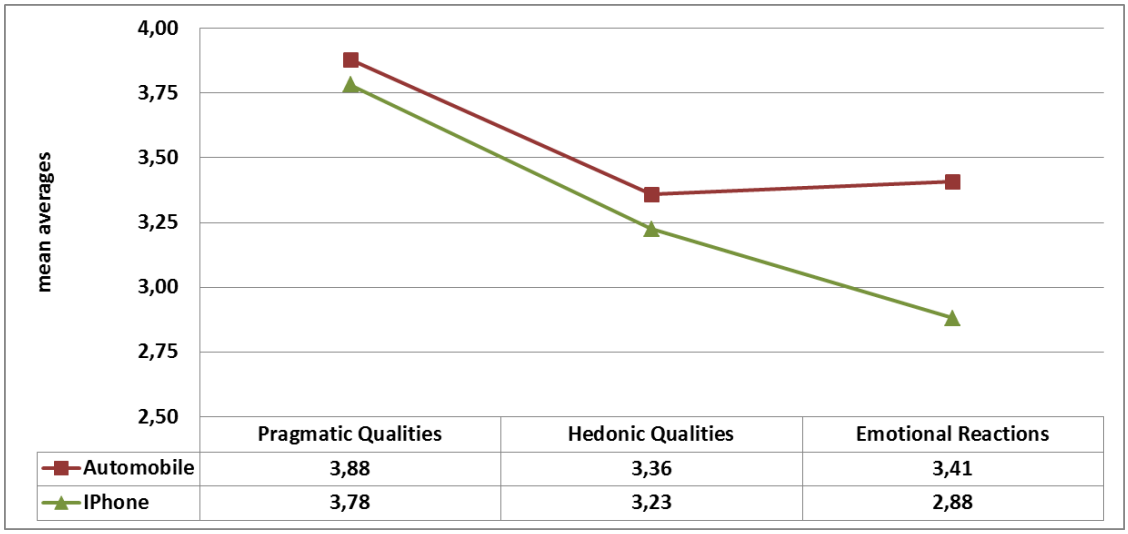
#### 6.4.3.1 Comparison of Word Pair Groups for Both Products

In the previous sections, it was mentioned that while preparing the questionnaire, the word pairs were grouped mainly into three main subject headings: pragmatic qualities, hedonic qualities and emotional reactions. Pragmatic qualities refer to utilitarian functions, effectiveness, efficiency and usability of products. Therefore, the pragmatic qualities category was divided into two sub-headings: qualities related to function and qualities related to usability. Hedonic qualities refer to the concepts, memories, identities, insights that the users associate with the products, these are the product qualities that enhance the usage process. The hedonic qualities category was divided into two sub-headings: qualities related to symbolism and qualities related to aesthetics. Symbolic qualities mainly focus on identity associations and socially related word pairs, while aesthetic qualities focus on appearance and innovativeness concerns.

In order to investigate the relevancy levels (in connoting the related product and product experience) of the main and sub-groups of automobiles and iPhones, the mean average scores of all groups have been computed. This was done by calculating the mean average of all word pairs belonging to the related main or sub-group. The more the mean average is high, the more that group is relevant in connoting the product and experiences with that product.

Figure 6.10 shows the mean average scores of all main groups, namely, pragmatic qualities, hedonic qualities and emotional reactions, for automobiles and iPhones respectively. Pragmatic qualities' high scores are expected results, since users give maximal importance to utilitarian concerns while evaluating a product. The production reason of a consumer product is firstly to serve a specific purpose,

therefore pragmatic qualities are found more relevant in connoting products than the other items. For the two different product groups, the situation does not differ; pragmatic qualities are the most relevant concerns for each of the product group similarly. But, while hedonic qualities have relatively low scores for the two different product groups, emotional reaction scores differ according to the product group. Emotional reactions have the lowest relevancy level for the iPhone, whereas for automobiles, they have a higher score, referring to more relevancy. In other words, emotional reactions have been found to be more relevant in connoting automobiles and automobile related experiences, while they are less relevant in connoting iPhones and iPhone related experiences. In the previous sections, it was mentioned that users see automobiles as their homes, loves, family members, and the like, which explains the emotional concerns relevancy for the automobile case. People establish more emotional bonds with automobiles than they do with iPhones.

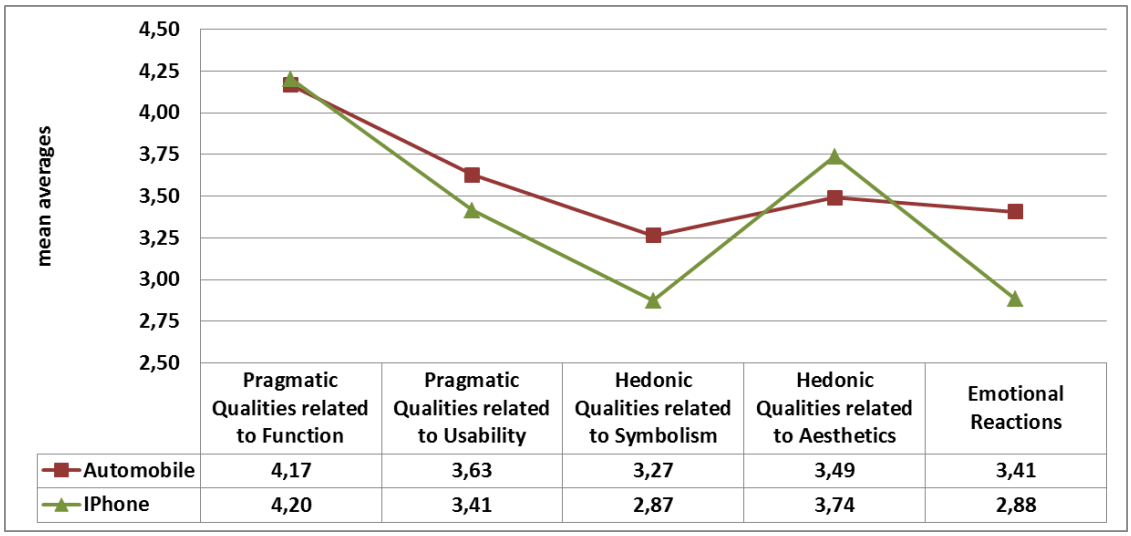



| | Pragmatic Qualities | Hedonic Qualities | Emotional Reactions |
|---|---|---|---|
| Automobile | 3,88 | 3,36 | 3,41 |
| IPhone | 3,78 | 3,23 | 2,88 |

Figure 6.10 Main groups relevancy levels

In order to look at the sub-groups relevancy levels in connoting the different research products, Figure 6.11 can be examined. As specified before, sub-groups of pragmatic qualities are function and usability, hedonic qualities are symbolism and aesthetics. Sub-groups of hedonic qualities show a remarkable situation. For aesthetics related word pairs, iPhone's relevancy level exceeds that of automobiles, meaning that aesthetic related word pairs are more relevant in connoting iPhones and iPhone related experiences, than automobiles. This can be explained by the

content of the words gathered for the aesthetics sub-group; as discussed earlier, innovativeness and similar issues are covered by *hedonic qualities related to aesthetics* sub-group. In the previous chapters, iPhone's new technology and its creative idea of touch screen design were emphasized, and these explain the rather high relevancy level of aesthetic qualities for the iPhone case.




| | Pragmatic Qualities related to Function | Pragmatic Qualities related to Usability | Hedonic Qualities related to Symbolism | Hedonic Qualities related to Aesthetics | Emotional Reactions |
|---|---|---|---|---|---|
| Automobile | 4,17 | 3,63 | 3,27 | 3,49 | 3,41 |
| IPhone | 4,20 | 3,41 | 2,87 | 3,74 | 2,88 |

Figure 6.11 Sub-groups relevancy levels

Later on in this chapter, each word pairs' relevancy level differences will be discussed according to their scores of mean average and standard deviations. For a word pair, the mean average score indicates if it is found relevant or irrelevant in connoting the research product, it is the average of all participants' ideas about that word pairs' relevancy level. The more the mean average of a word pair is higher, the more that word pair has been found relevant to the surveyed product. As mentioned before, in the Likert scale used for ranking the relevancy levels' of word pairs, point 5.00 stands for an extremely relevant word pair, while point 1.00 stands for a totally irrelevant word pair. Therefore, as the mean average of a word pair approaches 5.00, it becomes more relevant to the context; on the contrary, as the mean average falls around 1.00, it becomes more irrelevant. On the other hand, standard deviation scores connote to the participants agreement degrees on the mean average score of that word pair's relevancy. Smaller standard deviations represent that majority of the participants agree on that pair's relevancy level to that context, they agree on how much that word pair is relevant in connoting the product. In contrast, higher

standard deviations represent that there are disagreements about the relevancy levels of the concerned pair among the participants. While some participants think that the word pair is relevant, some others think the same pair to be irrelevant. Therefore, word pairs having high standard deviations are the ones that are not understood in the same way by all participants, namely participants have different ideas about that word pair.

### 6.4.3.2 Comparison of Pragmatic Qualities

#### Pragmatic Qualities, Word Pairs Related to Function

The relevancy level scores of each word pair, and standard deviations of relevancy level scores are graphically shown in Figure 6.12, and the related numerical values can be found in Table 6.10. The graphical chart visualizes the perceptual differences between automobiles and iPhones making the differences more visible. Remarkable points through this figure will be discussed accordingly.

Table 6.10 Numeric values for function related word pairs (M: mean average, s.d: standard deviation)

| | Automobile | | iPhone | |
|---|---|---|---|---|
| | M | s.d. | M | s.d. |
| Durable-Nondurable | 3,63 | 1,19 | 4,07 | 1,17 |
| Robust-Easily breaking down | 4,77 | 0,50 | 4,23 | 0,90 |
| High performance-Low performance | 4,53 | 0,82 | 4,37 | 0,85 |
| Perfect manufacturing-Careless manufacturing | 4,33 | 0,84 | 4,00 | 0,95 |
| Sufficient functions-Insufficient functions | 4,20 | 0,61 | 4,73 | 0,52 |
| Functional-Not functional | 3,77 | 1,22 | 4,60 | 0,56 |
| Useful-Useless | 4,23 | 0,90 | 4,73 | 0,58 |
| Beneficial-Ineffectual | 4,10 | 1,24 | 4,23 | 1,07 |
| High quality-Poor quality | 4,57 | 0,68 | 4,23 | 0,94 |
| Powerful-Weak | 3,87 | 1,25 | 3,30 | 1,37 |
| Speedy-Slow | 4,30 | 0,99 | 4,33 | 0,88 |
| Economical-Wasteful | 4,70 | 0,65 | 3,27 | 1,34 |
| High technology-Low technology | 4,30 | 0,92 | 4,77 | 0,50 |
| Professional-Amateurish | 3,03 | 1,54 | 3,97 | 1,16 |
| Averages | 4,17 | 0,95 | 4,20 | 0,91 |

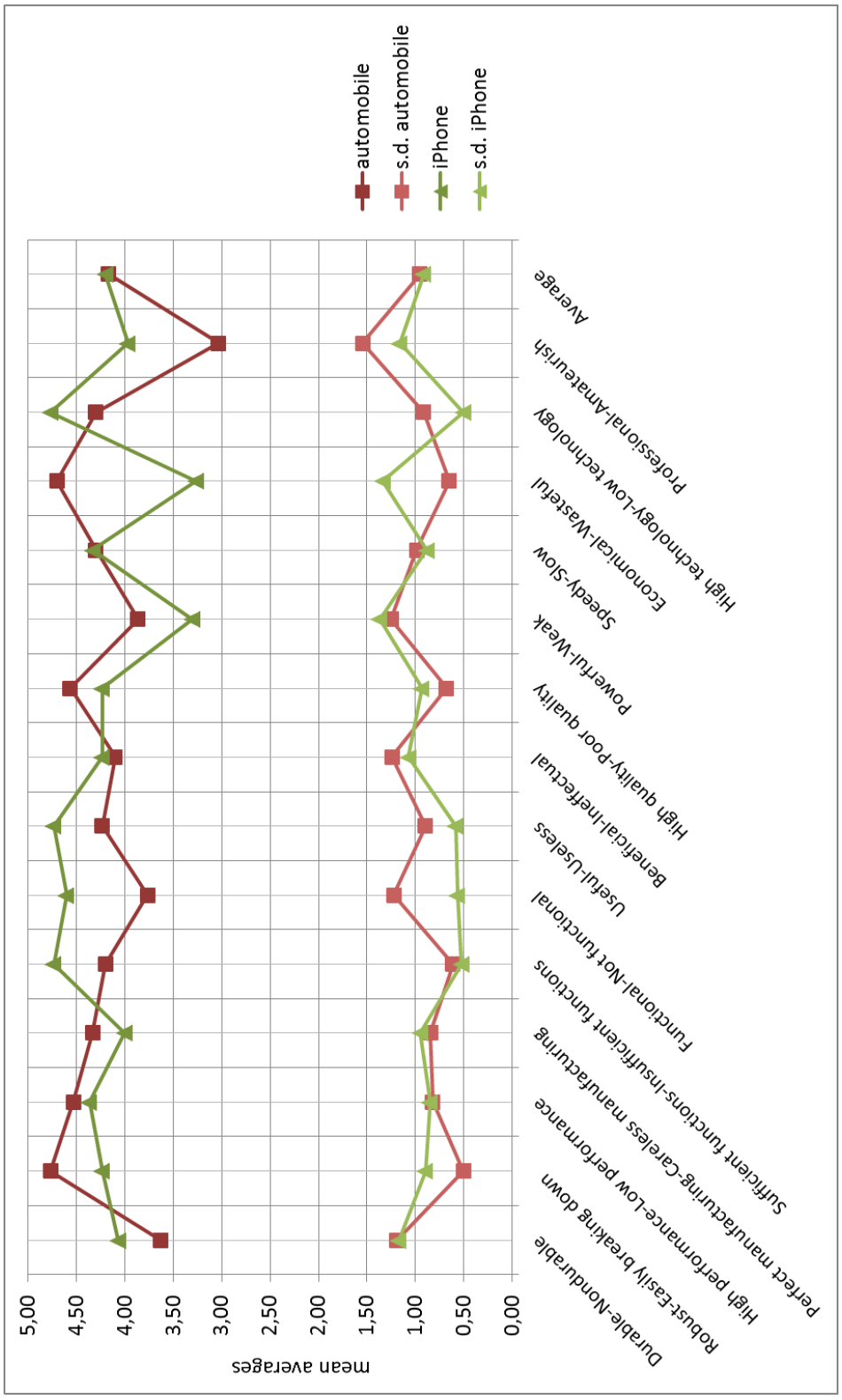



Figure 6.12 Pragmatic qualities, word pairs related to function

Overall averages of function related word pairs have taken nearly the same values for automobiles and iPhones, and they are considerably high values among the total research results. This implies the importance of functional concerns for each product separately, and nearly all word pairs' meaningfulness and relevance for each product group. But for almost every word pair, we can talk about its extreme relevancy to one product, while much or moderate relevancy to the other one.

*"Economical-Wasteful"* word pair has been found extremely relevant in connoting automobiles and related experiences, and its low standard deviation infers that everybody is like-minded on the relevancy level. However, the same pair has been found more than moderately relevant to iPhones and related experiences with a high standard deviation, showing that users have different ideas about its relevancy to iPhones. For automobiles, economy was associated with fuel consumption rate by almost every participant. But, for iPhones, many different ideas were suggested by the respondents. IPhone was found wasteful for its own price, to have a short battery life, for prices of many new applications, and for the time spent with it for games; while on the other hand it was found economical for wireless internet access, making use of the time well, helping users in way finding, and the like. In addition, some participants found economy irrelevant with iPhone when price and benefits are compared.

*"Robust-Easily breaking down"* and *"High quality-Low quality"* word pairs have been found extremely relevant for automobiles, with low standard deviations, and therefore subjects agree on their extreme relevancy for automobiles. They were associated with security concerns, material and equipment quality. The same word pairs have been found not extremely, but much relevant for iPhones, with low standard deviations, inferring that they are also meaningful for the iPhone case. Quality was associated with brand and high technology for the iPhone.

*"Sufficient functions-Insufficient functions"*, *"Useful-Useless"*, and *"High technology-Low technology"* are word pairs that are found extremely relevant in connoting iPhones and related experiences, while they are much relevant for automobiles. Standard deviations of these pairs for each research product are relatively low, therefore participants are agreeable on their extreme relevancy for iPhones and much relevancy for automobiles. IPhone's wide range of applications and features,

assistance for many different fields of daily life, and new technology are the main components of respondents' understanding of the iPhone.

*"Functional-Not functional"* word pair was found extremely relevant for the iPhone and related experiences, with a low standard deviation, inferring that subjects agree on the relevancy level because of its multifunctional characteristic; while this pair has taken a lower relevancy level with a high standard deviation for automobiles. This implies that majority of the participants do not agree on its relevancy and meaningfulness for automobiles. Functionality was associated with the secondary functions of automobile, which were found less meaningful when compared to the primary function of transportation.

*"Professional-Amateurish"* word pair has a relatively high relevancy level and low standard deviation for the iPhone case when compared with the automobile scores. It can be taken as a much relevant word pair for the iPhone, while as an irrelevant pair for automobiles. This pair's standard deviation is very high for the automobile case, inferring the inconsistency between users' understandings about this concern. For automobiles, participants mentioned such different ideas associated with the word pair: professionalism is related with the driver, not the automobile; it is related with driving quality, correct driving should be learnt; it is related to the manufacturing concerns; race cars are professional, while daily cars are amateurish; sporty cars are more professional compared to the others; old cars are amateurish while full automatic cars are professional, and so on. But for iPhone, the word pair was found more relevant and meaningful. Some points about subjects understandings are as follows: IPhone's software and high technology are professional, its use is amateurish such that a small child can understand and use easily; it can be professionalized and customized for the user; it has applications for professionals and amateurs, for both of them, such as professional applications, games and hobbies; it is professional as an mp3 player or minicomputer, it provides a professional look to its users; it is more suitable for professionals who can master more features; it is professional with its features that makes it like a person who knows everything; it can be used professionally and also unprofessionally; and so on.

*"Speedy-Slow"* word pair has taken almost same high relevancy scores for the automobile and iPhone a bit unexpectedly, and for both has low standard deviations.

All participants agreed on its relevancy to automobiles, whereas some subjects have given lower points because they do not expect speed from their automobiles, they do not like speed and fast driving. For the iPhone case, although participants have mentioned different ideas about speed's meaning for the iPhone, they all agreed on the importance level. Speed was associated with technical speed, touch screen's perception velocity of finger movement and response rate, passing speed through the menus, or speed in accessing any needed information, internet and e-mails.

*"Durable-Nondurable*" and *"Beneficial-Ineffectual"* word pairs have been found more relevant for iPhones, although they have good average scores for automobiles. For automobiles their standard deviations are higher, inferring different ideas among participants. *"High performance-Low performance"* and *"Perfect manufacturing-Careless manufacturing"* word pairs have somewhat higher scores for automobiles, they are also much relevant for the iPhone case, with good agreement levels of participants. Lastly, *"Powerful-Weak"* word pair has been found more relevant for automobiles, whereas it has high deviation scores for each of the two products, inferring difference of opinions among participants. For automobiles, it was associated with engine and performance; while, for iPhones, with software, content, features, battery life, and processor. Some subjects mentioned their understanding of feeling powerful while driving their car or using the iPhone (user feels powerful because he can do everything on his own with the help of iPhone).

**Pragmatic Qualities, Word Pairs Related to Usability**

The relevancy level scores of each word pair, and standard deviations of relevancy level scores are graphically shown in Figure 6.13, and the related numerical values can be found in Table 6.11. The graphical chart visualizes the perceptual differences between automobiles and iPhones making the differences more visible. Remarkable points through this figure will be discussed accordingly as follows.

*"Comfortable-Uncomfortable"*, *"Reliable-Unreliable"*, and *"Safe-Dangerous"* word pairs have the highest scores and lowest standard deviations for automobiles, therefore they are found extremely relevant for automobiles and related experiences, agreed by all respondents. On the other hand, comfort and reliability have been found more than moderately relevant for iPhones, with high standard

deviations, referring to disagreements through the participants, whereas safety has not been found relevant for iPhones, with its lower relevancy score. Some connoted meanings for comfort for the iPhone are such that the quick internet access ability that provides users lives a big ease, feature and application variety, easy use and ergonomics. Reliability was associated with brand, quality and robustness for the iPhone, whereas with equipment like engine and braking system, wheels, stopping distance, vehicle body, and also with brand and security for the automobiles. Safety has been taken as the most important word pair for automobiles, because of the associations with human life, whereas found irrelevant for iPhones. Even so, a few subjects mentioned connotations about iPhone's and all mobile phones' danger to human health because of the emitted radiation.

Table 6.11 Numeric values for usability related word pairs (M: mean average, s.d: standard deviation)

| | Automobile | | iPhone | |
|---|---|---|---|---|
| | M | s.d. | M | s.d. |
| Easy to use-Difficult to use | 3,87 | 1,17 | 4,70 | 0,60 |
| Ergonomic-Not suitable to body dimensions | 4,17 | 1,21 | 3,80 | 1,19 |
| Easily understood-Challenging | 2,67 | 1,60 | 4,10 | 1,06 |
| Simple-Complex | 3,53 | 1,43 | 3,80 | 1,06 |
| Familiar-Strange | 2,67 | 1,60 | 2,73 | 1,44 |
| Predictable-Unpredictable | 2,67 | 1,45 | 2,93 | 1,57 |
| Manageable-Unruly | 3,77 | 1,25 | 3,40 | 1,35 |
| Efficient-Inefficient | 3,90 | 1,03 | 3,60 | 1,33 |
| Practical-Impractical | 3,83 | 1,18 | 4,60 | 0,72 |
| Comfortable-Uncomfortable | 4,63 | 0,56 | 3,63 | 1,27 |
| Reliable-Unreliable | 4,77 | 0,43 | 3,50 | 1,31 |
| Safe-Dangerous | 4,80 | 0,61 | 2,60 | 1,59 |
| Easy to clean-Difficult to clean | 3,03 | 1,22 | 3,03 | 1,22 |
| Light-Heavy | 3,97 | 1,03 | 3,33 | 1,35 |
| Soft-Hard | 3,07 | 1,55 | 1,63 | 0,93 |
| Technical-Human | 2,70 | 1,37 | 3,23 | 1,33 |
| Averages | 3,63 | 1,17 | 3,41 | 1,21 |

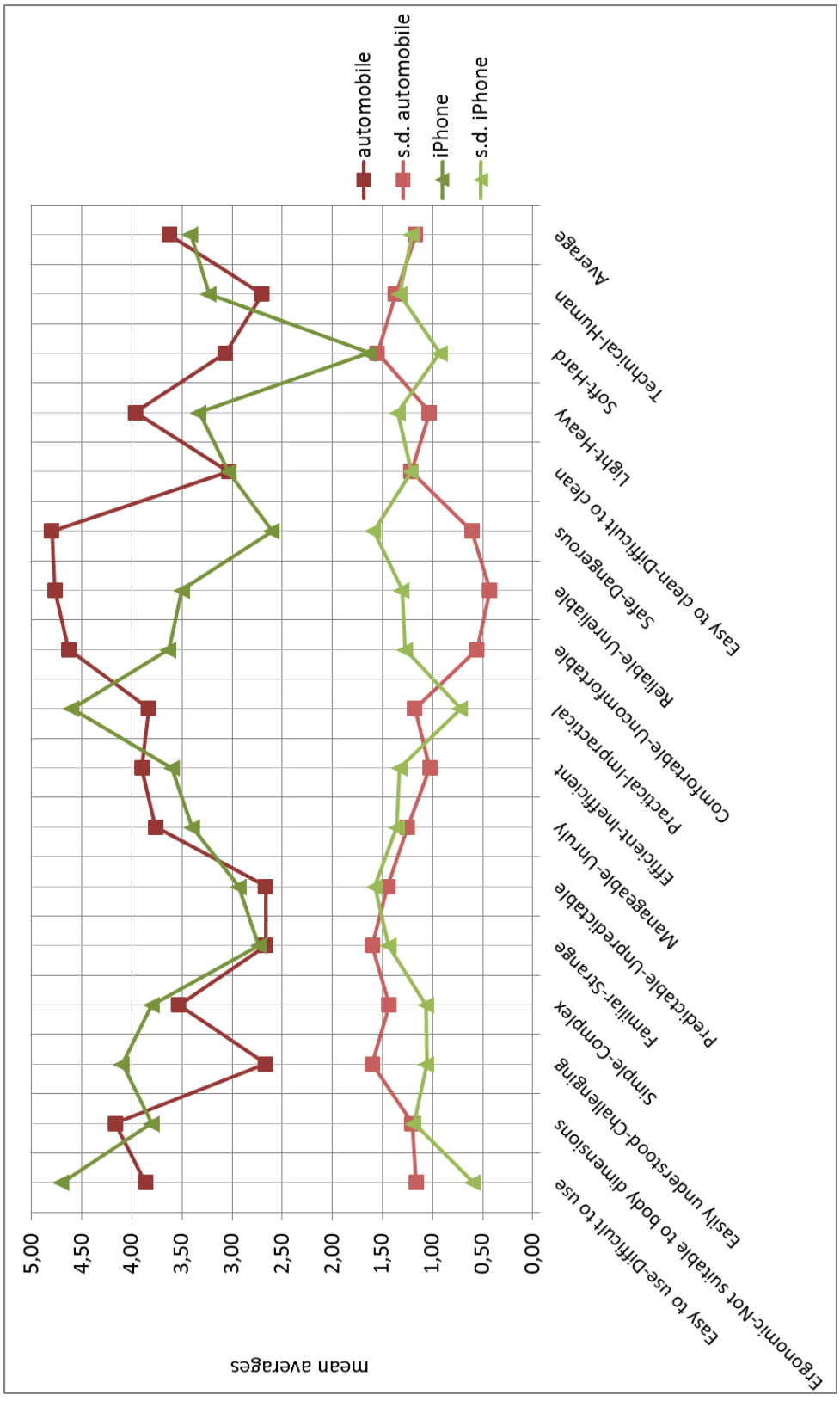



Figure 6.13 Pragmatic qualities, word pairs related to usability

*"Easy to use-Difficult to use"* and *"Practical-Impractical*" word pairs have taken the highest scores and lowest standard deviations for iPhones, therefore they are found extremely relevant for iPhones and related experiences, agreed by all respondents. Otherwise, they have also high scores for automobiles and found more than much relevant for automobiles, with relatively high standard deviations inferring different ideas among participants. Ease of use have found one of the main characteristics of the iPhone, and taken greatest relevancy score; while associated with gear, steering wheel or the secondary controls and not found very much meaningful for the automobile context. Similarly, practicality was found very meaningful and relevant for the iPhone case, while taken as less relevant for the automobiles.

*"Easily understood-Challenging"* word pair has a higher relevancy score for the iPhone, and also less standard deviation, therefore found more than much relevant for iPhones and related experiences. The iPhone's easily understood use and menu structure were found of an important characteristic. On the other hand, this word pair has a much lower relevancy score and high standard deviation thus can be taken as an irrelevant word pair for automobiles. It was associated with controls and displays for automobiles, and found not much meaningful in the context.

*"Light-Heavy"* word pair was found much relevant for automobiles, with lower standard deviation that majority of the participants agreed on its relevancy; while it has a lower relevancy score for the iPhone with high standard deviation, therefore only moderately relevant for iPhones, or can be taken as an irrelevant pair compared to the automobile case. For automobiles it was related to usage of the steering wheel; stability, drift and speed of the vehicle; security, and fuel consumption rate. For the iPhone, its weight criticized by the respondents, if it is heavy or not, but the common ground was its insignificancy and irrelevancy to define the iPhone or related experiences.

*"Efficient-Inefficient"* word pair has much relevancy score for automobiles, with lower standard deviation that majority of the participants agreed on its relevancy to automobiles; while it has a lower relevancy score for the iPhone with a higher standard deviation, thus have been found more relevant for automobiles. It was generally associated with fuel consumption and therefore economy for the automobiles, and has taken great importance in the automobile context. Whereas,

for iPhones, it was not a very significant word pair, and connoted to different meanings like battery life, speed in internet access and performance.

*"Ergonomic-Not suitable to body dimensions"* word pair has taken a greater relevancy score for automobiles compared to the iPhone case, but has high standard deviation scores for both. Its high standard deviation can be explained by if its meaning made sense or was not understood for automobiles; and difference of opinions about ergonomics of iPhone, if it is ergonomic with dimensions or it is huge and not ergonomic for users. For automobiles, respondents have associated ergonomics with seat comfort, interior dimensions suitability to the driver, and similar meaningful concerns.

*"Manageable-Unruly"* word pair has taken a greater relevancy score for automobiles, but for both of the products, it has high standard deviations. It is much relevant for automobiles, and can be taken as insignificant for iPhones. For automobiles, manageability was associated with usage of pedals, steering wheel and gear, and the total domination of driving; while iPhone was not seen such a device to be managed. Still, some participants associated manageability with usability and ease of use for the iPhone case. *"Simple-Complex*" has a higher relevancy score, with a less standard deviation, thus much relevant for the iPhone case, whereas has a lower relevancy score and much more higher standard deviation for automobiles, and can be taken insignificant for the automobiles. For iPhones, simplicity has taken attention according to the menu language, and easy usage.

*"Familiar-Strange"* and *"Predictable-Unpredictable"* pairs have low relevancy scores for both automobiles and iPhones, therefore they can be taken as irrelevant pairs for both of the products. Some different connotations of participants that have found relevancies for these pairs for automobiles and iPhones are as follows. For automobiles, familiar and strange come to mean local and foreign vehicles, one becomes familiar with his automobile some time later and it is easier to drive a familiar automobile, after one becomes familiar with his automobile it would be upsetting to sell his own car, brands that are familiar or not to the user, it would be difficult to drive a strange automobile thus one does not know clutch adjustments or headlight controls, and so on. For iPhones, familiarity was associated with menu language, brand and usage. For automobiles, predictability was connoted to performance, fuel performance or its behavior in road bends according to the

classification of the automobile, or the obvious primary function and may be unpredictable secondary functions. For iPhones, connoted meanings are the like: the iPhone is an unpredictable design, it provides many unpredictable features like measuring distance and loudness of voice, serves as a flash light, etc. that surprises the user.

*"Easy to clean-Difficult to clean"* word pair has taken low scores for both of the products, with high standard deviations, only found as moderately relevant for the both. Many respondents mentioned that they do not clean their automobiles on their own, and therefore did not find cleaning issues relevant for automobiles. For iPhones, some respondents found the word pair meaningful when compared to the other phones, in this sense the absence of buttons makes iPhone easy to clean, one can clean the screen easily; while some found cleaning concept senseless for the iPhone context.

*"Technical-Human"* word pair was found more relevant to iPhones when compared to its lowest score for automobiles, but has relatively high standard deviations for both. It can be taken as somewhat relevant for iPhones (although majority of participants do not agree on the relevancy level) while irrelevant for automobiles. For iPhones, besides its technical side, it was found to be human by many of the respondents. Its touch screen interface was found to be human, that user controls naturally with finger movements, the available applications were found to be human because everybody can find suitable ones for his/her individual preferences and hobbies, its design is human such that usage is easily understandable, its software is human such that it has a user centered structure.

*"Soft-Hard"* word pair shows a great difference between automobiles and iPhones. It can be taken as totally irrelevant for the iPhone, whereas has a moderately relevant score for automobiles, with a higher standard deviation, referring to different opinions among participants. It was associated with usage of steering wheel, gear and pedals, with seats and interior furnishing, with driving comfort and suspension. The word pair connoted to the appearance and designing lines for some subjects.

### 6.4.3.3 Comparison of Hedonic Qualities

#### Hedonic Qualities, Word Pairs Related to Symbolism

The relevancy level scores of each word pair, and standard deviations of relevancy level scores are graphically shown in Figure 6.14, and the related numerical values can be found in Table 6.12. The graphical chart visualizes the perceptual differences between automobiles and iPhones making the differences more visible. Remarkable points through this figure will be discussed accordingly as follows.

Table 6.12 Numeric values for symbolism related word pairs (M: mean average, s.d: standard deviation)

| | Automobile | | iPhone | |
|---|---|---|---|---|
| | M | s.d. | M | s.d. |
| Exciting-Calm | 3,40 | 1,33 | 2,97 | 1,33 |
| Attractive-Repulsive | 3,57 | 1,17 | 3,63 | 1,27 |
| Charismatic-Unimpressive | 3,70 | 1,18 | 3,63 | 1,16 |
| Proud-Humble | 4,13 | 0,78 | 3,70 | 1,15 |
| Presentable-Unpresentable | 2,60 | 1,48 | 2,37 | 1,40 |
| Open minded-Conservative | 1,77 | 1,25 | 3,00 | 1,70 |
| Luxurious-Modest | 4,33 | 0,76 | 3,83 | 0,99 |
| Valuable-Cheap | 4,00 | 1,14 | 3,60 | 1,40 |
| Prestigious-Not prestigious | 3,93 | 0,98 | 3,63 | 1,25 |
| Truthful-Exaggerated | 3,00 | 1,39 | 2,47 | 1,28 |
| High class-Low class | 4,30 | 0,84 | 3,27 | 1,23 |
| Reckless-Timid | 3,43 | 1,48 | 2,07 | 1,39 |
| Aggressive-Submissive | 2,37 | 1,45 | 1,50 | 0,78 |
| Courageous-Cautious | 2,43 | 1,38 | 2,07 | 1,26 |
| Young-Old | 3,97 | 1,19 | 3,17 | 1,29 |
| Feminine-Masculine | 3,63 | 1,33 | 2,50 | 1,33 |
| Quiet-Noisy | 4,57 | 0,63 | 1,93 | 0,91 |
| Warm-Cold | 3,23 | 1,50 | 2,00 | 1,17 |
| Friendly-Unfriendly | 2,37 | 1,59 | 2,23 | 1,45 |
| Integrating-Isolating | 2,23 | 1,59 | 3,07 | 1,66 |
| Bringing closer to people-Separating from people | 2,50 | 1,43 | 3,53 | 1,41 |
| Natural-Artificial | 2,33 | 1,65 | 2,07 | 1,20 |
| Sympathetic-Antipathic | 3,53 | 1,14 | 3,20 | 1,27 |
| Motivating-Discouraging | 2,50 | 1,55 | 2,13 | 1,50 |
| Interesting-Boring | 2,53 | 1,25 | 3,83 | 1,23 |

Table 6.12 (continued)

| | | | | |
|---|---|---|---|---|
| Merry-Joyless | 4,07 | 1,17 | 3,97 | 1,33 |
| Heartwarming-Depressing | 3,63 | 1,13 | 2,70 | 1,66 |
| Stylish-Styleless | 3,63 | 1,27 | 3,87 | 1,43 |
| Ill-tempered -Compliant | 3,00 | 1,49 | 1,37 | 0,85 |
| Averages | 3,27 | 1,26 | 2,87 | 1,29 |

Overall averages of symbolism related word pairs have taken different values for automobiles and iPhones, and automobiles' average is slightly higher than that of iPhones'. As symbolic qualities mainly focus on identity associations and social connotations, automobiles' higher score can be ascribed to the importance of automobiles for identification of individuals in the social life. Automobiles provide a wide variety of lifestyles and people can possess ones that can unify with them. Symbolism related pairs' higher average in relevancy for automobiles can be explained by this situation.

Starting with the word pair that has an outstanding difference in the scores of automobiles and iPhones, *"Quiet-Noisy"* word pair comes into consideration. This word pair has been found irrelevant for the iPhone, while extremely relevant for automobiles. But there is an important point according to this word pair which was explained before, in previous sections. Respondents have taken this word pair with its pragmatic meaning and talked about cabin insulation, engine noise, and related issues. Therefore, it should not be examined as a hedonic quality related pair.

*"Luxurious-Modest"* word pair has high relevancy scores for both of the products, and low standard deviations inferring that participants agree on relevancy, while some more higher relevancy level for automobiles. This pair was associated with mainly the classification of automobiles, and some ideas about the provided ease to users' lives, making automobiles not luxury rather necessity, have been mentioned. For iPhones, the price in Turkey, and the situation of possessing an iPhone as a matter of status has been argued for the related word pair.

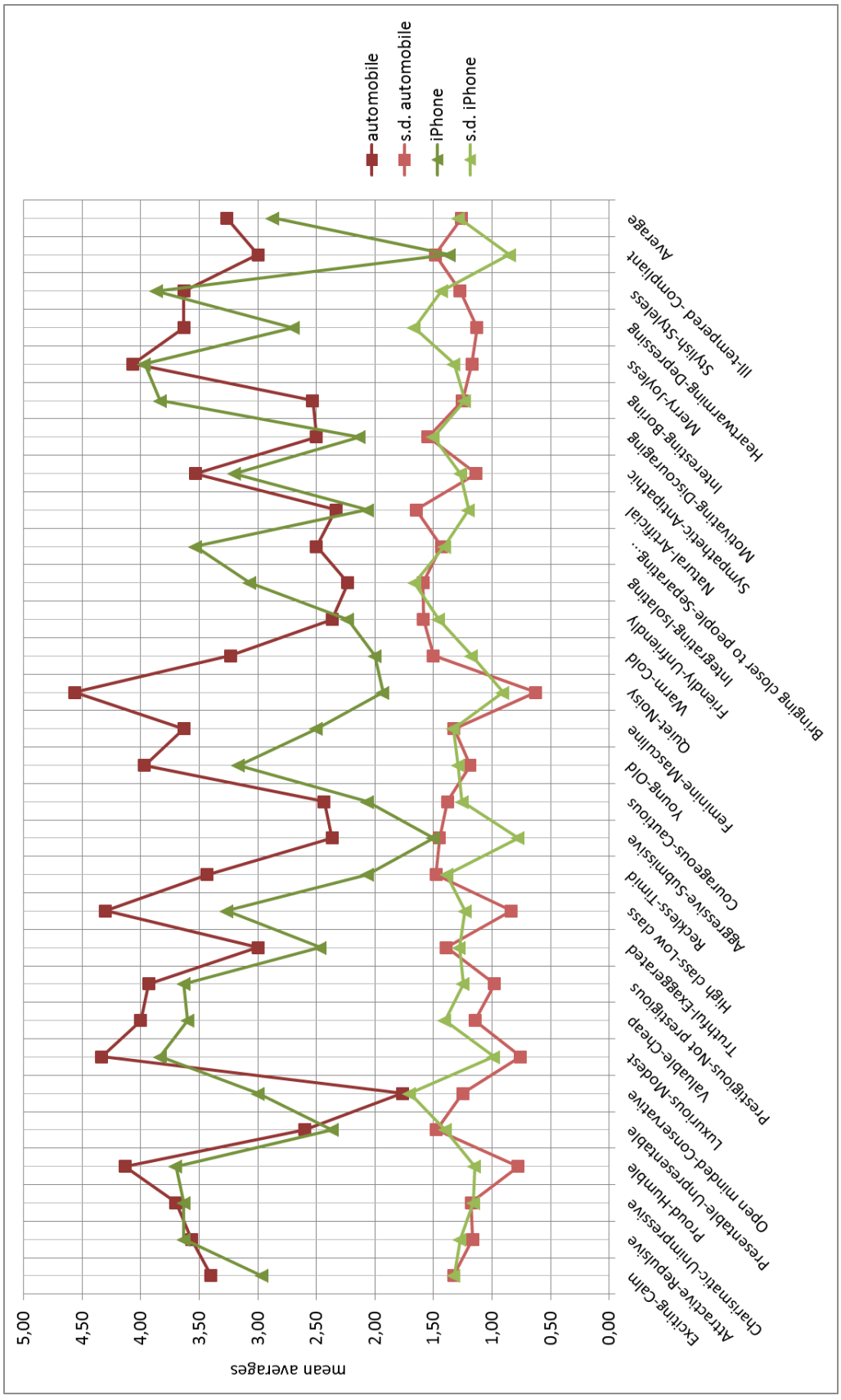



Figure 6.14 Hedonic qualities, word pairs related to symbolism

*"High class-Low class"* word pair has a high score and low standard deviation for automobiles, therefore it is much relevant for connoting automobiles and majority of the participants agree on this. On the other hand, it has a lower score for iPhones and was found moderately relevant for the iPhone case. For automobiles, users' social class in relation with their automobiles, automobiles as a sign to social status of the users, and such issues have been discussed. On the other hand, for iPhones, similar ideas have been mentioned, like possessing iPhone is a sign of social status because of its price. But many respondents have not given high relevancy scores in case of iPhones. Some respondents added that people own an iPhone for feeling high class, but do not deal with the technical content or pay money to the store in order to buy new applications. And some mentioned that they find the iPhone high class among other phones because of its technology.

*"Proud-Humble"* word pair has a higher score for automobiles, but also somewhat high value for iPhones. It has been found more than much relevant for automobiles and much relevant for iPhones; and has relatively low standard deviations for the both, inferring participants' like-minded states. For both products, the show off and image (public opinion) added to users in society was the mentioned issue. In addition, for iPhones, technology, functions and usability were mentioned as a source of pride.

*"Merry-Joyless"* word pair has high and nearly same relevancy scores for both of the products, and can be taken as a more than much relevant pair for the both, although it has somewhat high standard deviations. For automobiles, mostly it was associated with driving, while for iPhones, with applications and abilities. Similarly, *"Stylish-Styleless"* word pair is a one that has taken similar relevancy levels for both products, while a bit higher value for iPhones. It is a much relevant word pair for the two products, although the relatively high standard deviations show some difference of opinions among participants. The word pair was associated with the products' personalities, and harmony of products' and users' styles.

*"Valuable-Cheap"* and *"Prestigious-Not prestigious"* word pairs have higher relevancy scores for automobiles, but they have also high scores for iPhones. They have higher standard deviations for iPhones, thus they can be taken as more relevant for automobiles in comparison to iPhones. For both of the products,

generally, social value of the user, added prestige to the user with the possessed product and similar issues have been discussed.

*"Charismatic-Unimpressive"* and *"Attractive-Repulsive"* word pairs have taken nearly same high relevancy scores for both of the products. They are much relevant pairs for both products. While they belong to symbolism related pairs group, "Attractive-Repulsive" word pair was associated with aesthetics and appearance for both products, while also with technics and usage. Similarly, charisma was associated with aesthetics besides charisma added to the user over the products. Feeling charismatic and social status are associated with "Charismatic-Unimpressive" word pair in both of the contexts.

*"Young-Old"* and *"Feminine-Masculine"* word pairs have high relevancy scores for automobiles whereas low scores for iPhones. They are much relevant word pairs for automobiles, and associated with age and gender of automobiles and preference differences of the users according to their age and gender. But, for iPhones, "Young-Old" takes a moderate relevancy score, while "Feminine-Masculine" takes only a slightly relevant score. Age was associated with different issues for the iPhone case, such that: it is a young product, modern and futuristic; it is preferred by young people because of its applications; it can be used by everyone, it is so user friendly that age does not matter, and so on. For gender, some participants mentioned that iPhone does not have a gender; some thought that iPhone three is feminine while four is masculine because of exterior design with sharp or curvature lines, but in average gender issue was found not relevant for iPhones.

*"Interesting-Boring"* word pair has a high relevancy score and was found much relevant for iPhones, while for automobiles it has a low score and has not been found relevant for automobiles. New applications and features were found interesting aspects of iPhone usage. Similarly, *"Bringing closer to people-Separating from people"* word pair has taken a much higher relevancy score for iPhones in comparison with automobiles. It can be taken as an irrelevant pair for automobiles, whereas much relevant for iPhones, but its relatively high standard deviation shows that participants do not agree on its relevancy level for iPhones. Some connoted meanings are: the iPhone separates from surrounding while user spends much time with games and applications; the iPhone brings closer to people by providing communication, social networking or access to iPhone user committees. For

automobiles, although the word pair has a low relevancy score, associated meanings that are interesting shall be mentioned: automobiles bring closer to people in terms of distances, separate from people because individuals do not use public transportation, separate the others from people owning luxurious ones.

*"Heartwarming-Depressing"* word pair has a high relevancy score and therefore it is a much relevant pair for automobiles, whereas for iPhones it can be taken as an irrelevant pair with its low score and high standard deviation. It was associated with automobile interiors and roominess of the interior space for automobiles. For iPhones, a few subjects talked about the colourful and pleasurable content and applications associated with this word pair, but in average, it has been found only slightly relevant. *"Sympathetic-Antipathic"* word pair has a higher relevancy score for automobiles, than that of iPhones. It can be taken as much relevant for automobiles while moderately relevant for iPhones. For both products, generally, sympathy was associated with aesthetics, appearance and brand. "Exciting-Calm" word pair has a relatively high relevancy score for automobiles, but for both products has high standard deviations inferring to inconsistencies among respondents. For automobiles driving and speed were associated with excitement, while for iPhones, the new technology, new applications, and discoveries. Driving while listening to music or some applications (yoga, meditation) of the iPhone were mentioned to be the aspects making users calmer for each product respectively.

*"Presentable-Unpresentable"* word pair was not found relevant for both of the products. *"Open minded-Conservative"* word pair was found totally irrelevant for automobiles, whereas has a higher relevancy score for the iPhone. It can be taken as a moderately relevant word pair for the iPhone, with a high standard deviation inferring opinion differences among participants. Some thoughts mentioned related to this word pair and the iPhone are: open-minded people use iPhones; users can add new applications and programs, if the company likes the created idea, they make the creator a partner for that application; all provided applications are open-minded such that one can find much more than his imagination.

*"Truthful-Exaggerated"* word pair has low scores for both of the products; but it has a moderate relevancy score for automobiles, whereas can be taken as an irrelevant pair for iPhones. For automobiles, mentioned ideas about exaggeration are the like: exaggerated details are added to luxurious automobiles that are not for use;

exaggerated features are added to modified autos; although jeeps are exaggerated for city usage, they are preferred for luxury. *"Reckless-Timid"* word pair has not a very high value for automobiles, but it can be taken as an irrelevant one (its score corresponds to slightly relevant) for the iPhone. For automobiles, the word pair is a more than moderately relevant one, with a high standard deviation inferring different understandings. Speed, acceleration response, performance and sportive design were associated with automobile and "Reckless-Timid" word pair. A few subjects connoted the iPhone's position in the market, its speed and practicality for internet access and menu usage in relation to this word pair (relatively high standard deviation means that some subjects found it relevant), however it has been found irrelevant in average for the iPhone case. *"Ill-tempered-Compliant"* word pair has been found moderately relevant for automobiles whereas absolutely irrelevant for the iPhone. Speed, engine and performance, model and design style were associated with the word pair in automobile case, but the high standard deviation score points to the participants' different understandings.

*"Aggressive-Submissive"* word pair has low relevancy score for automobiles, and can be taken as only slightly relevant for automobiles; while it can be taken as a totally irrelevant one for the iPhone, with its very low relevancy score. Speed, engine power and performance are connoted meanings for automobiles. *"Courageous-Cautious"* word pair has low relevancy scores for both of the products, but a bit higher score for automobiles. It can be thought to be slightly relevant for each product. Some connoted associations with this word pair are like: security equipment gives the driver courage; while driving, one should be cautious; the iPhone doesn't have a competitor and is courageous in the market; the iPhone is cautious because one can find on duty pharmacies, location of atm's by the help of his/her iPhone.

*"Warm-Cold"* word pair was given in the symbolism related word pairs group, but generally connoted to tangible qualities, rather than intangible meaning associations. For automobiles, it has a relatively higher relevancy score, and can be thought of as a *more than moderately* relevant one (with a high standard deviation thus inconsistencies among respondents); although only slightly relevant for iPhones. For automobiles, it was generally associated with air conditioner, temperature and heat of the interior cabin, therefore taken as a pragmatic related quality rather than a hedonic one. Only a limited number of participants gave

intangible meanings like cuteness, sympathy, sincerity to the “Warm-Cold” word pair, which was an unexpected surprising result of the research. Some participants that have found the word pair relevant for the iPhone talked about its personalizable characteristic that makes it warm, and used “like a warm friend” while defining their iPhones.

*“Friendly-Unfriendly”* was found slightly relevant for both of the products, with high standard deviations for each. It was associated with interaction and emotional bond in relation with the products. *“Natural-Artificial”* word pair was found slightly relevant for both products. For automobiles some connoted meanings are the material of furnishing fabric, or the artificiality of all automobiles. For iPhones, the touch screen’s features of perceiving user’s finger and making everything with finger movements were associated with iPhone’s natural characteristic. *“Motivating-Discouraging”* word pair was found slightly relevant for both products. Some connoted meanings are: accidents discourage the driver, using larger automobiles is discouraging, going everywhere at any time motivates the individual, beautiful and fast cars motivate, the iPhone motivates against life, and so on. *“Integrating-Isolating”* word pair has a relatively high relevancy score for iPhones, and can be thought to be more than moderately relevant for the iPhone, whereas slightly relevant for automobiles. High standard deviations for both products infer to different understandings among participants. One understanding was integrating the product with the user, the product suitable to its user does not leaves him alone. Other understandings are: (for iPhones) iPhone isolate from social surrounding while user pays attention to games and applications, iPhone integrates through user committees and social networking, iPhone integrates with technology; (for automobiles) automobiles isolate people when compared to public transportation, the driver becomes integrated with his automobile and emotional bond is formed for many drivers.

**Hedonic Qualities, Word Pairs Related to Aesthetics**

The relevancy level scores of each word pair, and standard deviations of relevancy level scores are graphically shown in Figure 6.15, and the related numerical values can be found in Table 6.13. The graphical chart visualizes the perceptual differences

between automobiles and iPhones making the differences more visible. Remarkable points through this figure will be discussed accordingly as follows.

Table 6.13 Numeric values for aesthetics related word pairs (M: mean average, s.d: standard deviation)

| | Automobile | | iPhone | |
|---|---|---|---|---|
| | M | s.d. | M | s.d. |
| Pleasant-Unpleasant | 4,23 | 0,94 | 4,27 | 0,74 |
| Aesthetic-Not aesthetic | 4,50 | 0,68 | 4,50 | 0,63 |
| Creative-Standard | 3,97 | 1,10 | 4,33 | 0,99 |
| Modern-Classic | 4,67 | 0,61 | 4,30 | 0,99 |
| Original-Ordinary | 4,23 | 1,04 | 4,30 | 1,02 |
| Contemporary-Traditional | 3,10 | 1,35 | 3,70 | 1,37 |
| Futuristic-Nostalgic | 3,10 | 1,45 | 3,90 | 1,32 |
| Innovative-Imitative | 3,87 | 1,11 | 4,37 | 1,03 |
| In fashion-Out of fashion | 3,17 | 1,42 | 3,87 | 1,38 |
| Artistic-Functional | 3,23 | 1,38 | 4,07 | 1,28 |
| Admirable-The common run | 3,23 | 1,43 | 3,97 | 1,07 |
| Pleasurable-Tasteless | 4,07 | 0,91 | 4,13 | 1,07 |
| Elegant-Sloppy | 3,53 | 1,07 | 4,17 | 1,05 |
| Ornate-Plain | 3,40 | 1,22 | 3,53 | 1,11 |
| Compact-Large | 3,63 | 1,33 | 3,23 | 1,50 |
| Symmetrical-Asymmetrical | 2,73 | 1,46 | 3,00 | 1,55 |
| Organic-Geometric | 1,83 | 1,23 | 2,47 | 1,55 |
| Harmonious-Inharmonious | 2,87 | 1,48 | 2,70 | 1,58 |
| Shiny-Dull | 3,67 | 1,18 | 2,63 | 1,59 |
| Smooth-Rough | 2,80 | 1,35 | 3,30 | 1,62 |
| Averages | 3,49 | 1,19 | 3,74 | 1,22 |

Aesthetic qualities contain appearance and innovativeness related concerns, and the relatively high average score of iPhones was discussed in an earlier section (section 6.4.3.1).

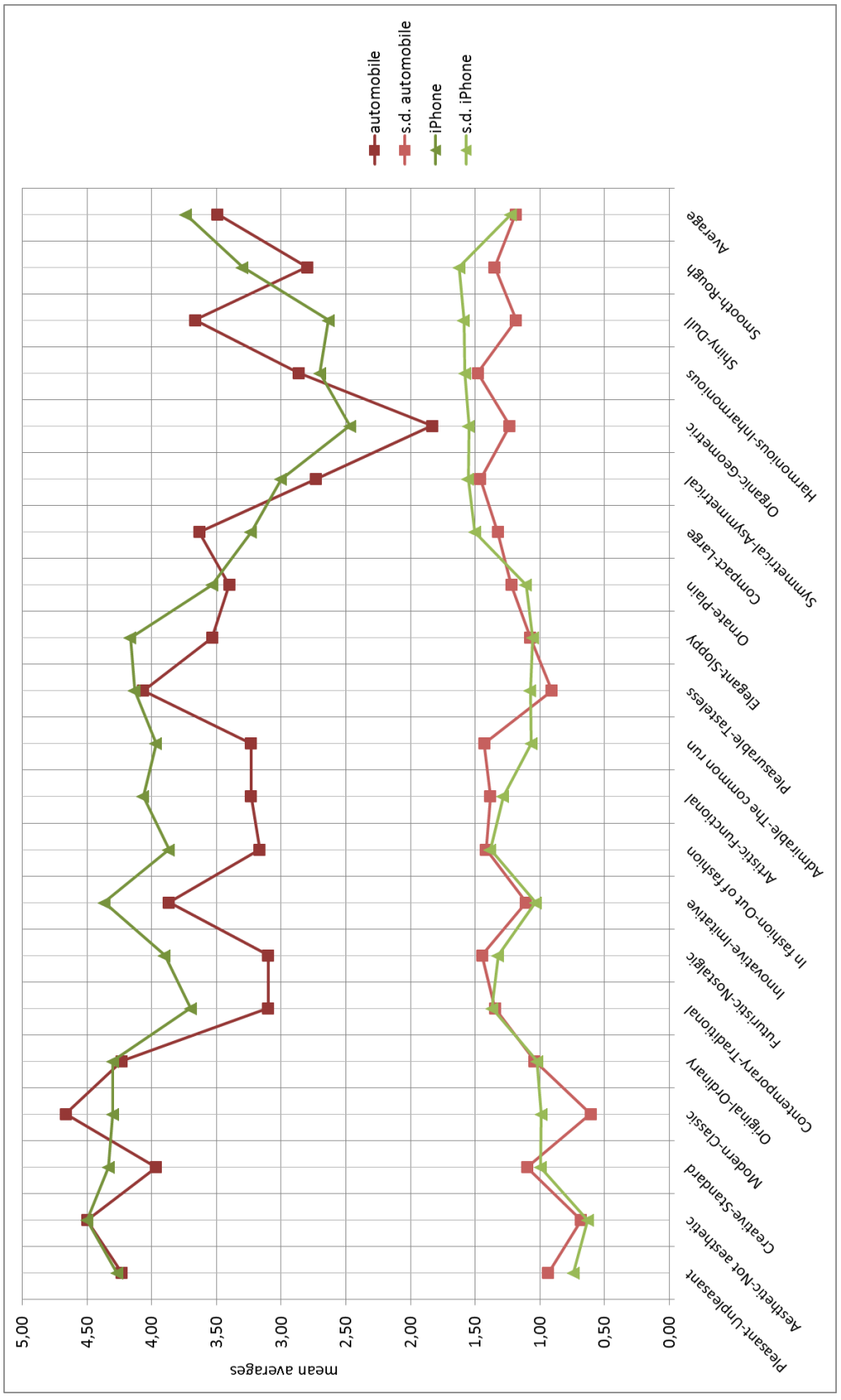



Figure 6.15 Hedonic qualities, word pairs related to aesthetics

*"Pleasant-Unpleasant"*, *"Aesthetic-Not aesthetic", "Original-Ordinary"*, *"Pleasurable-Tasteless"* are the word pairs that have taken nearly the same and very high relevancy scores for both of the products. "Aesthetic-Not aesthetic" can be taken as an extremely relevant pair for both products, while the others are *more than much relevant* ones. Pleasantness is related to pleasing appeal, technical features and functions, aesthetics is related to form and appearance concerns, originality is associated with novel features, and pleasure is related to aesthetics, design, usage and provided activities, for each product in a similar way. Their low standard deviations show consistency of the respondents' answers.

*"Modern-Classic"* word pair has the highest relevancy score in this group and it has been found extremely relevant for automobiles; while also having a high relevancy score for iPhones, and found *more than much relevant* for the iPhone case. For both products, it has low standard deviations, referring to consistent understandings. It is associated with classification of automobiles according to their designs, styles, features and models. For iPhones, it is associated with its new technology and novel applications suitable to today's living conditions and modern people.

*"Creative-Standard"* and *"Innovative-Imitative"* word pairs have high relevancy scores for both products, while they are higher for iPhones. They are *more than much relevant* pairs for the iPhone, and much relevant ones for automobiles. Creativity was associated with novel features and applications of the iPhone, whereas with add-on features or creative ideas and details like cup holders, stuff compartments for automobiles. Innovativeness was associated with new technologies of the products; for iPhone, with the new touch screen technology, and for automobiles, with whether new technology is adapted to the design.

*"Contemporary-Traditional"* and *"Futuristic-Nostalgic"* are word pairs that have higher relevancy scores for iPhones, and lower scores for automobiles. They are much relevant word pairs for the iPhone but can be taken as moderately relevant for automobiles. Their high standard deviations refer to different ideas among the participants for both of the products. Because of iPhone's new technology, its novel ideas about usage and provided features, iPhone was found futuristic and contemporary by many participants. *"In fashion-Out of fashion"*, *"Artistic-Functional"* and *"Admirable-The common run"* word pairs have higher relevancy scores for iPhones, and lower scores for automobiles, like the previous word pairs. They are

much relevant word pairs for the iPhone and can be taken as moderately relevant ones for automobiles. Only “Admirable-The common run” pair has a low standard deviation for the iPhone, other deviations are higher referring to inconsistencies among answers of the participants. For the iPhone, fashion was associated with being trendy and people who don’t deal with the technical content but own an iPhone only for fashion were criticized. For both products, fashion notion was associated with people who see the products as their accessories for show purposes. For “Artistic-Functional” word pair, iPhone’s artistic qualities like graphic content and aesthetics, and also provided artistic applications were discussed beyond its functionality and multifunctional structure. For automobiles, generally importance of functionality was emphasized, while a few subjects expressed ideas about artistic aspects like appearance, form and colour. The iPhone was found admirable, with majority of the participants being like-minded about the idea. Performance, manufacturing, quality, usability and functions are related concerns for both of the products’ admirableness.

*“Elegant-Sloppy”* word pair has a higher relevancy score for iPhones compared to automobiles. It is a *more than much relevant* pair for the iPhone, and can be taken as much relevant pair for automobiles. The word pair has low standard deviations for both products, inferring that participants agree on the relevancy levels. Elegance was associated with aesthetic appearance in each different product context. *“Ornate-Plain”* word pair has a bit higher relevancy score and lower standard deviation for the iPhone, and therefore is more relevant for the iPhone context. The iPhone’s plain appearance took compliments from many of the respondents.

*“Compact-Large”* and *“Shiny-Dull”* word pairs have taken higher relevancy scores for automobiles, but their relatively high standard deviations show different understandings of the participants. They are much relevant word pairs for automobiles, while “Compact-Large” can be taken as a *more than moderately relevant* pair and “Shiny-Dull” as a moderately relevant pair for the iPhone case. Compactness was associated with total dimensions, and also with the interior compartments for automobiles, and multifunctional structure of involving everything inside for iPhones. “Shiny-Dull” word pair was associated with colour and paint for automobiles, while with strikingness and shine of the iPhone.

*"Symmetrical-Asymmetrical"*, *"Harmonious-Inharmonious"* and *"Smooth-Rough"* word pairs have lower relevancy scores for both of the products. They can be considered as moderately relevant word pairs for each product, and their high standard deviations infer opinion differences among participants. The iPhone was found symmetrical by many respondents, who discussed its exterior appearance with only one button at the center, in addition mentioned about its interior symmetry. For automobiles, it was thought that exterior appearance should be symmetrical, and dashboard's symmetry, and interior related concerns were mentioned. Harmony was associated with the question whether the user and the product is harmonious or not. Also the harmony between the product's own properties like colour, material, etc. was mentioned. Smoothness was associated with exterior surface for both products, in addition, with accidents and deformations for automobiles, and touch screen usage for iPhones. Lastly, *"Organic-Geometric"* is the word pair that has the lowest relevancy scores for both of the products. It can be taken as a totally irrelevant one for automobiles, while having somewhat higher score for iPhones and can be taken as slightly relevant. Only a few number of participants associated the word pair with the lines, sharp or curved design of the forms. For iPhones, some subjects mentioned controlling with finger movements and the harmonious interface to human skin in relation with the word organic.

#### 6.4.3.4 Comparison of Emotional Reactions

**Word Pairs Related to Emotional Reactions**

The relevancy level scores of each word pair, and standard deviations of relevancy level scores are graphically shown in Figure 6.16, and the related numerical values can be found in Table 6.14. The graphical chart visualizes the perceptual differences between automobiles and iPhones making the differences more visible. Remarkable points through this figure will be discussed accordingly as follows.

Since the average relevancy score of emotional reactions have been found to be higher for automobiles, they are more relevant in connoting automobiles and automobile related experiences, while they are less relevant in connoting iPhones. In the previous sections, this situation was explained with the emotional bonds of

people to their automobiles. Automobiles are more traditional products, they are in people's lives for a long time (automobiles' average of use between participants was 13 years, while iPhone's was 1.5 years). Also the period of time of interaction with products plays an important role for emotional concerns. In addition, for today's world, automobiles became necessities for transportation, they are seen as part of the families, and this situation also increases the emotional content of experiences with them.

Table 6.14 Numeric values for emotional reaction related word pairs (M: mean average, s.d: standard deviation)

| | Automobile | | iPhone | |
|---|---|---|---|---|
| | M | s.d. | M | s.d. |
| Gratification-Disappointment | 4,03 | 1,22 | 4,03 | 1,25 |
| Satisfaction-Dissatisfaction | 3,90 | 1,21 | 4,07 | 1,14 |
| Attraction-Disgust | 3,63 | 1,22 | 3,77 | 1,01 |
| Pleasure-Displeasure | 4,13 | 0,94 | 3,43 | 1,30 |
| Admiration-Contempt | 2,77 | 1,19 | 2,93 | 1,55 |
| Amazement-Dullness | 2,07 | 1,14 | 2,37 | 1,43 |
| Fascination-Indifference | 2,83 | 1,26 | 2,67 | 1,27 |
| Interest-Disinterest | 3,87 | 1,11 | 3,57 | 1,30 |
| Desire-Unwillingness | 3,90 | 1,06 | 2,73 | 1,41 |
| Entertainment-Boredom | 3,93 | 1,08 | 4,37 | 0,89 |
| Joy-Sadness | 2,83 | 1,64 | 2,80 | 1,56 |
| Relief-Distress | 4,27 | 1,01 | 2,23 | 1,48 |
| Calmness-Stress | 2,67 | 1,52 | 1,63 | 1,16 |
| Pride-Modesty | 2,57 | 1,36 | 1,57 | 0,82 |
| Delight-Anger | 2,40 | 1,40 | 2,37 | 1,40 |
| Courage-Fear | 3,17 | 1,62 | 1,93 | 1,26 |
| Happiness-Unhappiness | 3,63 | 1,27 | 3,27 | 1,20 |
| Feeling of pride-Shame | 2,43 | 1,48 | 2,13 | 1,46 |
| Freedom-Addiction | 4,23 | 1,14 | 3,87 | 1,50 |
| Confidence-Anxiety | 4,20 | 1,06 | 2,77 | 1,59 |
| Enthusiasm-Stillness | 3,23 | 1,36 | 1,80 | 1,16 |
| Ease-Uneasiness | 4,17 | 0,99 | 2,50 | 1,50 |
| Loneliness-Togetherness | 2,73 | 1,64 | 2,77 | 1,63 |
| Contentment-Discontent | 4,20 | 1,10 | 3,57 | 1,38 |
| Averages | 3,41 | 1,25 | 2,88 | 1,32 |

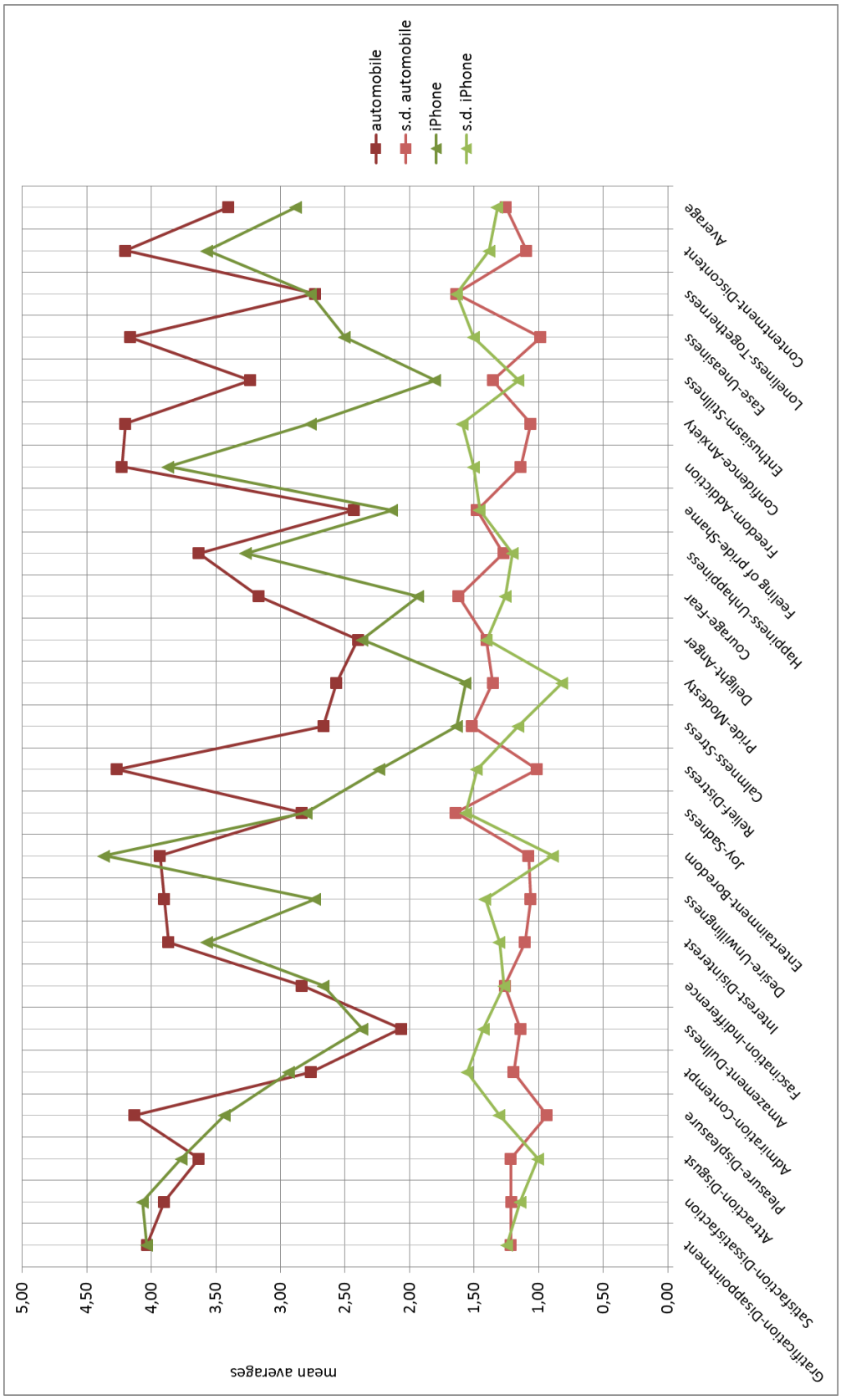



Figure 6.16 Word pairs related to emotional reactions

*"Entertainment-Boredom"* word pair is the only one word pair that's relevancy level is much higher for iPhones than the automobiles, as well its relevancy score for automobiles is also high. Entertainment has been found more than much relevant for iPhones, and much relevant for automobiles. IPhones' highest relevancy score for entertainment is an expected result, because of games and entertainment applications provided by the iPhone. For automobiles, entertainment was associated with driving, while boredom with traffic conditions or related expenses.

The other striking case for the emotional reaction word pairs is *"Relief-Distress"*. It has a very high relevancy score for automobiles and is found to be more than much relevant pair; on the contrary it has been found only slightly relevant for iPhones. Since automobiles provide a spatial experience, the word pair's much relevancy for automobiles is not surprising. It was associated with interior roominess, comfort, colours and light. For iPhone, only a few respondents mentioned about feeling relief with meditation applications, games, and the like.

*"Pleasure-Displeasure"*, *"Freedom-Addiction"*, *"Confidence-Anxiety"*, *"Ease-Uneasiness"* and *"Contentment-Discontent"* are emotion pairs for which automobiles have high relevancy scores and they can be taken as more than much relevant emotion pairs for automobiles; whereas their situation related with iPhones differ. For pleasure iPhone has a relatively high score and the word pair has been found more than moderately relevant for the iPhone. Driving was associated with pleasure; whereas for using iPhone, respondents mentioned that pleasure is an extreme word, instead joy will meet describing iPhone usage. Freedom is very important description for automobiles, as mentioned in earlier sections, in terms of providing opportunity of transporting at any time. For iPhone, "Freedom-Addiction" pair also gets good points, and has been found much relevant. Many different opinions like feeling of freedom because of speed access to information or addiction to the software were mentioned accordingly the word pair for iPhones. For "Confidence-Anxiety" pair, automobiles' high score is related to security concerns, while iPhones take low relevancy levels with high standard deviations, inferring the concept's senselessness for iPhones. Robustness and brand were mentioned issues for confidence in relation with iPhones. "Ease-Uneasiness" emotion pair is very important in connoting automobiles, as mentioned in earlier sections; while for iPhones does not make much sense, and has been found only slightly relevant.

*"Desire-Unwillingness"* and *"Enthusiasm-Stillness"* word pairs have higher relevancy scores for automobiles in comparison to iPhones. "Desire-Unwillingness" is a much relevant word pair for automobiles and "Enthusiasm-Stillness" is a more than moderately relevant pair for them. They are associated with driving, while they do not make much sense for iPhones.

*"Attraction-Disgust"* and *"Interest-Disinterest"* word pairs have similar relevancy scores for both products, and they are much relevant emotion pairs for automobiles and iPhones. *"Courage-Fear"* word pair has taken higher relevancy score for automobiles and it is a more than relevant pair, while it does not make sense for iPhones. It was associated with driving, traffic and speed in relation with automobiles. *"Calmness-Stress"* and *"Pride-Modesty"* emotion pairs are found somewhat meaningful for the automobile context while they are meaningless for iPhones. For automobiles, calmness was associated with traffic conditions, driving issues and confidence to the automobile. Pride was about social status related concerns. *"Amazement-Dullness"*, *"Delight-Anger"* and *"Feeling of pride-Shame"* are emotion pairs that can be taken as totally irrelevant ones for both of the products. In addition, *"Admiration-Contempt"*, *"Fascination-Indifference"*, *"Joy-Sadness"* and *"Loneliness-Togetherness"* word pairs have slightly higher relevancy scores compared to the previous ones, but their scores are below 3.00 (moderately relevant) and can be thought to be senseless word pairs for both of the products.

### 6.4.4 COMPARISON BETWEEN MALE AND FEMALE RESPONDENTS

It was not an aim of the research to find out differences between male and female respondents' perceptions of the word pairs and related relevancies to the products, but during the survey, it was striking to see differences in male and female respondents' comments. Therefore, a need arised to look at the relevancy scores of male and female respondents independently. In order not to extend this section and go beyond the scope of this thesis, only general remarkable points will be mentioned.

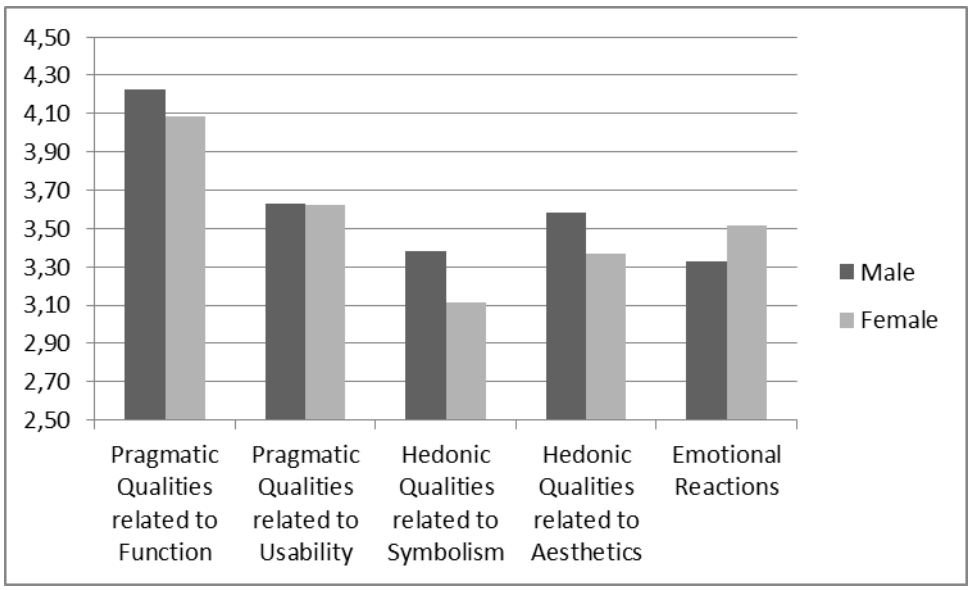



Figure 6.17 Average of male and female respondents' scores for each group separately, for automobile survey

As can be seen from Figures 6.17 and 6.18, for pragmatic and hedonic qualities, male respondents' relevancy scores are slightly higher for automobiles, in contrast female respondents' scores are somewhat higher for iPhones. Seeing male respondents' higher relevancy scores for automobiles can be thought to be natural, the importance of automobiles for males is an unquestionable traditional truth, as they have been in relation with automobiles since their childhoods. And social status related concerns take much more attention from males. However, for emotional reactions, female respondents' answers have higher relevancy scores for both of the products, although the difference is much bigger for the iPhone case. This will be commented to females' more emotional natures.

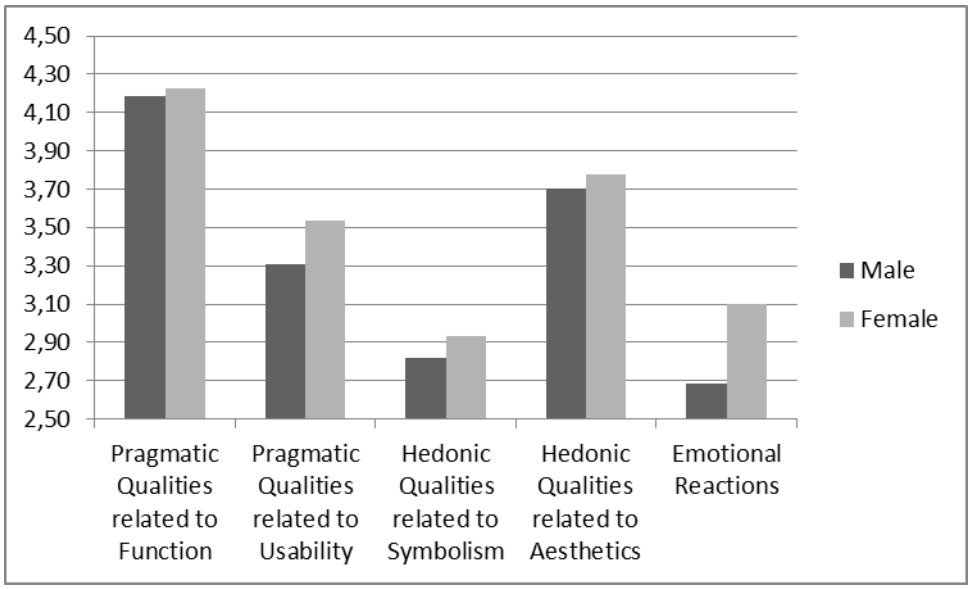



Figure 6.18 Average of male and female respondents' scores for each group separately, for the iPhone survey

### 6.4.5 FINAL DISCUSSION

In order to constitute a visible and coherent way to indicate the relevant and irrelevant word pairs of the two different products, sets are created which also show the common relevant or irrelevant ones.

Since standard deviation results of the relevancy level scores show the variability of the respondents' answers (the variation from the mean average score), high standard deviation of a word pairs' relevancy score will denote that the respondents do not agree on the relevancy level; while some think that the word pair is relevant for describing that product, some think inversely, the same word pair to be irrelevant for describing the same product. This situation may also imply the different connotations of the same word pair according to the participant. Therefore, while creating different set constructions, standard deviation scores are also taken into account.

In order to indicate the relevant and irrelevant word pair resultings of the empirical study, word pairs' mean average relevancy scores were used. While finding the word pairs that have higher relevancy scores, an average of all word pairs' relevancy score was evaluated in a different way for automobiles and iPhones independently. The procedure is described as follows: The number of word pairs is not equal to each other for the different groups used in the survey; in other words, 103 total word pairs are not distributed equally into the five different word pair groups of the questionnaire. 14 of the word pairs belong to function related pragmatic qualities, 16 to usability related pragmatic qualities, 29 to symbolism related hedonic qualities, 20 to aesthetics related hedonic qualities and 24 word pairs belong to emotional reactions. In addition, as seen in Section 6.4.3, the relevancy score averages of all the different groups of word pairs are different from each other (e.g., for automobile, mean average of function related word pairs is 4.17, usability related word pairs is 3.63, symbolism related word pairs is 3.49 and emotion related word pairs is 3.41, for iPhone see Figure 6.11). In order to minimize the impact of the differences of word pair groups on the mean average relevancy scores of the products, the average of word pair groups relevancy scores is calculated for automobiles and iPhones, and while deciding the word pairs having high relevancy scores, the calculated averages are used. Average standard

deviation scores are found out with the same procedure for automobiles and iPhones separately. The resulting scores are shown in Table 6.15.

Table 6.15 Average scores for the different word pair groups

| | Automobile | | iPhone | |
|---|---|---|---|---|
| | M | s.d. | M | s.d. |
| Function related pragmatic qualities | 4,17 | 0,95 | 4,20 | 0,91 |
| Usability related pragmatic qualities | 3,63 | 1,17 | 3,41 | 1,21 |
| Symbolism related hedonic qualities | 3,27 | 1,26 | 2,87 | 1,29 |
| Aesthetics related hedonic qualities | 3,49 | 1,19 | 3,74 | 1,22 |
| Emotional reactions | 3,41 | 1,25 | 2,88 | 1,32 |
| **Averages** | **3,59** | **1,16** | **3,42** | **1,19** |

Automobile's and iPhone's relevant word pairs are decided with each product's resulting average values, independent of each other. For the relevant word pairs, the pairs that have low standard deviations and that have high standard deviations are studied in separate groups of sets, in order to indicate the certain and debatable pairs. On the other hand, irrelevant pairs are taken as the pairs that have average relevancy scores below 3.00. It is unnecessary to discuss standard deviations for irrelevant pairs, therefore one group of sets was found to be sufficient.

The first group of sets (Figure 6.19) shows the most relevant word pairs, which have relevancy levels above the average of all word pairs, and have low standard deviations inferring to the consistency of their relevancies. Looking at these sets, the superiority of many different word pairs associated with function related hedonic qualities in the intersecting region of automobiles and iPhones can be seen. In addition, while many emotion-related word pairs are seen on the automobile set, any word pair related to hedonic qualities cannot be found. And another point, while many different emotion-related word pairs are encountered in the automobile set, rareness of them in the iPhone side is remarkable. Considering the percentages of different groups of word pairs, symbolism related hedonic quality word pairs' rarity stands out, and the content related to social identity concerns like prestige, value, class, luxuriousness of most of the symbolism related word pairs can be seen. Considering the total number of word pairs in the three distinct regions of the sets, a

slightly more number of word pairs are seen in the automobile part referring to the variety of different expressions in defining automobiles and related experiences of respondents.

The second group of sets (Figure 6.20) shows the word pairs which have high relevancy levels whereas also high standard deviations, inferring to different opinions among participants. Therefore, their relevancies are debatable, and require attention. Firstly, a slightly less amount of word pairs are encountered in these sets, compared to the previous sets, referring to the idea that most of the word pairs taking high relevancy scores have low standard deviations, therefore have similar opinions among users and can be used in further studies without doubt. A second point is that, any function related pragmatic quality word pair is not encountered in the mere iPhone region, and a nearly uniform distribution of the other word groups is seen. The rarity of common word pairs among this sets group should be highlighted.

The third group of sets (Figure 6.21) shows the word pairs that have relevancy scores below 3.00 (moderately relevant), which can be taken as the ones close to irrelevancy. These are not very relevant word pairs in connoting that product and related experiences. While they are used by many researchers, designers, etc. in the field of product design in order to express product related perceptions and experiences, users do not want to accept their relevancies with the products used in this study and find them incoherent in the product context. Looking at these sets, redundancy of word pairs in the intersecting region and the iPhone region is seen firstly, additional to the redundancy of the word pairs associated with symbolism related hedonic qualities and emotional reactions. From these, the incoherency of many different emotions in the context of iPhones and both products can be concluded. Additionally, the superiority of word pairs ascribing human traits to the products, such as “aggressive-submissive”, “friendly-unfriendly”, “courageous-cautious”, is seen apparently in these resulting sets, referring to that generally users do not imagine using anthropomorphic words in describing products or do not see products with human traits, although many different studies include symbolic words related with human characteristics and personality in order to assess products’ subjective expressions for different users.

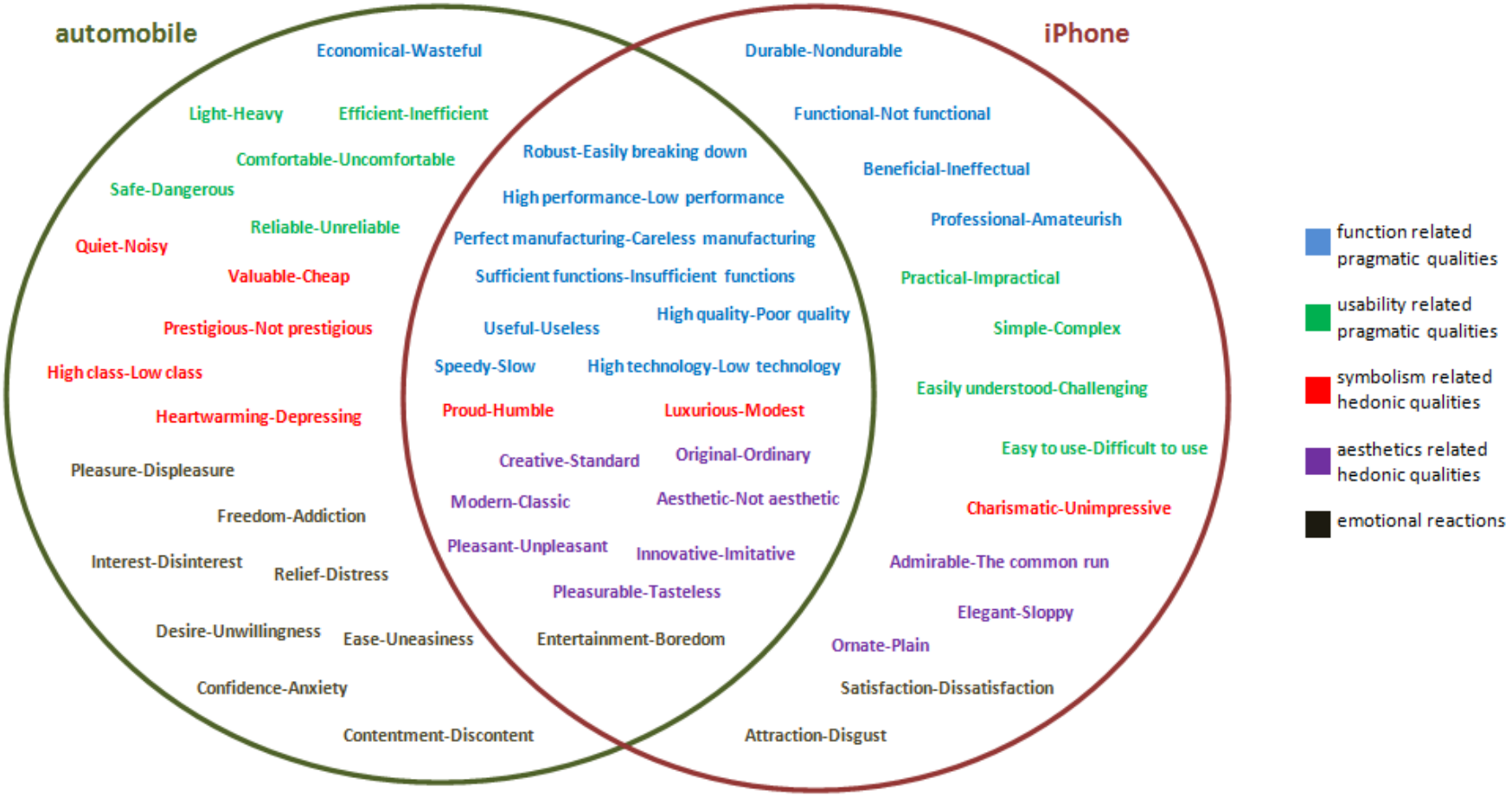



Figure 6.19 Word pairs of high mean average and low standard deviation

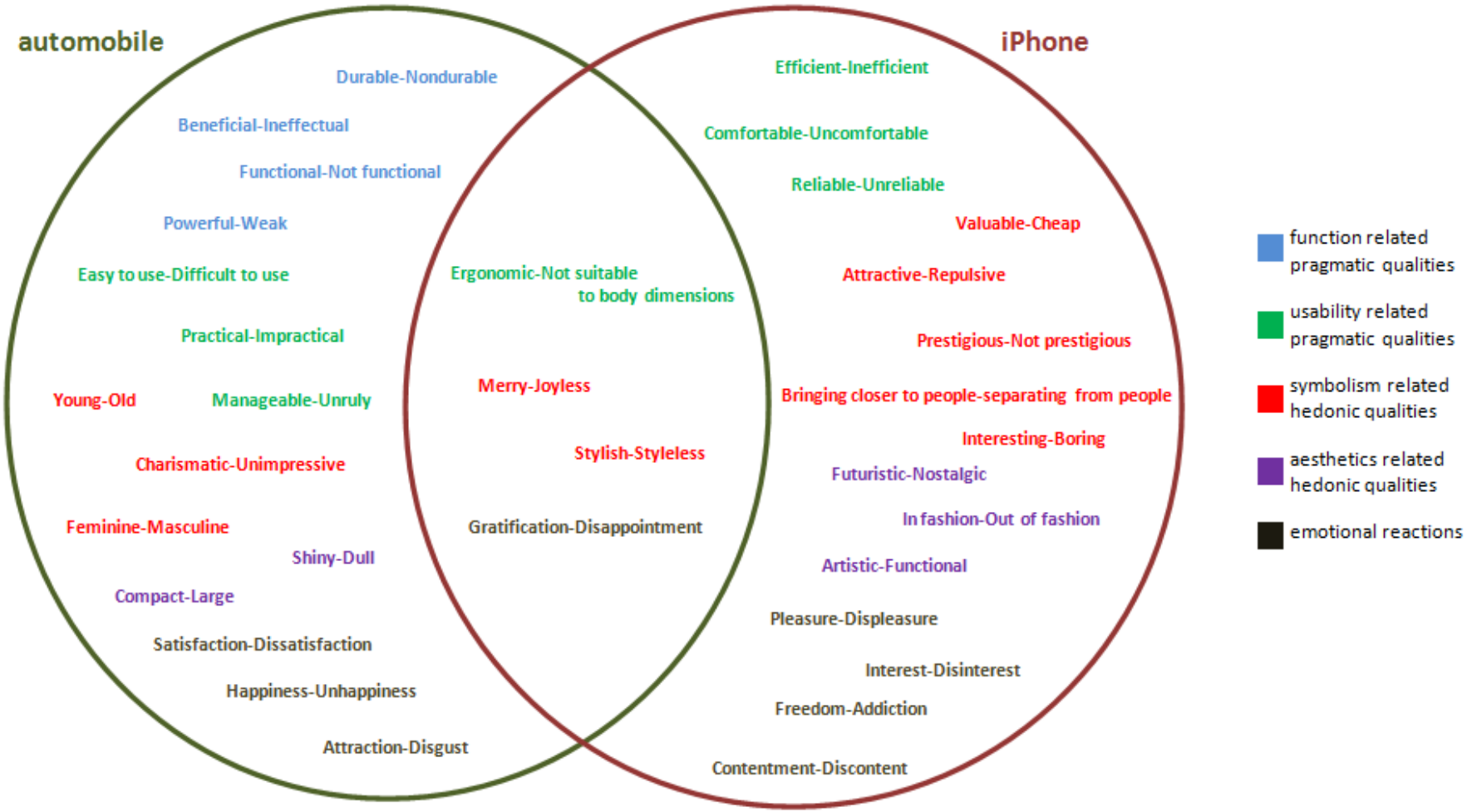



Figure 6.20 Word pairs of high mean average and high standard deviation

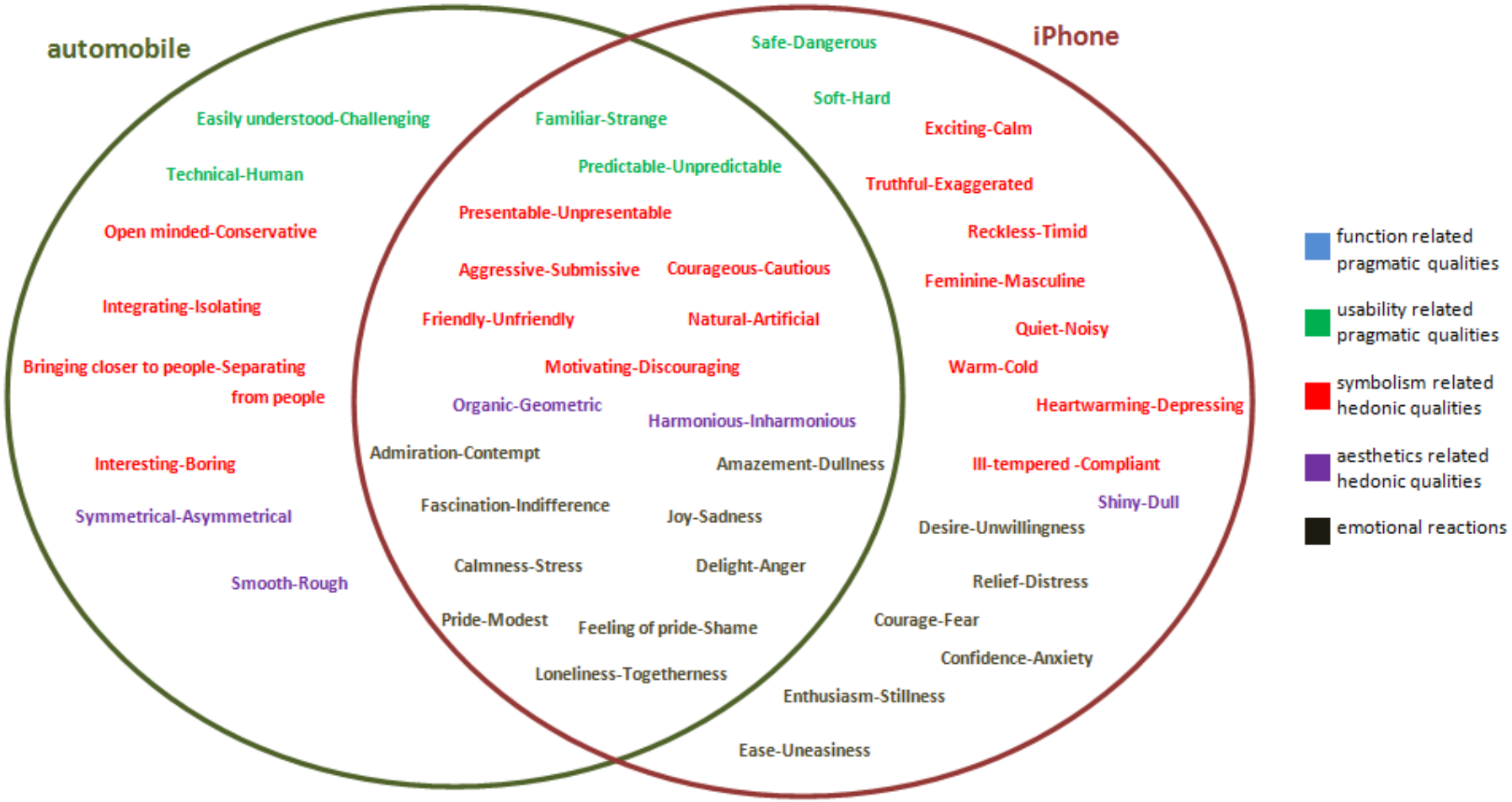



Figure 6.21 Word pairs of mean averages below 3.00 (below moderately relevant)

# CHAPTER 7

# CONCLUSION

In this chapter, findings of the empirical study will be discussed in relation to the research questions, and suggestions for further research will be brought forward.

## 7.1 CONCLUDING REMARKS

In order to investigate human product interaction with a focus on physical experience, firstly user experience studies were investigated, which place emphasis on users' non-instrumental needs and expectations as well as their instrumental needs. The content of experience with products was explained as: aesthetic experience, experience of meaning and emotional experience, which all are influential on the users' understandings about the product.

Since physical bodies of humans play a central role in shaping human experience in the world, understanding of the world and interactions in the world; the quality of the experience with a product may change according to the interaction content, namely how much of the senses are dominant and how much physical experience is provided through the interaction. In order to find out the differences created on the understandings and judgments of the users with the changing physicality content of interaction, two different product groups, which differ by the amount of provided physical experiences, were compared according to their perceptual differences among users. Perceptions of the users were assessed by using the definition of user experience phenomenon (a holistic way to investigate human product interaction) gathered from the literature review including utilitarian concerns (functional and usability issues) together with aesthetic, symbolic and emotional aspects of the experience.

Although the way in which people interact with a product differs depending on the product itself (its purpose of use, etc.), people always use their senses to perceive it, they use their motor system and their knowledge to operate or communicate with it, and during the interaction they process the information they perceive, they may experience one or more emotions, and they are likely to form an affective evaluation of the product (Hekkert & Schifferstein, 2008). It was supposed that according to the richness in the provided experience, namely how much sensory modalities are stimulated, how much physical (real) interaction is included (stimulating motor system), the perceptions of users will differ in a positive way, and the experience will be a more positive and emotional usage, including much more aesthetical and symbolic associations.

For the study, automobiles and iPhones are selected as research objects. Here, automobiles are taken as examples of the products providing multisensory experience, offering an intense bodily experience; whereas iPhones are taken as examples of products offering a more virtual experience through some physical interaction. Experience with automobiles is a totally tangible (physical) one, while experience with iPhones is more intangible (virtual). The physicality in the interaction with iPhones is a formed reality; the qualities related to iPhones are formed, virtual ones, on the contrary to automobiles. In addition, experience with iPhone is different from other mobile phones; it has been enriched by attributing an illusion of actually physically manipulating data with users' hands, giving users somewhat an imaginary physical experience.

In the preliminary survey conducted for the study, users of automobiles and mobile phones (not specifically iPhone) were surveyed in order to gather a general understanding about users' perceptions of these two different product groups. This survey marked that mobile phones are perceived as physical objects with their buttons, dimensions, weight, etc., therefore they would not serve as research objects containing less physicality. IPhones are different in terms of their physicality independent characteristic; they have a specific fixed form, with only one button, and provide many virtual features through the interaction. Users have mentioned physical features of their mobile phones, while in case of iPhones, they were interested in the applications provided together with the different usage technology offered, namely the illusion of actually physically manipulating data with fingers.

Norman (2004) states that the physical feel of a product is important, it will make a huge difference in appreciations of users. Tangibility, namely the weight, texture and surface of the physical objects, the physical touch and feel of physical objects, give pleasure of manipulating the product and a sense of control to the user. Since humans are all biological creatures, with physical bodies, arms and legs, and a huge amount of brain is taken up by the sensory systems, continually probing and interacting with the environment, full use of this interaction creates success for products. Virtual words, high-technology creations operated by touching the screen or manipulating a mouse rather than real physical controls, eliminate one of the great delights of real interaction, which is the delight that comes from touching, feeling, and moving real physical objects.

For the study, it was assumed that perceptual differences in relation with the usage of automobiles and iPhones could be observed, in terms of different significant qualities and emotions for each respectively. Since automobiles provide a more physical, multisensory experience, more positive and emotional usage consequences, including much more aesthetical and symbolic associations were expected. In order to find out the perceptual differences, word pairs describing perceived qualities and emotional states are used as measurement tools. A list consisting of bipolar word pairs in relation with pragmatic qualities, hedonic qualities and emotional reactions has been composed, and perceptual differences are investigated through the bipolar word pairs' relevancy levels according to the product. As expected, for each product different word pairs were found to be relevant and different ones irrelevant.

Different from the researches seen in the literature, in this study, the word pairs were used to identify the relevant and irrelevant words in connoting the related product and experiences with that product. In literature, semantic differentials are commonly used by scaling bipolar word pairs in order to evaluate products, resulting with information about the user's understanding of that product: which side of polarity for that word is more appropriate in order to define user's perception. But, in the empirical study of this thesis, the bipolar word pairs were not scaled, instead the relevancy-irrelevancy of the bipolar word pairs in connoting the products were investigated through a Likert scale consisting of scale elements: extremely relevant, much relevant, moderately relevant, slightly relevant and totally irrelevant.

## 7.2 MAJOR FINDINGS

- Pragmatic qualities take higher relevancy scores in comparison to hedonic qualities and emotional reactions in both of the product context.

In the research, word pairs have been grouped under three main headings: pragmatic qualities, hedonic qualities and emotional reactions; while pragmatic qualities category was divided into two sub-headings: qualities related to function and qualities related to usability; hedonic qualities category was divided into two sub-headings: qualities related to symbolism and qualities related to aesthetics.

Figure 6.10 shows the average relevancy scores of all main groups: pragmatic qualities, hedonic qualities and emotional reactions, for automobiles and iPhones respectively. Pragmatic qualities' obvious high scores confirm the conventional thought of users against products, users give maximal importance to utilitarian concerns while evaluating a product and explaining their preferences. For the two different product groups, the situation does not differ; pragmatic qualities are the most relevant concerns for each of the product groups similarly. Since one product category is conventional, the other is a new technology product, they are different in many characteristics and constitute examples for a wide range of products. Therefore, the resulting similar high scores of pragmatic qualities can be interpreted as to the priority of pragmatic qualities in any kind of product categories against hedonic and emotional concerns.

In addition, Figure 6.11 shows the average relevancy scores of word pairs for each sub-group of the research. Only for the function related qualities, automobiles and iPhones take near values, for the other groups of word pairs, their relevancy levels differ.

Although it was more probable to see a higher relevancy score for function related qualities for automobiles, thinking about their primary dominant utilitarian function of transportation, the result shows that iPhone is accepted as a product having important functional qualities. This can be explained by the rich variety of provided applications through iPhones that have utilitarian functions in users' lives. If the research object was mobile phones, instead of iPhones, probably the function related qualities would have higher scores for automobiles. Since, as found out from the preliminary survey, for the majority of users, mobile phones have only one

utilitarian function of communication, not more. But iPhones are seen in a different way, because of the provided variety of utilitarian functions, they are seen important for functional qualities, as much as automobiles.

For usability related qualities, automobiles' relevancy score is somewhat higher than that of iPhones'. Although it was continuously highlighted by iPhone users that the iPhone is very user friendly because of the new touch screen technology it offers, users can do everything with their fingers easily as if they are actually physically controlling the data, and the like, automobiles' higher relevancy shows the importance of totally bodily experience and multisensory experience in usability concerns. The illusion of actually physically manipulating data added to the iPhone design does not provide substitute for real physical experiences.

For symbolism related hedonic qualities, automobiles' relevancy score is much higher than that of iPhones'. Symbolic qualities mainly focus on identity associations and socially related word pairs; and automobiles' higher relevancy score stands for users' more symbolic associations with automobiles in comparison to iPhones. This result may not be explained only with the physical experience content differences of the two products, automobiles' traditional place in people's lives is important. Automobiles have been in users' lives for many years, and they are seen as a must for the modern world living conditions. They provide a wide variety of lifestyles, every kind of people can find an automobile that represents his personality and social identity. Automobiles are products that users generally find themselves integrated with. In this sense, iPhone is a highly new product, not surprisingly, it does not have such a place like automobiles in users' lives.

On the contrary, for aesthetics related hedonic qualities, iPhones' relevancy score is much higher than that of automobiles'. Aesthetic qualities focus on appearance and innovativeness concerns, in the study; therefore iPhones' higher relevancy score in aesthetic related word pairs can be explained by its new technology. Since all of the users complimented on the high new technology of the iPhone, the high relevancy score also emphasizes this situation.

Lastly, for emotional reactions related word pairs, automobiles' relevancy score is much higher than that of iPhones'. This suggests a higher emotional content in the interaction with automobiles. This emotional richness emphasizes a higher

emotional attachment opportunity with automobiles than that of iPhones. Although iPhones take a higher relevancy score for the emotion pair “Entertainment-Boredom”, which is related with provided functions about games and the like, for all other emotional pairs, priority of automobiles can be mentioned. At this point, it may be suggested that the physical experience provided by products will create more opportunities for attachment with those products.

- Different dimensions come into consideration for each product category, considering relevant word pairs and also irrelevant ones.

There are many different word pairs, related to different qualities and emotions, which are found more relevant for iPhones or more relevant for automobiles. From these word pairs, different significant dimensions of each product group can be decided, and which dimensions are more dominant for that product group can be determined. The extremely relevant, more than much relevant and much relevant word pairs are discussed separately in the previous chapter. Briefly, security and comfort related issues’ relevancy for automobiles whereas technological advances and easiness of usage related concerns’ relevancy for iPhones can be mentioned. In addition, spatial experience related word pairs’ (“relief-distress”, “hearthwarming-depressing”) relevancy for automobiles, entertainment’s overwhelming relevancy for iPhones, and relevancy of symbolism related hedonic qualities connoting value and status of the user in society, like “luxurious-modest”, “high class-low class”, “valuable-cheap”, for automobiles are some points to be again highlighted.

Figures 6.19 and 6.20 show the word pairs of high relevancy scores for automobiles and iPhones respectively, and also represent the common word pairs of each different product category. From these figures, the differences and similarities of relevant dimensions for the two product category can be seen clearly. The behaviours of word pairs across these sets can be interpreted to many different or similar features and characteristics of the two different product contexts. Since throughout the thesis study, the focused difference of these products was the provided physical experience, automobiles serve with more bodily interactions while iPhones with more virtual ones. However, of course, this is not the only difference between these product categories. Their prices and places in users’ lives are different. While automobiles belong to the family, iPhones are more personal products. Automobiles are conventional products, whereas iPhones are new

technology creations. IPhone's relation with fashion is much more strong compared to automobiles, since iPhone is a technology driven product and effected by changes in technology and fashion in a more rapid way. Automobiles are used for longer periods of time and potentially create stronger relations and attachments with the user. Decision making processes for each of these products differ, and so on.

Apart from these, irrelevant word pairs are also decided as a result of the research study. The irrelevant or slightly relevant word pairs are the meaningless descriptions for that product group, which do not make sense in the context of that product. Figure 6.21 shows the incoherent word pairs for automobiles and iPhones respectively, and also the common ones. Most of the incoherent word pairs belong to symbolism related hedonic qualities and emotional reactions, in addition the redundancy of word pairs ascribing human traits to people is obvious across the irrelevant word pairs.

- Word pairs that can be interpreted in different ways that have double meanings are found.

There are many different connotations for many of the word pairs, which were not thought of while preparing the questionnaire. These connotations differ for the two different products, and also for the same product according to the participant answering. This implies that meaning associations regarding the same verbal description is context dependent and also user dependent. People's characteristics are important while determining the connoted meanings of a description in relation with a product. This situation does not mean that the meaning of that word pair is not understood by the user, rather he/she understands the word pair in a distinctive way. As might be expected, user's characteristics such as background, personality, gender, age, culture, occupation, etc., will influence the way he/she connotes the meaning. But this issue is not within the scope of this thesis, and can be researched in the future.

Concerning this issue, the standard deviation results used in the analysis of the research data implies an important point. Since standard deviation results of the relevancy level scores show the variability of the respondents' answers (the variation from the mean average score), high standard deviation of a word pairs' relevancy score will denote that the respondents do not agree on the relevancy

level; while some think that the word pair is relevant for describing that product, some think inversely, the same word pair to be irrelevant for describing the same product. This situation may also imply the different connotations of the same word pair according to the participant. The word pairs that have high standard deviations are specified in the results and discussions part of Chapter Five; since these word pairs have potentials to create different understandings in relation with the user, they should be considered before using in semantic differential analysis for comparing different products with each other. After using these word pairs in semantic differential analysis, or the like, a follow-up section should be designed in order to investigate the users' understandings.

Finally, it should be mentioned that the associated meanings which create semantic shifts are mostly through the direct physical meanings of the expressions. For example, "quiet-noisy" is associated with engine noise and insulation, "warm-cold" with air conditioning, "bringing closer to people-separating from people" with real distances. This refers to the importance of bodily experiences and bodily basis of expressions; people show a tendency to interpret the world with direct physical considerations.

## 7.2 LIMITATIONS OF THE STUDY

There are some limitations that may have affected the results of the study. The first and the most important one is the translation of word pairs. In order to carry out the research in Turkish, the word pairs gathered from literature review were all translated into Turkish. Similarly, word pairs taken from preliminary survey results, which were in Turkish, were translated into English to discuss the results. This situation creates some meaning variations, where culture is the biggest factor affecting these variations. Some words used in English naturally were found not much meaningful with their Turkish translations. Some examples are pleasure and fascination, which were found to be extreme emotions with their Turkish versions.

Another limitation is related with the grouping of the word pairs. As mentioned many times in the previous sections, the word pairs used in the questionnaire are grouped into five sub-headings: pragmatic qualities related to function, pragmatic qualities related to usability, hedonic qualities related to aesthetics, hedonic qualities related to symbolism and emotional reactions. For some word pairs, their supposed

meanings while preparing the questionnaire and the connotations of the respondents differed unexpectedly. Some examples are:

- “Quiet-Noisy” word pair was grouped in *hedonic qualities related to symbolism* part, but it was associated with engine noise and cabin insulation issues in the case of automobiles, where it was taken as a pragmatic quality; and it was found only slightly relevant for iPhones, with meaning associations like quiet (meeting) mode, morning alarm sound, etc., there was only one respondent who associated iPhone to a noisy person, who talks too much and knows everything.
- “Warm-Cold” word pair was grouped in hedonic qualities related to symbolism part, but in case of automobiles, it was generally associated with the temperature of the interior and air conditioner issues, therefore it was connoted to a meaning in relation with pragmatic qualities. Its supposed intangible hedonic meaning connoted to a tangible pragmatic one.
- “Bringing closer to people-Separating from people” was grouped in *hedonic qualities related to symbolism* part, but through the automobile survey, a few respondents connoted the word pair with its real meaning: automobiles transport people thus brings closer to people or separates from people in terms of distances.

## 7.3 SUGGESTIONS FOR FURTHER STUDY

In order to investigate the influence of provided physical experiences by products on the users’ understandings (perceptions), automobiles and iPhones were chosen to be at the two separate ends of the imaginary physical-virtual product axis. For further research, the scope of the products can be enriched, and the study can be conducted with many different products standing on different positions through the axis. The word pairs that will be used in the survey may be refined with several preliminary studies; meaning associations with the word pairs can be gathered through the preliminary studies, and the pairs having variations in meaning associations can be eliminated.

A second suggestion for further study is to focus on the variation of meaning associations problem, which is a secondary result of the research. However it is a very critical issue for all researches conducted in this area by using word pairs to make users evaluate and compare some products. It was seen that, for some word

pairs, people associate very different meanings which are out of the supposed scope. These differences are related with the product, context of interaction and user characteristics. User's attachment amount with a product and the product's place and importance in the user's life affect the associated meanings with the word pairs, and also affect the relevancy level of the word pairs in describing that product. The variations of connoted meanings problem should be investigated deeply, since it is a common way to make users evaluate products by scaling some word pairs. In order to result with a consistent and meaningful argument, evaluation studies using word pairs to measure perceptions (e.g. semantic differentials) should be pursued by a follow-up section that discusses the meaning associations.

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# APPENDIX A

## A.1 PRELIMINARY SURVEY QUESTIONS (Turkish Version)

- Yaş:
- Cinsiyet:
- Eğitim Durumu:
- Meslek:
- Gelir Seviyesi: 1000 TL altı ….. 1000 TL-2000TL ….. 2000 TL-3000 TL….
  3000-4500 TL ….. 4500 TL üzeri …..

1. Ne zamandır otomobil/cep telefonu/iPhone kullanıyorsunuz?
2. Otomobilinizi/cep telefonunuzu/iPhone'unuzu ne sıklıkla kullanıyorsunuz?
3. Otomobilinizi/cep telefonunuzu/iPhone'unuzu hangi amaçlarla kullanıyorsunuz?
4. Otomobilden/cep telefonundan/iPhone'dan beklentileriniz nelerdir?
5. Otomobil/cep telefonu/iPhone satın alırken sizi en fazla etkileyen unsurlar nelerdir?
6. Otomobil/cep telefonu/iPhone kullanımı ile ilgili hangi özellikler size çekici geliyor?
7. Otomobiliniz/cep telefonunuz/iPhone'unuz ile ilişkinizi üç sözcükle tanımlayınız.
8. Sizce otomobilde/cep telefonunda/iPhone'da kullanım kolaylığı sağlayan en önemli unsurlar nelerdir?
9. Sizce otomobili/cep telefonunu/iPhone'u daha konforlu yapan unsurlar nelerdir?
10. Sizce otomobilde/cep telefonunda/iPhone'da kaliteyi belirleyen unsurlar nelerdir?
11. Sizce otomobil/cep telefonu/iPhone kullanımını zevkli yapan unsurlar nelerdir?
12. Sizce otomobil/cep telefonu/iPhone kullanımını memnun edici bir deneyim haline getiren unsurlar nelerdir?
13. Sizce otomobil/cep telefonu/iPhone kullanımında güvenilirliği sağlayan unsurlar nelerdir?
14. Sizce bir otomobili/cep telefonunu/iPhone'u lüks yapan unsurlar nelerdir?

15. Otomobilinizi/cep telefonunuzu/iPhone'unuzu kullanırken aracınızla deneyiminizin size hissettirdiği duygular nelerdir?
16. Yeni bir otomobilde/cep telefonunda/iPhone'da sizi heyecanlandıran unsurlar nelerdir?
17. Kullandığınız otomobilin/cep telefonunun/iPhone'un sizin yaşam standartlarınız ve kimliğinizle ilişkisini nasıl tanımlarsınız?
18. Sizce reklamlarda otomobiller/cep telefonları/iPhone'lar ile ilgili en çok hangi özellikler vurgulanıyor?
19. Kendi otomobilinizin/cep telefonunuzun/iPhone'unuzun malzeme kalitesi ve yüzey özellikleri ile ilgili düşünceleriniz nelerdir?
20. Kendi otomobilinizdeki/cep telefonundaki/iPhone'unuzdaki renk kullanımı ile ilgili düşünceleriniz nelerdir?
21. Kendi otomobilinizin/cep telefonunuzun/iPhone'unuzun formunu birkaç sözcükle tanımlar mısınız?
22. Sizin için otomobil/cep telefonu/iPhone ile ilgili deneyiminizde aracın/ürünün kendi özellikleri mi, yoksa otomobil/cep telefonu/iPhone aracılığı ile gerçekleştirdiğiniz aktiviteler mi daha belirleyicidir?

## A.2 PRELIMINARY SURVEY QUESTIONS (English Version)

- Age:
- Gender:
- Educational Background:
- Profession:
- Income Level: Below 1000 TL….. 1000 TL-2000TL ….. 2000 TL-3000 TL…. 3000-4500 TL ….. Upon 4500 TL…..

1. How long have you been using automobile/mobile phone/iPhone?
2. How often do you use your automobile/mobile phone/iPhone?
3. For which purposes you are using automobiles/mobile phones/the iPhone?
4. What are your expectations from automobiles/mobile phones/the iPhone?
5. While purchasing an automobile/a mobile phone/the iPhone, what are the factors affecting you the most?
6. Which features are appealing related with using an automobile/a mobile phone/the iPhone?

7. Please define your relation (interaction) with your automobile/mobile phone/ iPhone in three words.
8. What are the most important factors providing ease of use for an automobile/a mobile phone/the iPhone?
9. What are the factors making an automobile/a mobile phone/the iPhone more comfortable?
10. What are the factors that determine quality of an automobile/a mobile phone/the iPhone?
11. What are the factors that make the usage of an automobile/a mobile phone/the iPhone pleasurable?
12. What are the factors that make the usage of an automobile/a mobile phone/the iPhone a satisfying experience?
13. What are the factors that provide reliability for the usage of an automobile/a mobile phone/the iPhone?
14. What are the factors that make an automobile/a mobile phone/the iPhone luxurious?
15. While using an automobile/a mobile phone/the iPhone, what are the emotions elicited by your experience with the product?
16. What are the factors that excite you for new automobile/mobile phone/ iPhone?
17. How can you describe the relation between your identity-standard of living and the automobile/mobile phone/iPhone you have been using?
18. Which features are highlighted in the advertisements related with automobiles/mobile phones/the iPhone?
19. What is your opinion about the material quality and surface properties of your automobile/mobile phone/iPhone?
20. What is your opinion about the colour content of your automobile/mobile phone/iPhone?
21. Can you describe the form of your automobile/mobile phone/iPhone in a few words?
22. Which one is the determining factor in your experience with your automobile/ mobile phone/iPhone: the features of the product itself, or the activities you perform through the product?

# APPENDIX B

## B.1 BIPOLAR WORD PAIRS' ENGLISH AND CORRESPONDENT TURKISH VERSIONS USED IN THE QUESTIONNAIRE

| **TABLE A1**-<br>Pragmatic (Utilitarian) Qualities, word pairs related to Function | |
|---|---|
| Durable-Nondurable | Uzun ömürlü-Kısa ömürlü |
| Robust-Easily breaking down | Sağlam-Kolay arızalanan |
| High performance-Low performance | Performansı yüksek-Performansı düşük |
| Perfect manufacturing-Careless manufacturing | Kusursuz üretim-İtinasız üretim |
| Sufficient functions-Insufficient functions | İşlevleri yeterli-İşlevleri yetersiz |
| Functional-Not functional | İşlevsel-İşlevsel olmayan |
| Useful-Useless | Kullanışlı-Kullanışsız |
| Beneficial-Ineffectual | Faydalı-Faydasız |
| High quality-Poor quality | Kaliteli-Kalitesiz |
| Powerful-Weak | Güçlü-Zayıf |
| Speedy-Slow | Hızlı-Yavaş |
| Economical-Wasteful | Ekonomik-Savurgan |
| High technology-Low technology | İleri Teknoloji-Düşük teknoloji |
| Professional-Amateurish | Profesyonel-Amatör |

| **TABLE A2**-<br>Pragmatic (Utilitarian) Qualities, word pairs related to Usability | |
|---|---|
| Easy to use-Difficult to use | Kullanımı kolay-Kullanımı zor |
| Ergonomic-Not suitable to body dimensions | Ergonomik-İnsan ölçülerine uymayan |
| Easily understood-Challenging | Kolay anlaşılır-Düşünmeye iten |
| Simple-Complex | Yalın-Kompleks |
| Familiar-Strange | Tanıdık-Yabancı |
| Predictable-Unpredictable | Tahmin edilebilir-Beklenmedik |
| Manageable-Unruly | İdaresi kolay-İdaresi zor |
| Efficient-Inefficient | Verimli-Verimsiz |
| Practical-Impractical | Pratik-Pratik olmayan |
| Comfortable-Uncomfortable | Konforlu-Konforsuz |
| Reliable-Unreliable | Güvenilir-Güvenilmez |
| Safe-Dangerous | Emniyetli-Tehlikeli |

Table (continued)

| | |
|---|---|
| Easy to clean-Difficult to clean | Temizlemesi kolay-Temizlemesi zor |
| Light-Heavy | Hafif-Ağır |
| Soft-Hard | Yumuşak- Sert |
| Technical-Human | Teknik-İnsani |

| **TABLE B1**-<br>Hedonic (Non-utilitarian) Qualities, word pairs related to Symbolism | |
|---|---|
| Exciting-Calm | Heyecan veren-Sakinleştiren |
| Attractive-Repulsive | Çekici-İtici |
| Charismatic-Unimpressive | Karizmatik-Etkisiz |
| Proud-Humble | İddialı-Gösterişsiz |
| Presentable-Unpresentable | Prezantabl- Dağınık |
| Open minded-Conservative | Açık fikirli-Tutucu |
| Luxurious-Modest | Lüks- Mütevazı |
| Valuable-Cheap | Değerli-Değersiz |
| Prestigious-Not prestigious | Prestijli-Prestijsiz |
| Truthful-Exaggerated | Gerçekçi-Abartılı |
| High class-Low class | Üst sınıf- Alt sınıf |
| Reckless-Timid | Atak-Çekingen |
| Aggressive-Submissive | Saldırgan-Uysal |
| Courageous-Cautious | Cesur-Temkinli |
| Young-Old | Genç- Yaşlı |
| Feminine-Masculine | Kadınsı-Erkeksi |
| Quiet-Noisy | Sessiz-Gürültülü |
| Warm-Cold | Sıcak-Soğuk |
| Friendly-Unfriendly | Samimi-Samimiyetsiz |
| Integrating-Isolating | Bütünleştirici-Yalnız bırakan |
| Bringing closer to people-Separating from people | İnsanlara yakınlaştıran-İnsanlardan uzaklaştıran |
| Natural-Artificial | Doğal-Yapay |
| Sympathetic-Antipathic | Sempatik- Antipatik |
| Motivating-Discouraging | Motive edici- Cesaret kırıcı |
| Interesting-Boring | Enteresan-Sıkıcı |
| Merry-Joyless | Keyifli-Keyifsiz |
| Heartwarming-Depressing | İç açıcı-İç sıkıcı |
| Stylish-Styleless | Stil sahibi-Kişiliksiz |
| Ill-tempered -Compliant | Hırçın-Uysal |

| **TABLE B2**-<br>Hedonic (Non-utilitarian) Qualities, word pairs related to Aesthetics | |
|---|---|
| Pleasant-Unpleasant | Hoşa giden-Hoşa gitmeyen |
| Aesthetic-Not aesthetic | Estetik- Estetik olmayan |
| Creative-Standard | Yaratıcı-Standart |
| Modern-Classic | Modern-Klasik |
| Original-Ordinary | Orijinal-Sıradan |
| Contemporary-Traditional | Çağdaş-Geleneksel |
| Futuristic-Nostalgic | Gelecekçi-Nostaljik |
| Innovative-Imitative | Yenilikçi-Taklitçi |
| In fashion-Out of fashion | Moda-Demode |
| Artistic-Functional | Sanatsal-Fonksiyonel |
| Admirable-The common run | Takdire değer-Vasat |
| Pleasurable-Tasteless | Zevkli-Zevksiz |
| Elegant-Sloppy | Şık-Özensiz |
| Ornate-Plain | Süslü-Sade |
| Compact-Large | Kompakt-İri |
| Symmetrical-Asymmetrical | Simetrik-Asimetrik |
| Organic-Geometric | Organik-Geometrik |
| Harmonious-Inharmonious | Uyumlu-Uyumsuz |
| Shiny-Dull | Parlak-Donuk |
| Smooth-Rough | Düzgün-Pürüzlü |

| **TABLE C**-<br>word pairs related to Emotional Reactions | |
|---|---|
| Gratification-Disappointment | Memnuniyet-Hayal kırıklığı |
| Satisfaction-Dissatisfaction | Tatmin-Tatminsizlik |
| Attraction-Disgust | Cazibe-İticilik |
| Pleasure-Displeasure | Haz-Keyifsizlik |
| Admiration-Contempt | Hayranlık-Küçümseme |
| Amazement-Dullness | Şaşkınlık-Durgunluk |
| Fascination-Indifference | Büyülenme-Umursamazlık |
| Interest-Disinterest | Heves-İlgisizlik |
| Desire-Unwillingness | Arzu-İsteksizlik |
| Entertainment-Boredom | Eğlence-Sıkıntı |
| Joy-Sadness | Neşe-Hüzün |

Table (continued)

| | |
|---|---|
| Relief-Distress | Ferahlık-Daralma |
| Calmness-Stress | Soğukkanlılık-Gerginlik |
| Pride-Modesty | Gurur-Tevazu |
| Delight-Anger | Sevinç-Kızgınlık |
| Courage-Fear | Cesaret- Korku |
| Happiness-Unhappiness | Mutluluk -Mutsuzluk |
| Feeling of pride-Shame | Övünç-Utanç |
| Freedom-Addiction | Özgürlük-Bağımlılık |
| Confidence-Anxiety | Güven-Endişe |
| Enthusiasm-Stillness | Coşku-Sakinlik |
| Ease-Uneasiness | Rahatlık-Huzursuzluk |
| Loneliness-Togetherness | Yalnızlık-Birliktelik |
| Contentment-Discontent | Hoşnutluk-Memnuniyetsizlik |

## B.2 MAIN RESEARCH QUESTIONNAIRE-AUTOMOBILE (Turkish Version)

ORTA DOĞU TEKNİK ÜNİVERSİTESİ ENDÜSTRİ ÜRÜNLERİ TASARIMI BÖLÜMÜ Yüksek Lisans Tezi ANKET Çalışması

Bu çalışma kullanıcı deneyimi ve ürün algısı ile ilgili yürüttüğüm bir araştırmada kullanılacaktır.

Çalışma sırasında sizlerden otomobiliniz ile deneyiminizi/etkileşiminizi çeşitli kelime çiftlerinin ne ölçüde ifade ettiğinin değerlendirmesi istenecektir.

Çalışma sırasında bazı noktalarda size birkaç soru sorarak verdiğiniz cevabı açıklamanızı isteyeceğim. Bu sırada, söylediklerinizi not etmeye çalışacağım, ancak daha detaylı yorum yapmak veya kaçırılabilecek noktaları hatırlamak amacıyla, izniniz olursa söyleyeceklerinizi bir ses kayıt cihazıyla kaydetmek istiyorum. Bu kayıt ve çalışmaya verdiğiniz cevaplar gizli tutulacak, sadece bu tez çalışması kapsamında kullanılacaktır.

Bu çalışmada, doğru ya da yanlış olmadığını, önemli olanın sizin düşünceleriniz ve ifadeleriniz olduğunu belirtmek isterim.

Katılımınız için şimdiden teşekkür ediyorum.

Seçil Köprülü

Tel: 0535 608 52 25 E-posta: seacila@gmail.com

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- Lütfen öncelikle aşağıdaki soruları cevaplayınız.

| | |
|---|---|
| Yaşınız: | Cinsiyetiniz: |
| Eğitim Durumunuz: | Mesleğiniz: |
| Gelir Seviyeniz: 1000 TL altı ( ) 1000 TL-2000TL ( ) 2000 TL-3000 TL ( ) 3000 TL-4500 TL ( ) 4500 TL üzeri ( ) | |
| Kaç yıldır otomobil kullanıyorsunuz? | Otomobilinizi ne sıklıkla kullanıyorsunuz? |

- Otomobilinizi ve otomobilinizle olan deneyimlerinizi ifade etmek için hangi sözcükleri kullanırsınız, lütfen aşağıdaki tabloda belirtiniz.

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- Lütfen aşağıdaki kelime çiftlerinin, otomobilinizi ve otomobilinizle alakalı deneyimlerinizi ifade etmede ne kadar **ilgili** olduğunu belirtiniz.

**ÖRNEK:** Aşağıdaki kelime çiftlerinin, bir restoranı ve restoranla alakalı deneyimlerinizi ifade etmede ne kadar **ilgili** olduğunu belirtiniz.

| | Çok fazla ilgili | Oldukça ilgili | Orta derecede ilgili | Az ilgili | Tamamen ilgisiz |
|---|---|---|---|---|---|
| Lezzetli-Lezzetsiz | X | | | | |
| Atak-Çekingen | | | | | X |
| Haz-Keyifsizlik | | X | | | |

(Bana göre, bir restoran ve restoranla alakalı deneyimlerimi ifade etmede, "Lezzetli-Lezzetsiz" kelime çifti çok fazla ilgili, "Atak-Çekingen" kelime çifti tamamen ilgisiz, "Haz-Keyifsizlik" kelime çifti oldukça ilgilidir.)

| **TABLO A1**-<br>Pragmatik (Yararcı) Değerler,<br>Fonksiyona yönelik kelime çiftleri | Çok fazla ilgili | Oldukça ilgili | Orta derecede ilgili | Az ilgili | Tamamen ilgisiz |
|---|---|---|---|---|---|
| Uzun ömürlü-Kısa ömürlü | | | | | |
| Sağlam-Kolay arızalanan | | | | | |
| Performansı yüksek-Performansı düşük | | | | | |
| Kusursuz üretim-İtinasız üretim | | | | | |
| İşlevleri yeterli-İşlevleri yetersiz | | | | | |
| İşlevsel-İşlevsel olmayan | | | | | |
| Kullanışlı-Kullanışsız | | | | | |
| Faydalı-Faydasız | | | | | |
| Kaliteli-Kalitesiz | | | | | |
| Güçlü-Zayıf | | | | | |
| Hızlı-Yavaş | | | | | |
| Ekonomik-Savurgan | | | | | |
| İleri Teknoloji-Düşük teknoloji | | | | | |
| Profesyonel-Amatör | | | | | |

| **TABLO A2**- Pragmatik (Yararcı) Değerler, Kullanılabilirliğe yönelik kelime çiftleri | **Çok fazla ilgili** | **Oldukça ilgili** | **Orta derecede ilgili** | **Az ilgili** | **Tamamen ilgisiz** |
|---|---|---|---|---|---|
| Kullanımı kolay-Kullanımı zor | | | | | |
| Ergonomik-İnsan ölçülerine uymayan | | | | | |
| Kolay anlaşılır-Düşünmeye iten | | | | | |
| Yalın-Kompleks | | | | | |
| Tanıdık-Yabancı | | | | | |
| Tahmin edilebilir-Beklenmedik | | | | | |
| İdaresi kolay-İdaresi zor | | | | | |
| Verimli-Verimsiz | | | | | |
| Pratik-Pratik olmayan | | | | | |
| Konforlu-Konforsuz | | | | | |
| Güvenilir-Güvenilmez | | | | | |
| Emniyetli-Tehlikeli | | | | | |
| Temizlemesi kolay-Temizlemesi zor | | | | | |
| Hafif-Ağır | | | | | |
| Yumuşak- Sert | | | | | |
| Teknik-İnsani | | | | | |

Bu gruptaki kelime çiftlerine eklemek istedikleriniz varsa lütfen aşağıdaki tabloya yazınız.

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| **TABLO B1**-<br>Hedonik (Hazcı) Değerler, Sembolizme yönelik kelime çiftleri | **Çok fazla ilgili** | **Oldukça ilgili** | **Orta derecede ilgili** | **Az ilgili** | **Tamamen ilgisiz** |
|---|---|---|---|---|---|
| Heyecan veren-Sakinleştiren | | | | | |
| Çekici-İtici | | | | | |
| Karizmatik-Etkisiz | | | | | |
| İddialı-Gösterişsiz | | | | | |
| Prezantabl- Dağınık | | | | | |
| Açık fikirli-Tutucu | | | | | |
| Lüks- Mütevazı | | | | | |
| Değerli-Değersiz | | | | | |
| Prestijli-Prestijsiz | | | | | |
| Gerçekçi-Abartılı | | | | | |
| Üst sınıf- Alt sınıf | | | | | |
| Atak-Çekingen | | | | | |
| Saldırgan-Uysal | | | | | |
| Cesur-Temkinli | | | | | |
| Genç- Yaşlı | | | | | |
| Kadınsı-Erkeksi | | | | | |
| Sessiz-Gürültülü | | | | | |
| Sıcak-Soğuk | | | | | |
| Samimi-Samimiyetsiz | | | | | |
| Bütünleştirici-Yalnız bırakan | | | | | |
| İnsanlara yakınlaştıran-İnsanlardan uzaklaştıran | | | | | |
| Doğal-Yapay | | | | | |
| Sempatik- Antipatik | | | | | |
| Motive edici- Cesaret kırıcı | | | | | |
| Enteresan-Sıkıcı | | | | | |
| Keyifli-Keyifsiz | | | | | |
| İç açıcı-İç sıkıcı | | | | | |
| Stil sahibi-Kişiliksiz | | | | | |
| Hırçın-Uysal | | | | | |

| **TABLO B2**-<br>Hedonik (Hazcı) Değerler,<br>Estetiğe yönelik kelime çiftleri | **Çok fazla ilgili** | **Oldukça ilgili** | **Orta derecede ilgili** | **Az ilgili** | **Tamamen ilgisiz** |
|---|---|---|---|---|---|
| Hoşa giden-Hoşa gitmeyen | | | | | |
| Estetik- Estetik olmayan | | | | | |
| Yaratıcı-Standart | | | | | |
| Modern-Klasik | | | | | |
| Orijinal-Sıradan | | | | | |
| Çağdaş-Geleneksel | | | | | |
| Gelecekçi-Nostaljik | | | | | |
| Yenilikçi-Taklitçi | | | | | |
| Moda-Demode | | | | | |
| Sanatsal-Fonksiyonel | | | | | |
| Takdire değer-Vasat | | | | | |
| Zevkli-Zevksiz | | | | | |
| Şık-Özensiz | | | | | |
| Süslü-Sade | | | | | |
| Kompakt-İri | | | | | |
| Simetrik-Asimetrik | | | | | |
| Organik-Geometrik | | | | | |
| Uyumlu-Uyumsuz | | | | | |
| Parlak-Donuk | | | | | |
| Düzgün-Pürüzlü | | | | | |

Bu gruptaki kelime çiftlerine eklemek istedikleriniz varsa lütfen aşağıdaki tabloya yazınız.

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| **TABLO C**-<br>Duygusal reaksiyonlara yönelik kelime çiftleri | **Çok fazla ilgili** | **Oldukça ilgili** | **Orta derecede ilgili** | **Az ilgili** | **Tamamen ilgisiz** |
|---|---|---|---|---|---|
| Memnuniyet-Hayal kırıklığı | | | | | |
| Tatmin-Tatminsizlik | | | | | |
| Cazibe-İticilik | | | | | |
| Haz-Keyifsizlik | | | | | |
| Hayranlık-Küçümseme | | | | | |
| Şaşkınlık-Durgunluk | | | | | |
| Büyülenme-Umursamazlık | | | | | |
| Heves-İlgisizlik | | | | | |
| Arzu-İsteksizlik | | | | | |
| Eğlence-Sıkıntı | | | | | |
| Neşe-Hüzün | | | | | |
| Ferahlık-Daralma | | | | | |
| Soğukkanlılık-Gerginlik | | | | | |
| Gurur-Tevazu | | | | | |
| Sevinç-Kızgınlık | | | | | |
| Cesaret- Korku | | | | | |
| Mutluluk -Mutsuzluk | | | | | |
| Övünç-Utanç | | | | | |
| Özgürlük-Bağımlılık | | | | | |
| Güven-Endişe | | | | | |
| Coşku-Sakinlik | | | | | |
| Rahatlık-Huzursuzluk | | | | | |
| Yalnızlık-Birliktelik | | | | | |
| Hoşnutluk-Memnuniyetsizlik | | | | | |

Bu gruptaki kelime çiftlerine eklemek istedikleriniz varsa lütfen aşağıdaki tabloya yazınız.

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- Son olarak sizin eklemek isteyebileceğiniz ifadeler var ise lütfen aşağıdaki tabloya yazınız.

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BİTTİ!

TEŞEKKÜRLER☺

## B.3 MAIN RESEARCH QUESTIONNAIRE-IPHONE (Turkish Version)

ORTA DOĞU TEKNİK ÜNİVERSİTESİ ENDÜSTRİ ÜRÜNLERİ TASARIMI BÖLÜMÜ Yüksek Lisans Tezi ANKET Çalışması

Bu çalışma kullanıcı deneyimi ve ürün algısı ile ilgili yürüttüğüm bir araştırmada kullanılacaktır.

Çalışma sırasında sizlerden iPhone'unuz ile deneyiminizi/etkileşiminizi çeşitli kelime çiftlerinin ne ölçüde ifade ettiğinin değerlendirmesi istenecektir.

Çalışma sırasında bazı noktalarda size birkaç soru sorarak verdiğiniz cevabı açıklamanızı isteyeceğim. Bu sırada, söylediklerinizi not etmeye çalışacağım, ancak daha detaylı yorum yapmak veya kaçırılabilecek noktaları hatırlamak amacıyla, izniniz olursa söyleyeceklerinizi bir ses kayıt cihazıyla kaydetmek istiyorum. Bu kayıt ve çalışmaya verdiğiniz cevaplar gizli tutulacak, sadece bu tez çalışması kapsamında kullanılacaktır.

Bu çalışmada, doğru ya da yanlış olmadığını, önemli olanın sizin düşünceleriniz ve ifadeleriniz olduğunu belirtmek isterim.

Katılımınız için şimdiden teşekkür ediyorum.

Seçil Köprülü

Tel: 0535 608 52 25 E-posta: seacila@gmail.com

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- Lütfen öncelikle aşağıdaki soruları cevaplayınız.

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| Yaşınız: | Cinsiyetiniz: |
| Eğitim Durumunuz: | Mesleğiniz: |
| Gelir Seviyeniz: 1000 TL altı ( ) 1000 TL-2000TL ( ) 2000 TL-3000 TL ( ) 3000 TL-4500 TL ( ) 4500 TL üzeri ( ) | |
| Ne kadar zamandır iPhone kullanıyorsunuz? | iPhone'nunuzu ne sıklıkla kullanıyorsunuz? |

- iPhone'nunuz ve iPhone'nunuzla olan deneyimlerinizi ifade etmek için hangi sözcükleri kullanırsınız, lütfen aşağıdaki tabloda belirtiniz.

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- Lütfen aşağıdaki kelime çiftlerinin, iPhone'nunuz ve iPhone'nunuzla alakalı deneyimlerinizi ifade etmede ne kadar **ilgili** olduğunu belirtiniz.

**ÖRNEK:** Aşağıdaki kelime çiftlerinin, bir restoranı ve restoranla alakalı deneyimlerinizi ifade etmede ne kadar **ilgili** olduğunu belirtiniz.

| | Çok fazla ilgili | Oldukça ilgili | Orta derecede ilgili | Az ilgili | Tamamen ilgisiz |
|---|---|---|---|---|---|
| Lezzetli-Lezzetsiz | X | | | | |
| Atak-Çekingen | | | | | X |
| Haz-Keyifsizlik | | X | | | |

(Bana göre, bir restoran ve restoranla alakalı deneyimlerimi ifade etmede, "Lezzetli-Lezzetsiz" kelime çifti çok fazla ilgili, "Atak-Çekingen" kelime çifti tamamen ilgisiz, "Haz-Keyifsizlik" kelime çifti oldukça ilgilidir.)

| **TABLO A1**- Pragmatik (Yararcı) Değerler, Fonksiyona yönelik kelime çiftleri | Çok fazla ilgili | Oldukça ilgili | Orta derecede ilgili | Az ilgili | Tamamen ilgisiz |
|---|---|---|---|---|---|
| Uzun ömürlü-Kısa ömürlü | | | | | |
| Sağlam-Kolay arızalanan | | | | | |
| Performansı yüksek-Performansı düşük | | | | | |
| Kusursuz üretim-İtinasız üretim | | | | | |
| İşlevleri yeterli-İşlevleri yetersiz | | | | | |
| İşlevsel-İşlevsel olmayan | | | | | |
| Kullanışlı-Kullanışsız | | | | | |
| Faydalı-Faydasız | | | | | |
| Kaliteli-Kalitesiz | | | | | |
| Güçlü-Zayıf | | | | | |
| Hızlı-Yavaş | | | | | |
| Ekonomik-Savurgan | | | | | |
| İleri Teknoloji-Düşük teknoloji | | | | | |
| Profesyonel-Amatör | | | | | |

| **TABLO A2**- Pragmatik (Yararcı) Değerler, Kullanılabilirliğe yönelik kelime çiftleri | **Çok fazla ilgili** | **Oldukça ilgili** | **Orta derecede ilgili** | **Az ilgili** | **Tamamen ilgisiz** |
|---|---|---|---|---|---|
| Kullanımı kolay-Kullanımı zor | | | | | |
| Ergonomik-İnsan ölçülerine uymayan | | | | | |
| Kolay anlaşılır-Düşünmeye iten | | | | | |
| Yalın-Kompleks | | | | | |
| Tanıdık-Yabancı | | | | | |
| Tahmin edilebilir-Beklenmedik | | | | | |
| İdaresi kolay-İdaresi zor | | | | | |
| Verimli-Verimsiz | | | | | |
| Pratik-Pratik olmayan | | | | | |
| Konforlu-Konforsuz | | | | | |
| Güvenilir-Güvenilmez | | | | | |
| Emniyetli-Tehlikeli | | | | | |
| Temizlemesi kolay-Temizlemesi zor | | | | | |
| Hafif-Ağır | | | | | |
| Yumuşak- Sert | | | | | |
| Teknik-İnsani | | | | | |

Bu gruptaki kelime çiftlerine eklemek istedikleriniz varsa lütfen aşağıdaki tabloya yazınız.

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| **TABLO B1**-<br>Hedonik (Hazcı) Değerler, Sembolizme yönelik kelime çiftleri | **Çok fazla ilgili** | **Oldukça ilgili** | **Orta derecede ilgili** | **Az ilgili** | **Tamamen ilgisiz** |
|---|---|---|---|---|---|
| Heyecan veren-Sakinleştiren | | | | | |
| Çekici-İtici | | | | | |
| Karizmatik-Etkisiz | | | | | |
| İddialı-Gösterişsiz | | | | | |
| Prezantabl- Dağınık | | | | | |
| Açık fikirli-Tutucu | | | | | |
| Lüks- Mütevazı | | | | | |
| Değerli-Değersiz | | | | | |
| Prestijli-Prestijsiz | | | | | |
| Gerçekçi-Abartılı | | | | | |
| Üst sınıf- Alt sınıf | | | | | |
| Atak-Çekingen | | | | | |
| Saldırgan-Uysal | | | | | |
| Cesur-Temkinli | | | | | |
| Genç- Yaşlı | | | | | |
| Kadınsı-Erkeksi | | | | | |
| Sessiz-Gürültülü | | | | | |
| Sıcak-Soğuk | | | | | |
| Samimi-Samimiyetsiz | | | | | |
| Bütünleştirici-Yalnız bırakan | | | | | |
| İnsanlara yakınlaştıran-İnsanlardan uzaklaştıran | | | | | |
| Doğal-Yapay | | | | | |
| Sempatik- Antipatik | | | | | |
| Motive edici- Cesaret kırıcı | | | | | |
| Enteresan-Sıkıcı | | | | | |
| Keyifli-Keyifsiz | | | | | |
| İç açıcı-İç sıkıcı | | | | | |
| Stil sahibi-Kişiliksiz | | | | | |
| Hırçın-Uysal | | | | | |

| **TABLO B2**-<br>Hedonik (Hazcı) Değerler,<br>Estetiğe yönelik kelime çiftleri | **Çok fazla ilgili** | **Oldukça ilgili** | **Orta derecede ilgili** | **Az ilgili** | **Tamamen ilgisiz** |
|---|---|---|---|---|---|
| Hoşa giden-Hoşa gitmeyen | | | | | |
| Estetik- Estetik olmayan | | | | | |
| Yaratıcı-Standart | | | | | |
| Modern-Klasik | | | | | |
| Orijinal-Sıradan | | | | | |
| Çağdaş-Geleneksel | | | | | |
| Gelecekçi-Nostaljik | | | | | |
| Yenilikçi-Taklitçi | | | | | |
| Moda-Demode | | | | | |
| Sanatsal-Fonksiyonel | | | | | |
| Takdire değer-Vasat | | | | | |
| Zevkli-Zevksiz | | | | | |
| Şık-Özensiz | | | | | |
| Süslü-Sade | | | | | |
| Kompakt-İri | | | | | |
| Simetrik-Asimetrik | | | | | |
| Organik-Geometrik | | | | | |
| Uyumlu-Uyumsuz | | | | | |
| Parlak-Donuk | | | | | |
| Düzgün-Pürüzlü | | | | | |

Bu gruptaki kelime çiftlerine eklemek istedikleriniz varsa lütfen aşağıdaki tabloya yazınız.

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| **TABLO C**-<br>Duygusal reaksiyonlara yönelik kelime çiftleri | **Çok fazla ilgili** | **Oldukça ilgili** | **Orta derecede ilgili** | **Az ilgili** | **Tamamen ilgisiz** |
|---|---|---|---|---|---|
| Memnuniyet-Hayal kırıklığı | | | | | |
| Tatmin-Tatminsizlik | | | | | |
| Cazibe-İticilik | | | | | |
| Haz-Keyifsizlik | | | | | |
| Hayranlık-Küçümseme | | | | | |
| Şaşkınlık-Durgunluk | | | | | |
| Büyülenme-Umursamazlık | | | | | |
| Heves-İlgisizlik | | | | | |
| Arzu-İsteksizlik | | | | | |
| Eğlence-Sıkıntı | | | | | |
| Neşe-Hüzün | | | | | |
| Ferahlık-Daralma | | | | | |
| Soğukkanlılık-Gerginlik | | | | | |
| Gurur-Tevazu | | | | | |
| Sevinç-Kızgınlık | | | | | |
| Cesaret- Korku | | | | | |
| Mutluluk -Mutsuzluk | | | | | |
| Övünç-Utanç | | | | | |
| Özgürlük-Bağımlılık | | | | | |
| Güven-Endişe | | | | | |
| Coşku-Sakinlik | | | | | |
| Rahatlık-Huzursuzluk | | | | | |
| Yalnızlık-Birliktelik | | | | | |
| Hoşnutluk-Memnuniyetsizlik | | | | | |

Bu gruptaki kelime çiftlerine eklemek istedikleriniz varsa lütfen aşağıdaki tabloya yazınız.

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- Son olarak sizin eklemek isteyebileceğiniz ifadeler var ise lütfen aşağıdaki tabloya yazınız.

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BİTTİ!

TEŞEKKÜRLER☺

## B.4 MAIN RESEARCH QUESTIONNAIRE-AUTOMOBILE (English Version)

MIDDLE EAST TECHNICAL UNIVERSITY INDUSTRIAL DESIGN DEPARTMENT
Master Thesis SURVEY

This study will be used in the research related to user experience and product perception.

In this survey, you are asked to evaluate various word pairs in terms of to which extent they relate to your experience/interaction with your automobile.

At some points during the survey, I will ask you to explain some of your answers. I will try to write down what you say, but in order to make more detailed interpretation or to remember missed points, I would like to record your voice with a tape recorder, if you do not mind. This recording and your answers to the study will be kept confidential and will be used only for this thesis research.

You should note that there is no true or false answer in this study, rather your ideas and expressions are important.

Thank you for your participation in advance.

Seçil Köprülü

Tel: 0535 608 52 25 E-mail: seacila@gmail.com

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- Before beginning, please answer the questions below.

| | |
|---|---|
| Age: | Gender: |
| Educational Background: | Profession: |
| Income Level: Below 1000 TL ( ) 1000 TL-2000TL ( ) 2000 TL-3000 TL ( ) 3000 TL-4500 TL ( ) Upon 4500 TL ( ) | |
| How many years have you been using automobile? | How often do you use your automobile? |

- In order to describe your automobile and your experience with your automobile, which words you use, please specify in the table below.

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- How much are the word pairs below **relevant** in connoting your automobile and your experience with your automobile, please specify.

**EXAMPLE:** How much are the word pairs below relevant in connoting a restaurant and your experiences with a restaurant, please specify.

| | Extremely Relevant | Much Relevant | Moderately Relevant | Slightly Relevant | Totally Irrelevant |
|---|---|---|---|---|---|
| Delicious-Tasteless | X | | | | |
| Reckless-Timid | | | | | X |
| Pleasure-Displeasure | | X | | | |

(For me, in order to describe a restaurant, "Delicious-Tasteless" word pair is extremely relevant, "Reckless-Inhibited" word pair is totally irrelevant, and "Pleasure-Feeling down" word pair is much relevant.)

| **TABLE A1**- Pragmatic (Utilitarian) Qualities, word pairs related to Function | Extremely Relevant | Much Relevant | Moderately Relevant | Slightly Relevant | Totally Irrelevant |
|---|---|---|---|---|---|
| Durable-Nondurable | | | | | |
| Robust-Easily breaking down | | | | | |
| High performance-Low performance | | | | | |
| Perfect manufacturing-Careless manufacturing | | | | | |
| Sufficient functions-Insufficient functions | | | | | |
| Functional-Not functional | | | | | |
| Useful-Useless | | | | | |
| Beneficial-Ineffectual | | | | | |
| High quality-Poor quality | | | | | |
| Powerful-Weak | | | | | |
| Speedy-Slow | | | | | |
| Economical-Wasteful | | | | | |
| High technology-Low technology | | | | | |
| Professional-Amateurish | | | | | |

| **TABLE A2**-<br>Pragmatic (Utilitarian) Qualities, word pairs related to Usability | **Extremely Relevant** | **Much Relevant** | **Moderately Relevant** | **Slightly Relevant** | **Totally Irrelevant** |
|---|---|---|---|---|---|
| Easy to use-Difficult to use | | | | | |
| Ergonomic-Not suitable to body dimensions | | | | | |
| Easily understood-Challenging | | | | | |
| Simple-Complex | | | | | |
| Familiar-Strange | | | | | |
| Predictable-Unpredictable | | | | | |
| Manageable-Unruly | | | | | |
| Efficient-Inefficient | | | | | |
| Practical-Impractical | | | | | |
| Comfortable-Uncomfortable | | | | | |
| Reliable-Unreliable | | | | | |
| Safe-Dangerous | | | | | |
| Easy to clean-Difficult to clean | | | | | |
| Light-Heavy | | | | | |
| Soft-Hard | | | | | |
| Technical-Human | | | | | |

If you want to add any word pairs related to this group of word pairs, please use the table below.

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| **TABLE B1**- Hedonic (Non-utilitarian) Qualities, word pairs related to Symbolism | **Extremely Relevant** | **Much Relevant** | **Moderately Relevant** | **Slightly Relevant** | **Totally Irrelevant** |
|---|---|---|---|---|---|
| Exciting-Calm | | | | | |
| Attractive-Repulsive | | | | | |
| Charismatic-Unimpressive | | | | | |
| Proud-Humble | | | | | |
| Presentable-Unpresentable | | | | | |
| Open minded-Conservative | | | | | |
| Luxurious-Modest | | | | | |
| Valuable-Cheap | | | | | |
| Prestigious-Not prestigious | | | | | |
| Truthful-Exaggerated | | | | | |
| High class-Low class | | | | | |
| Reckless-Timid | | | | | |
| Aggressive-Submissive | | | | | |
| Courageous-Cautious | | | | | |
| Young-Old | | | | | |
| Feminine-Masculine | | | | | |
| Quiet-Noisy | | | | | |
| Warm-Cold | | | | | |
| Friendly-Unfriendly | | | | | |
| Integrating-Isolating | | | | | |
| Bringing closer to people-Separating from people | | | | | |
| Natural-Artificial | | | | | |
| Sympathetic-Antipathic | | | | | |
| Motivating-Discouraging | | | | | |
| Interesting-Boring | | | | | |
| Merry-Joyless | | | | | |
| Heartwarming-Depressing | | | | | |
| Stylish-Styleless | | | | | |
| Ill-tempered -Compliant | | | | | |

| **TABLE B2**- Hedonic (Non-utilitarian) Qualities, word pairs related to Aesthetics | **Extremely Relevant** | **Much Relevant** | **Moderately Relevant** | **Slightly Relevant** | **Totally Irrelevant** |
|---|---|---|---|---|---|
| Pleasant-Unpleasant | | | | | |
| Aesthetic-Not aesthetic | | | | | |
| Creative-Standard | | | | | |
| Modern-Classic | | | | | |
| Original-Ordinary | | | | | |
| Contemporary-Traditional | | | | | |
| Futuristic-Nostalgic | | | | | |
| Innovative-Imitative | | | | | |
| In fashion-Out of fashion | | | | | |
| Artistic-Functional | | | | | |
| Admirable-The common run | | | | | |
| Pleasurable-Tasteless | | | | | |
| Elegant-Sloppy | | | | | |
| Ornate-Plain | | | | | |
| Compact-Large | | | | | |
| Symmetrical-Asymmetrical | | | | | |
| Organic-Geometric | | | | | |
| Harmonious-Inharmonious | | | | | |
| Shiny-Dull | | | | | |
| Smooth-Rough | | | | | |

If you want to add any word pairs related to this group of word pairs, please use the table below.

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| **TABLE C**-<br>word pairs related to Emotional Reactions | **Extremely Relevant** | **Much Relevant** | **Moderately Relevant** | **Slightly Relevant** | **Totally Irrelevant** |
|---|---|---|---|---|---|
| Gratification-Disappointment | | | | | |
| Satisfaction-Dissatisfaction | | | | | |
| Attraction-Disgust | | | | | |
| Pleasure-Displeasure | | | | | |
| Admiration-Contempt | | | | | |
| Amazement-Dullness | | | | | |
| Fascination-Indifference | | | | | |
| Interest-Disinterest | | | | | |
| Desire-Unwillingness | | | | | |
| Entertainment-Boredom | | | | | |
| Joy-Sadness | | | | | |
| Relief-Distress | | | | | |
| Calmness-Stress | | | | | |
| Pride-Modesty | | | | | |
| Delight-Anger | | | | | |
| Courage-Fear | | | | | |
| Happiness-Unhappiness | | | | | |
| Feeling of pride-Shame | | | | | |
| Freedom-Addiction | | | | | |
| Confidence-Anxiety | | | | | |
| Enthusiasm-Stillness | | | | | |
| Ease-Uneasiness | | | | | |
| Loneliness-Togetherness | | | | | |
| Contentment-Discontent | | | | | |

If you want to add any word pairs related to this group of word pairs, please use the table below.

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- Finally, if you have any expressions you want to add, please write down in the table below.

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FINISHED!

THANKS☺

## B.5 MAIN RESEARCH QUESTIONNAIRE-IPHONE (English Version)

MIDDLE EAST TECHNICAL UNIVERSITY INDUSTRIAL DESIGN DEPARTMENT
Master Thesis SURVEY

This study will be used in the research related to user experience and product perception.

In this survey, you are asked to evaluate various word pairs in terms of to which extent they relate to your experience/interaction with your iPhone.

At some points during the survey, I will ask you to explain some of your answers. I will try to write down what you say, but in order to make more detailed interpretation or to remember missed points, I would like to record your voice with a tape recorder, if you do not mind. This recording and your answers to the study will be kept confidential and will be used only for this thesis research.

You should note that there is no true or false answer in this study, rather your ideas and expressions are important.

Thank you for your participation in advance.

Seçil Köprülü

Tel: 0535 608 52 25 E-mail: seacila@gmail.com

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- Before beginning, please answer the questions below.

| | |
|---|---|
| Age: | Gender: |
| Educational Background: | Profession: |
| Income Level: Below 1000 TL ( ) 1000 TL-2000TL ( ) 2000 TL-3000 TL ( ) 3000 TL-4500 TL ( ) Upon 4500 TL ( ) | |
| How long have you been using the iPhone? | How often do you use your iPhone? |

- In order to describe your iPhone and your experience with your iPhone, which words you use, please specify in the table below.

| | | |
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| | | |

- How much are the word pairs below **relevant** in connoting your iPhone and your experience with your iPhone, please specify.

**EXAMPLE:** How much are the word pairs below relevant in connoting a restaurant and your experiences with a restaurant, please specify.

| | Extremely Relevant | Much Relevant | Moderately Relevant | Slightly Relevant | Totally Irrelevant |
|---|---|---|---|---|---|
| Delicious-Tasteless | X | | | | |
| Reckless-Timid | | | | | X |
| Pleasure-Displeasure | | X | | | |

(For me, in order to describe a restaurant, "Delicious-Tasteless" word pair is extremely relevant, "Reckless-Inhibited" word pair is totally irrelevant, and "Pleasure-Feeling down" word pair is much relevant.)

| **TABLE A1**- Pragmatic (Utilitarian) Qualities, word pairs related to Function | Extremely Relevant | Much Relevant | Moderately Relevant | Slightly Relevant | Totally Irrelevant |
|---|---|---|---|---|---|
| Durable-Nondurable | | | | | |
| Robust-Easily breaking down | | | | | |
| High performance-Low performance | | | | | |
| Perfect manufacturing-Careless manufacturing | | | | | |
| Sufficient functions-Insufficient functions | | | | | |
| Functional-Not functional | | | | | |
| Useful-Useless | | | | | |
| Beneficial-Ineffectual | | | | | |
| High quality-Poor quality | | | | | |
| Powerful-Weak | | | | | |
| Speedy-Slow | | | | | |
| Economical-Wasteful | | | | | |
| High technology-Low technology | | | | | |
| Professional-Amateurish | | | | | |

| **TABLE A2**-<br>Pragmatic (Utilitarian) Qualities, word pairs related to Usability | **Extremely Relevant** | **Much Relevant** | **Moderately Relevant** | **Slightly Relevant** | **Totally Irrelevant** |
|---|---|---|---|---|---|
| Easy to use-Difficult to use | | | | | |
| Ergonomic-Not suitable to body dimensions | | | | | |
| Easily understood-Challenging | | | | | |
| Simple-Complex | | | | | |
| Familiar-Strange | | | | | |
| Predictable-Unpredictable | | | | | |
| Manageable-Unruly | | | | | |
| Efficient-Inefficient | | | | | |
| Practical-Impractical | | | | | |
| Comfortable-Uncomfortable | | | | | |
| Reliable-Unreliable | | | | | |
| Safe-Dangerous | | | | | |
| Easy to clean-Difficult to clean | | | | | |
| Light-Heavy | | | | | |
| Soft-Hard | | | | | |
| Technical-Human | | | | | |

If you want to add any word pairs related to this group of word pairs, please use the table below.

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| **TABLE B1**- Hedonic (Non-utilitarian) Qualities, word pairs related to Symbolism | **Extremely Relevant** | **Much Relevant** | **Moderately Relevant** | **Slightly Relevant** | **Totally Irrelevant** |
|---|---|---|---|---|---|
| Exciting-Calm | | | | | |
| Attractive-Repulsive | | | | | |
| Charismatic-Unimpressive | | | | | |
| Proud-Humble | | | | | |
| Presentable-Unpresentable | | | | | |
| Open minded-Conservative | | | | | |
| Luxurious-Modest | | | | | |
| Valuable-Cheap | | | | | |
| Prestigious-Not prestigious | | | | | |
| Truthful-Exaggerated | | | | | |
| High class-Low class | | | | | |
| Reckless-Timid | | | | | |
| Aggressive-Submissive | | | | | |
| Courageous-Cautious | | | | | |
| Young-Old | | | | | |
| Feminine-Masculine | | | | | |
| Quiet-Noisy | | | | | |
| Warm-Cold | | | | | |
| Friendly-Unfriendly | | | | | |
| Integrating-Isolating | | | | | |
| Bringing closer to people-Separating from people | | | | | |
| Natural-Artificial | | | | | |
| Sympathetic-Antipathic | | | | | |
| Motivating-Discouraging | | | | | |
| Interesting-Boring | | | | | |
| Merry-Joyless | | | | | |
| Heartwarming-Depressing | | | | | |
| Stylish-Styleless | | | | | |
| Ill-tempered -Compliant | | | | | |

| **TABLE B2**- Hedonic (Non-utilitarian) Qualities, word pairs related to Aesthetics | **Extremely Relevant** | **Much Relevant** | **Moderately Relevant** | **Slightly Relevant** | **Totally Irrelevant** |
|---|---|---|---|---|---|
| Pleasant-Unpleasant | | | | | |
| Aesthetic-Not aesthetic | | | | | |
| Creative-Standard | | | | | |
| Modern-Classic | | | | | |
| Original-Ordinary | | | | | |
| Contemporary-Traditional | | | | | |
| Futuristic-Nostalgic | | | | | |
| Innovative-Imitative | | | | | |
| In fashion-Out of fashion | | | | | |
| Artistic-Functional | | | | | |
| Admirable-The common run | | | | | |
| Pleasurable-Tasteless | | | | | |
| Elegant-Sloppy | | | | | |
| Ornate-Plain | | | | | |
| Compact-Large | | | | | |
| Symmetrical-Asymmetrical | | | | | |
| Organic-Geometric | | | | | |
| Harmonious-Inharmonious | | | | | |
| Shiny-Dull | | | | | |
| Smooth-Rough | | | | | |

If you want to add any word pairs related to this group of word pairs, please use the table below.

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| **TABLE C**-<br>word pairs related to Emotional Reactions | **Extremely Relevant** | **Much Relevant** | **Moderately Relevant** | **Slightly Relevant** | **Totally Irrelevant** |
|---|---|---|---|---|---|
| Gratification-Disappointment | | | | | |
| Satisfaction-Dissatisfaction | | | | | |
| Attraction-Disgust | | | | | |
| Pleasure-Displeasure | | | | | |
| Admiration-Contempt | | | | | |
| Amazement-Dullness | | | | | |
| Fascination-Indifference | | | | | |
| Interest-Disinterest | | | | | |
| Desire-Unwillingness | | | | | |
| Entertainment-Boredom | | | | | |
| Joy-Sadness | | | | | |
| Relief-Distress | | | | | |
| Calmness-Stress | | | | | |
| Pride-Modesty | | | | | |
| Delight-Anger | | | | | |
| Courage-Fear | | | | | |
| Happiness-Unhappiness | | | | | |
| Feeling of pride-Shame | | | | | |
| Freedom-Addiction | | | | | |
| Confidence-Anxiety | | | | | |
| Enthusiasm-Stillness | | | | | |
| Ease-Uneasiness | | | | | |
| Loneliness-Togetherness | | | | | |
| Contentment-Discontent | | | | | |

If you want to add any word pairs related to this group of word pairs, please use the table below.

| | | | | | |
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- Finally, if you have any expressions you want to add, please write down in the table below.

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FINISHED!

THANKS☺

# APPENDIX C

## C.1 SCORES OF AUTOMOBILE SURVEY

| Participant Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TABLE A1 Pragmatic Qualities related to Function | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | M | s.d. |
| Durable-Nondurable | 5 | 2 | 1 | 4 | 5 | 4 | 4 | 3 | 1 | 4 | 3 | 5 | 5 | 2 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | 5 | 2 | 4 | 2 | 4 | 3 | 4 | 4 | 3 | 3,63 | 1,19 |
| Robust-Easily breaking down | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 4 | 4 | 3 | 5 | 5 | 5 | 5 | 4 | 4,77 | 0,50 |
| High performance-Low performance | 5 | 5 | 5 | 4 | 5 | 2 | 5 | 4 | 5 | 5 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 3 | 5 | 3 | 5 | 5 | 5 | 5 | 3 | 4 | 5 | 4,53 | 0,82 |
| Perfect manufacturing-Careless manufacturing | 4 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 2 | 4 | 4 | 4 | 5 | 4 | 5 | 4 | 5 | 4 | 5 | 5 | 4 | 5 | 2 | 4 | 5 | 4 | 5 | 3 | 5 | 4 | 4,33 | 0,84 |
| Sufficient functions-Insufficient functions | 5 | 3 | 5 | 4 | 4 | 4 | 5 | 4 | 3 | 5 | 4 | 4 | 5 | 4 | 5 | 4 | 5 | 5 | 4 | 4 | 3 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4,20 | 0,61 |
| Functional-Not functional | 5 | 1 | 5 | 4 | 4 | 4 | 5 | 5 | 2 | 5 | 2 | 4 | 5 | 2 | 5 | 4 | 5 | 3 | 4 | 4 | 2 | 5 | 4 | 4 | 2 | 3 | 5 | 4 | 4 | 2 | 3,77 | 1,22 |
| Useful-Useless | 5 | 3 | 4 | 5 | 5 | 4 | 5 | 4 | 4 | 5 | 3 | 5 | 5 | 3 | 5 | 5 | 5 | 4 | 4 | 4 | 5 | 5 | 3 | 5 | 5 | 2 | 4 | 3 | 5 | 3 | 4,23 | 0,90 |
| Beneficial-Ineffectual | 5 | 1 | 3 | 4 | 5 | 4 | 5 | 4 | 3 | 5 | 1 | 5 | 5 | 3 | 5 | 5 | 4 | 2 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 4 | 4 | 2 | 5 | 5 | 4,10 | 1,24 |
| High quality-Poor quality | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 5 | 3 | 5 | 3 | 5 | 5 | 4 | 5 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 5 | 5 | 4 | 5 | 5 | 4 | 5 | 4 | 4,57 | 0,68 |
| Powerful-Weak | 5 | 4 | 5 | 3 | 4 | 3 | 5 | 2 | 5 | 5 | 3 | 5 | 5 | 3 | 5 | 5 | 5 | 2 | 4 | 3 | 2 | 5 | 3 | 5 | 3 | 1 | 5 | 2 | 4 | 5 | 3,87 | 1,25 |
| Speedy-Slow | 5 | 5 | 5 | 3 | 3 | 3 | 4 | 3 | 5 | 5 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 3 | 2 | 5 | 4 | 5 | 4 | 5 | 5 | 2 | 4 | 5 | 4,30 | 0,99 |
| Economical-Wasteful | 5 | 5 | 5 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 2 | 5 | 5 | 5 | 4 | 4 | 4 | 5 | 5 | 5 | 4 | 4 | 5 | 5 | 5 | 5 | 5 | 4,70 | 0,65 |
| High technology-Low technology | 5 | 5 | 5 | 5 | 4 | 2 | 5 | 4 | 3 | 4 | 5 | 5 | 2 | 5 | 5 | 5 | 5 | 4 | 5 | 3 | 4 | 5 | 4 | 5 | 5 | 5 | 3 | 4 | 4 | 4 | 4,30 | 0,92 |
| Professional-Amateurish | 5 | 5 | 3 | 5 | 5 | 5 | 4 | 2 | 1 | 1 | 4 | 3 | 2 | 1 | 4 | 2 | 2 | 1 | 5 | 4 | 2 | 5 | 2 | 4 | 1 | 1 | 4 | 1 | 4 | 3 | 3,03 | 1,54 |
| Average | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 4,17 | 0,95 |

| Participant Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TABLE A2 Pragmatic Qualities related to Usability | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | M | s.d. |
| Easy to use-Difficult to use | 5 | 3 | 5 | 4 | 5 | 3 | 3 | 3 | 1 | 2 | 5 | 5 | 5 | 4 | 5 | 5 | 5 | 2 | 5 | 4 | 5 | 5 | 3 | 2 | 3 | 4 | 4 | 3 | 4 | 4 | 3,87 | 1,17 |
| Ergonomic-Not suitable to body dimensions | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 2 | 1 | 5 | 4 | 5 | 4 | 5 | 1 | 5 | 4 | 5 | 4 | 5 | 5 | 3 | 2 | 5 | 4 | 5 | 4 | 5 | 4 | 4,17 | 1,21 |
| Easily understood-Challenging | 5 | 1 | 2 | 3 | 5 | 1 | 4 | 1 | 1 | 1 | 1 | 1 | 5 | 1 | 5 | 1 | 3 | 2 | 4 | 4 | 4 | 5 | 3 | 2 | 2 | 1 | 5 | 2 | 4 | 1 | 2,67 | 1,60 |
| Simple-Complex | 5 | 1 | 4 | 2 | 5 | 5 | 3 | 2 | 1 | 4 | 2 | 5 | 5 | 3 | 5 | 5 | 5 | 2 | 4 | 4 | 5 | 5 | 3 | 4 | 3 | 1 | 5 | 2 | 4 | 2 | 3,53 | 1,43 |
| Familiar-Strange | 1 | 5 | 2 | 2 | 4 | 1 | 5 | 3 | 1 | 3 | 1 | 5 | 5 | 1 | 5 | 1 | 1 | 1 | 3 | 4 | 4 | 5 | 1 | 4 | 1 | 1 | 4 | 2 | 2 | 2 | 2,67 | 1,60 |
| Predictable-Unpredictable | 5 | 5 | 1 | 3 | 4 | 1 | 4 | 2 | 1 | 2 | 1 | 3 | 5 | 1 | 5 | 3 | 2 | 1 | 3 | 4 | 1 | 3 | 4 | 2 | 1 | 1 | 4 | 2 | 4 | 2 | 2,67 | 1,45 |
| Manageable-Unruly | 5 | 1 | 4 | 4 | 5 | 5 | 4 | 5 | 4 | 3 | 3 | 2 | 5 | 3 | 5 | 5 | 5 | 4 | 4 | 4 | 5 | 5 | 3 | 2 | 1 | 2 | 4 | 3 | 5 | 3 | 3,77 | 1,25 |
| Efficient-Inefficient | 3 | 5 | 5 | 4 | 5 | 5 | 5 | 4 | 3 | 4 | 2 | 3 | 5 | 3 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | 2 | 2 | 4 | 3 | 4 | 2 | 3,90 | 1,03 |
| Practical-Impractical | 5 | 5 | 2 | 4 | 5 | 5 | 5 | 3 | 2 | 4 | 4 | 4 | 5 | 3 | 5 | 5 | 5 | 2 | 5 | 4 | 4 | 5 | 3 | 4 | 3 | 2 | 4 | 1 | 4 | 3 | 3,83 | 1,18 |
| Comfortable-Uncomfortable | 5 | 5 | 5 | 4 | 4 | 5 | 5 | 5 | 4 | 5 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 4 | 5 | 5 | 5 | 5 | 5 | 3 | 4 | 4 | 5 | 4,63 | 0,56 |
| Reliable-Unreliable | 5 | 4 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 5 | 4 | 5 | 4 | 4,77 | 0,43 |
| Safe-Dangerous | 2 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 5 | 5 | 5 | 4 | 4,80 | 0,61 |
| Easy to clean-Difficult to clean | 5 | 5 | 2 | 3 | 4 | 5 | 3 | 4 | 1 | 2 | 3 | 3 | 1 | 1 | 5 | 4 | 2 | 3 | 2 | 3 | 3 | 4 | 2 | 3 | 4 | 3 | 3 | 3 | 4 | 1 | 3,03 | 1,22 |
| Light-Heavy | 5 | 5 | 5 | 3 | 5 | 5 | 5 | 2 | 4 | 2 | 4 | 4 | 5 | 5 | 5 | 4 | 5 | 3 | 3 | 3 | 5 | 4 | 4 | 5 | 2 | 3 | 4 | 3 | 4 | 3 | 3,97 | 1,03 |
| Soft-Hard | 5 | 5 | 4 | 2 | 4 | 1 | 4 | 1 | 1 | 1 | 2 | 4 | 5 | 2 | 5 | 2 | 5 | 1 | 3 | 4 | 5 | 5 | 2 | 3 | 1 | 1 | 4 | 4 | 4 | 2 | 3,07 | 1,55 |
| Technical-Human | 5 | 1 | 4 | 2 | 5 | 3 | 5 | 2 | 1 | 4 | 2 | 3 | 1 | 3 | 5 | 1 | 3 | 1 | 3 | 4 | 1 | 2 | 2 | 3 | 3 | 1 | 1 | 3 | 4 | 3 | 2,70 | 1,37 |
| Average | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 3,63 | 1,17 |

| Participant Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TABLE B1 Hedonic Qualities related to Symbolism | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | M | s.d. |
| Exciting-Calm | 5 | 4 | 5 | 3 | 4 | 2 | 5 | 1 | 3 | 4 | 3 | 3 | 1 | 3 | 5 | 5 | 3 | 1 | 5 | 2 | 5 | 5 | 4 | 4 | 2 | 4 | 4 | 2 | 3 | 2 | 3,40 | 1,33 |
| Attractive-Repulsive | 5 | 2 | 3 | 3 | 4 | 4 | 5 | 1 | 3 | 4 | 2 | 5 | 4 | 2 | 5 | 5 | 5 | 3 | 4 | 3 | 3 | 5 | 2 | 4 | 2 | 4 | 4 | 3 | 5 | 3 | 3,57 | 1,17 |
| Charismatic-Unimpressive | 5 | 1 | 5 | 4 | 4 | 5 | 5 | 2 | 2 | 4 | 4 | 3 | 4 | 2 | 5 | 5 | 4 | 4 | 5 | 2 | 5 | 5 | 4 | 4 | 3 | 3 | 2 | 3 | 4 | 3 | 3,70 | 1,18 |
| Proud-Humble | 5 | 5 | 5 | 4 | 4 | 4 | 5 | 3 | 3 | 3 | 4 | 5 | 5 | 3 | 5 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 4 | 4 | 3 | 3 | 4 | 4 | 4,13 | 0,78 |
| Presentable-Unpresentable | 1 | 1 | 1 | 1 | 5 | 5 | 4 | 1 | 3 | 2 | 2 | 3 | 5 | 1 | 5 | 1 | 3 | 1 | 4 | 3 | 3 | 4 | 1 | 3 | 1 | 1 | 4 | 3 | 4 | 2 | 2,60 | 1,48 |
| Open minded-Conservative | 1 | 1 | 1 | 1 | 5 | 2 | 4 | 1 | 1 | 2 | 2 | 1 | 5 | 1 | 1 | 1 | 3 | 1 | 2 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 1 | 2 | 4 | 1 | 1,77 | 1,25 |
| Luxurious-Modest | 5 | 5 | 5 | 3 | 4 | 5 | 5 | 3 | 5 | 4 | 4 | 5 | 5 | 4 | 5 | 5 | 5 | 4 | 3 | 3 | 5 | 5 | 4 | 5 | 4 | 4 | 5 | 3 | 4 | 4 | 4,33 | 0,76 |
| Valuable-Cheap | 5 | 5 | 5 | 4 | 4 | 5 | 5 | 3 | 3 | 4 | 1 | 5 | 1 | 4 | 5 | 5 | 5 | 2 | 4 | 3 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | 3 | 4 | 5 | 4,00 | 1,14 |
| Prestigious-Not prestigious | 5 | 5 | 5 | 4 | 4 | 4 | 3 | 4 | 2 | 4 | 4 | 5 | 5 | 4 | 5 | 5 | 5 | 3 | 4 | 3 | 5 | 5 | 2 | 4 | 3 | 3 | 3 | 2 | 4 | 4 | 3,93 | 0,98 |
| Truthful-Exaggerated | 5 | 3 | 4 | 4 | 5 | 3 | 3 | 1 | 4 | 3 | 1 | 4 | 5 | 3 | 3 | 5 | 4 | 1 | 3 | 2 | 1 | 4 | 1 | 2 | 2 | 1 | 2 | 4 | 5 | 2 | 3,00 | 1,39 |
| High class-Low class | 5 | 5 | 5 | 4 | 3 | 5 | 5 | 5 | 4 | 2 | 4 | 5 | 5 | 4 | 5 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 5 | 4 | 3 | 3 | 4 | 5 | 4,30 | 0,84 |
| Reckless-Timid | 5 | 5 | 4 | 1 | 4 | 4 | 5 | 2 | 5 | 2 | 2 | 3 | 4 | 1 | 5 | 5 | 3 | 1 | 3 | 3 | 1 | 5 | 5 | 4 | 5 | 1 | 5 | 3 | 4 | 3 | 3,43 | 1,48 |
| Aggressive-Submissive | 5 | 5 | 1 | 1 | 3 | 1 | 4 | 1 | 1 | 2 | 1 | 4 | 4 | 1 | 3 | 5 | 4 | 1 | 3 | 2 | 1 | 1 | 3 | 3 | 1 | 1 | 1 | 2 | 4 | 2 | 2,37 | 1,45 |
| Courageous-Cautious | 5 | 2 | 1 | 1 | 4 | 1 | 3 | 1 | 2 | 3 | 3 | 1 | 1 | 3 | 3 | 2 | 4 | 1 | 4 | 4 | 1 | 1 | 3 | 5 | 1 | 1 | 1 | 4 | 4 | 3 | 2,43 | 1,38 |
| Young-Old | 5 | 5 | 5 | 4 | 4 | 5 | 5 | 1 | 4 | 4 | 3 | 1 | 1 | 3 | 5 | 4 | 4 | 4 | 4 | 4 | 5 | 4 | 5 | 5 | 3 | 4 | 5 | 4 | 5 | 4 | 3,97 | 1,19 |
| Feminine-Masculine | 1 | 5 | 5 | 5 | 3 | 4 | 1 | 3 | 3 | 4 | 3 | 5 | 5 | 2 | 3 | 4 | 3 | 4 | 1 | 4 | 5 | 5 | 5 | 2 | 4 | 2 | 5 | 4 | 5 | 4 | 3,63 | 1,33 |
| Quiet-Noisy | 5 | 5 | 5 | 4 | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 5 | 5 | 4 | 5 | 5 | 5 | 4 | 3 | 4 | 5 | 5 | 5 | 5 | 4 | 3 | 5 | 4 | 5 | 4 | 4,57 | 0,63 |
| Warm-Cold | 5 | 4 | 3 | 1 | 5 | 5 | 1 | 4 | 1 | 2 | 3 | 3 | 5 | 1 | 5 | 1 | 2 | 2 | 3 | 4 | 5 | 4 | 4 | 5 | 3 | 1 | 5 | 4 | 4 | 2 | 3,23 | 1,50 |
| Friendly-Unfriendly | 5 | 1 | 1 | 1 | 5 | 5 | 1 | 3 | 1 | 3 | 2 | 1 | 5 | 1 | 3 | 1 | 3 | 1 | 3 | 4 | 5 | 1 | 1 | 1 | 1 | 1 | 2 | 4 | 4 | 1 | 2,37 | 1,59 |
| Integrating-Isolating | 5 | 1 | 2 | 1 | 5 | 1 | 5 | 1 | 1 | 1 | 3 | 1 | 5 | 1 | 5 | 1 | 2 | 1 | 1 | 4 | 3 | 1 | 4 | 1 | 2 | 1 | 1 | 2 | 4 | 1 | 2,23 | 1,59 |
| Bringing closer to people-Separating from people | 5 | 1 | 1 | 1 | 4 | 1 | 5 | 2 | 1 | 2 | 1 | 1 | 5 | 2 | 5 | 4 | 2 | 1 | 1 | 3 | 3 | 4 | 2 | 4 | 3 | 1 | 2 | 3 | 3 | 2 | 2,50 | 1,43 |
| Natural-Artificial | 5 | 5 | 1 | 1 | 4 | 1 | 3 | 1 | 1 | 1 | 2 | 5 | 5 | 2 | 5 | 1 | 1 | 1 | 2 | 4 | 1 | 4 | 1 | 1 | 1 | 1 | 2 | 2 | 5 | 1 | 2,33 | 1,65 |
| Sympathetic-Antipathic | 3 | 1 | 2 | 3 | 5 | 5 | 5 | 3 | 4 | 3 | 4 | 5 | 5 | 2 | 5 | 4 | 3 | 3 | 3 | 5 | 4 | 4 | 4 | 3 | 3 | 2 | 3 | 3 | 5 | 2 | 3,53 | 1,14 |
| Motivating-Discouraging | 4 | 1 | 1 | 1 | 4 | 5 | 5 | 2 | 1 | 1 | 2 | 1 | 1 | 3 | 5 | 1 | 3 | 1 | 4 | 4 | 3 | 3 | 4 | 5 | 1 | 1 | 4 | 2 | 1 | 1 | 2,50 | 1,55 |
| Interesting-Boring | 5 | 1 | 3 | 3 | 4 | 1 | 1 | 2 | 2 | 3 | 2 | 2 | 1 | 2 | 1 | 5 | 5 | 2 | 3 | 4 | 3 | 2 | 2 | 2 | 1 | 2 | 4 | 2 | 4 | 2 | 2,53 | 1,25 |
| Merry-Joyless | 5 | 4 | 5 | 4 | 5 | 5 | 5 | 2 | 4 | 4 | 4 | 4 | 1 | 4 | 5 | 5 | 5 | 1 | 4 | 5 | 5 | 5 | 5 | 4 | 4 | 2 | 5 | 3 | 4 | 4 | 4,07 | 1,17 |
| Heartwarming-Depressing | 5 | 4 | 4 | 3 | 5 | 5 | 5 | 3 | 3 | 3 | 2 | 1 | 5 | 2 | 5 | 5 | 5 | 3 | 3 | 4 | 3 | 4 | 2 | 4 | 3 | 2 | 4 | 4 | 4 | 4 | 3,63 | 1,13 |
| Stylish-Styleless | 5 | 4 | 5 | 3 | 4 | 4 | 1 | 3 | 4 | 5 | 3 | 5 | 5 | 2 | 5 | 1 | 5 | 4 | 4 | 4 | 5 | 5 | 4 | 4 | 2 | 2 | 2 | 2 | 4 | 3 | 3,63 | 1,27 |
| Ill-tempered -Compliant | 5 | 4 | 2 | 3 | 3 | 1 | 1 | 2 | 4 | 4 | 1 | 5 | 5 | 1 | 5 | 4 | 4 | 1 | 3 | 4 | 5 | 1 | 4 | 4 | 1 | 3 | 1 | 3 | 4 | 2 | 3,00 | 1,49 |
| Average | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 3,27 | 1,26 |

| Participant Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TABLE B2 Hedonic Qualities related to Aesthetics | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | M | s.d. |
| Pleasant-Unpleasant | 5 | 4 | 5 | 5 | 5 | 5 | 5 | 4 | 3 | 5 | 2 | 4 | 5 | 4 | 5 | 5 | 5 | 5 | 4 | 3 | 4 | 5 | 5 | 3 | 3 | 4 | 4 | 2 | 5 | 4 | 4,23 | 0,94 |
| Aesthetic-Not aesthetic | 5 | 4 | 5 | 4 | 4 | 5 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 | 5 | 5 | 5 | 5 | 5 | 3 | 5 | 5 | 5 | 3 | 5 | 5 | 4 | 3 | 5 | 5 | 4,50 | 0,68 |
| Creative-Standard | 4 | 4 | 4 | 4 | 4 | 5 | 1 | 2 | 4 | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 5 | 4 | 3 | 3 | 5 | 5 | 5 | 5 | 5 | 4 | 1 | 3 | 4 | 4 | 3,97 | 1,10 |
| Modern-Classic | 5 | 5 | 5 | 4 | 4 | 5 | 5 | 3 | 5 | 5 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 3 | 5 | 5 | 4,67 | 0,61 |
| Original-Ordinary | 5 | 3 | 5 | 4 | 5 | 5 | 3 | 2 | 5 | 5 | 2 | 3 | 4 | 5 | 5 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 2 | 5 | 5 | 4,23 | 1,04 |
| Contemporary-Traditional | 3 | 3 | 3 | 4 | 5 | 5 | 5 | 3 | 2 | 4 | 1 | 2 | 1 | 2 | 1 | 3 | 5 | 4 | 4 | 4 | 3 | 1 | 4 | 4 | 1 | 3 | 4 | 2 | 5 | 2 | 3,10 | 1,35 |
| Futuristic-Nostalgic | 5 | 1 | 4 | 4 | 4 | 1 | 1 | 2 | 2 | 3 | 1 | 5 | 1 | 2 | 1 | 5 | 5 | 4 | 3 | 4 | 1 | 4 | 4 | 4 | 4 | 5 | 4 | 3 | 3 | 3 | 3,10 | 1,45 |
| Innovative-Imitative | 5 | 1 | 5 | 4 | 4 | 5 | 5 | 1 | 3 | 4 | 4 | 4 | 4 | 3 | 3 | 5 | 5 | 2 | 4 | 4 | 4 | 5 | 4 | 4 | 4 | 5 | 3 | 3 | 5 | 4 | 3,87 | 1,11 |
| In fashion-Out of fashion | 5 | 1 | 5 | 4 | 3 | 4 | 1 | 2 | 2 | 1 | 5 | 4 | 1 | 2 | 5 | 5 | 4 | 3 | 2 | 3 | 2 | 5 | 4 | 2 | 4 | 5 | 3 | 2 | 4 | 2 | 3,17 | 1,42 |
| Artistic-Functional | 5 | 3 | 2 | 5 | 3 | 4 | 4 | 1 | 1 | 3 | 2 | 5 | 1 | 1 | 5 | 3 | 4 | 2 | 2 | 4 | 4 | 5 | 3 | 5 | 4 | 4 | 4 | 4 | 1 | 3 | 3,23 | 1,38 |
| Admirable-The common run | 5 | 1 | 5 | 1 | 3 | 1 | 5 | 4 | 4 | 4 | 4 | 3 | 1 | 3 | 2 | 5 | 4 | 2 | 3 | 2 | 1 | 5 | 5 | 4 | 3 | 4 | 1 | 4 | 4 | 4 | 3,23 | 1,43 |
| Pleasurable-Tasteless | 5 | 3 | 5 | 4 | 4 | 4 | 5 | 4 | 4 | 4 | 4 | 5 | 4 | 3 | 5 | 5 | 4 | 4 | 4 | 2 | 5 | 5 | 4 | 4 | 5 | 4 | 2 | 2 | 4 | 5 | 4,07 | 0,91 |
| Elegant-Sloppy | 5 | 3 | 5 | 4 | 4 | 4 | 3 | 2 | 3 | 4 | 4 | 2 | 4 | 4 | 5 | 5 | 4 | 4 | 4 | 2 | 4 | 1 | 4 | 4 | 1 | 3 | 4 | 3 | 4 | 3 | 3,53 | 1,07 |
| Ornate-Plain | 5 | 3 | 5 | 4 | 3 | 3 | 3 | 1 | 3 | 2 | 4 | 4 | 4 | 4 | 5 | 5 | 4 | 3 | 5 | 4 | 2 | 1 | 4 | 4 | 1 | 4 | 4 | 2 | 4 | 2 | 3,40 | 1,22 |
| Compact-Large | 5 | 5 | 5 | 4 | 3 | 1 | 1 | 3 | 4 | 3 | 3 | 4 | 4 | 3 | 4 | 5 | 5 | 2 | 2 | 2 | 4 | 5 | 5 | 5 | 4 | 5 | 4 | 3 | 5 | 1 | 3,63 | 1,33 |
| Symmetrical-Asymmetrical | 3 | 1 | 5 | 4 | 3 | 5 | 1 | 1 | 4 | 2 | 1 | 4 | 4 | 2 | 2 | 4 | 3 | 2 | 1 | 3 | 1 | 3 | 1 | 5 | 1 | 2 | 4 | 4 | 5 | 1 | 2,73 | 1,46 |
| Organic-Geometric | 1 | 1 | 2 | 1 | 4 | 1 | 1 | 1 | 3 | 1 | 1 | 4 | 1 | 2 | 2 | 1 | 3 | 5 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 5 | 2 | 1,83 | 1,23 |
| Harmonious-Inharmonious | 5 | 4 | 5 | 4 | 4 | 1 | 5 | 1 | 1 | 1 | 1 | 4 | 1 | 3 | 5 | 3 | 4 | 3 | 3 | 3 | 1 | 1 | 3 | 2 | 3 | 1 | 4 | 3 | 5 | 2 | 2,87 | 1,48 |
| Shiny-Dull | 5 | 4 | 5 | 3 | 3 | 5 | 5 | 1 | 4 | 2 | 1 | 4 | 5 | 3 | 2 | 4 | 3 | 4 | 3 | 4 | 4 | 5 | 5 | 2 | 5 | 4 | 4 | 4 | 4 | 3 | 3,67 | 1,18 |
| Smooth-Rough | 5 | 3 | 4 | 5 | 2 | 4 | 3 | 1 | 1 | 1 | 2 | 2 | 1 | 2 | 3 | 1 | 3 | 2 | 1 | 2 | 4 | 5 | 3 | 4 | 3 | 2 | 4 | 4 | 5 | 2 | 2,80 | 1,35 |
| Average | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 3,49 | 1,19 |

| Participant Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TABLE C Emotional Reactions | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | M | s.d. |
| Gratification-Disappointment | 5 | 4 | 5 | 4 | 5 | 5 | 5 | 2 | 3 | 3 | 1 | 5 | 1 | 4 | 5 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 5 | 5 | 5 | 3 | 4 | 4 | 5 | 2 | 4,03 | 1,22 |
| Satisfaction-Dissatisfaction | 3 | 4 | 5 | 4 | 5 | 4 | 5 | 1 | 3 | 3 | 3 | 5 | 1 | 3 | 5 | 5 | 4 | 4 | 4 | 2 | 5 | 5 | 5 | 5 | 4 | 5 | 4 | 4 | 5 | 2 | 3,90 | 1,21 |
| Attraction-Disgust | 5 | 1 | 4 | 4 | 4 | 5 | 4 | 4 | 2 | 4 | 3 | 5 | 5 | 2 | 5 | 5 | 4 | 3 | 4 | 2 | 2 | 1 | 3 | 5 | 4 | 4 | 3 | 3 | 5 | 4 | 3,63 | 1,22 |
| Pleasure-Displeasure | 5 | 4 | 2 | 4 | 4 | 4 | 5 | 2 | 4 | 3 | 3 | 5 | 5 | 3 | 5 | 4 | 4 | 4 | 5 | 3 | 5 | 5 | 5 | 5 | 4 | 5 | 5 | 4 | 5 | 3 | 4,13 | 0,94 |
| Admiration-Contempt | 2 | 1 | 3 | 1 | 4 | 4 | 4 | 4 | 2 | 2 | 4 | 4 | 1 | 1 | 4 | 3 | 3 | 2 | 3 | 2 | 1 | 1 | 5 | 4 | 3 | 4 | 3 | 3 | 2 | 3 | 2,77 | 1,19 |
| Amazement-Dullness | 3 | 1 | 1 | 1 | 3 | 1 | 5 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 3 | 3 | 1 | 3 | 2 | 3 | 1 | 3 | 4 | 1 | 2 | 2 | 3 | 4 | 2 | 2,07 | 1,14 |
| Fascination-Indifference | 2 | 3 | 3 | 3 | 4 | 1 | 5 | 3 | 3 | 2 | 3 | 2 | 1 | 3 | 2 | 5 | 3 | 2 | 4 | 2 | 1 | 1 | 5 | 5 | 3 | 2 | 4 | 3 | 1 | 4 | 2,83 | 1,26 |
| Interest-Disinterest | 5 | 4 | 2 | 3 | 5 | 3 | 5 | 3 | 4 | 2 | 1 | 5 | 4 | 3 | 5 | 5 | 4 | 4 | 4 | 2 | 4 | 5 | 4 | 3 | 5 | 4 | 4 | 4 | 5 | 5 | 3,87 | 1,11 |
| Desire-Unwillingness | 5 | 5 | 2 | 3 | 5 | 3 | 5 | 3 | 1 | 3 | 3 | 5 | 3 | 3 | 5 | 5 | 3 | 3 | 4 | 4 | 5 | 5 | 4 | 5 | 4 | 4 | 4 | 4 | 5 | 4 | 3,90 | 1,06 |
| Entertainment-Boredom | 5 | 3 | 2 | 4 | 5 | 3 | 5 | 5 | 3 | 4 | 2 | 4 | 5 | 3 | 5 | 5 | 4 | 2 | 4 | 4 | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 3 | 2 | 3 | 3,93 | 1,08 |
| Joy-Sadness | 5 | 1 | 4 | 3 | 5 | 4 | 5 | 5 | 1 | 3 | 1 | 2 | 1 | 2 | 1 | 5 | 2 | 2 | 4 | 4 | 4 | 5 | 1 | 5 | 5 | 2 | 1 | 1 | 2 | 1 | 2 | 2,83 | 1,64 |
| Relief-Distress | 5 | 3 | 5 | 4 | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 5 | 5 | 2 | 5 | 5 | 3 | 4 | 3 | 4 | 5 | 5 | 5 | 5 | 5 | 2 | 5 | 4 | 4 | 2 | 4,27 | 1,01 |
| Calmness-Stress | 5 | 4 | 1 | 1 | 5 | 1 | 4 | 1 | 1 | 2 | 2 | 1 | 5 | 4 | 2 | 2 | 2 | 1 | 3 | 4 | 5 | 1 | 1 | 2 | 3 | 2 | 4 | 4 | 5 | 2 | 2,67 | 1,52 |
| Pride-Modesty | 5 | 1 | 1 | 1 | 3 | 1 | 5 | 3 | 1 | 1 | 2 | 3 | 1 | 1 | 4 | 4 | 3 | 3 | 2 | 2 | 5 | 3 | 1 | 3 | 4 | 2 | 4 | 2 | 2 | 4 | 2,57 | 1,36 |
| Delight-Anger | 5 | 3 | 1 | 1 | 5 | 1 | 5 | 1 | 1 | 1 | 1 | 2 | 3 | 2 | 1 | 3 | 2 | 2 | 2 | 3 | 3 | 1 | 3 | 5 | 1 | 1 | 4 | 2 | 3 | 4 | 2,40 | 1,40 |
| Courage-Fear | 5 | 1 | 1 | 1 | 5 | 1 | 5 | 1 | 3 | 3 | 1 | 3 | 4 | 5 | 1 | 5 | 3 | 1 | 3 | 3 | 5 | 5 | 5 | 5 | 4 | 1 | 4 | 4 | 4 | 3 | 3,17 | 1,62 |
| Happiness-Unhappiness | 5 | 3 | 4 | 3 | 5 | 3 | 5 | 4 | 1 | 2 | 1 | 2 | 5 | 4 | 5 | 5 | 3 | 4 | 2 | 4 | 4 | 5 | 5 | 5 | 4 | 2 | 4 | 2 | 4 | 4 | 3,63 | 1,27 |
| Feeling of pride-Shame | 1 | 1 | 1 | 1 | 5 | 1 | 5 | 3 | 2 | 1 | 1 | 4 | 2 | 1 | 5 | 4 | 2 | 2 | 1 | 2 | 5 | 1 | 4 | 4 | 4 | 2 | 3 | 2 | 1 | 2 | 2,43 | 1,48 |
| Freedom-Addiction | 5 | 5 | 5 | 4 | 5 | 5 | 5 | 5 | 2 | 4 | 4 | 2 | 5 | 5 | 2 | 5 | 2 | 4 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 2 | 3 | 4,23 | 1,14 |
| Confidence-Anxiety | 5 | 1 | 5 | 4 | 5 | 5 | 5 | 4 | 2 | 4 | 3 | 4 | 5 | 4 | 5 | 4 | 2 | 4 | 4 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 3 | 4,20 | 1,06 |
| Enthusiasm-Stillness | 5 | 1 | 4 | 3 | 3 | 4 | 4 | 4 | 2 | 3 | 1 | 4 | 5 | 4 | 2 | 4 | 4 | 1 | 2 | 2 | 5 | 1 | 4 | 5 | 2 | 3 | 5 | 3 | 5 | 2 | 3,23 | 1,36 |
| Ease-Uneasiness | 5 | 1 | 5 | 4 | 5 | 4 | 5 | 4 | 3 | 3 | 3 | 4 | 5 | 4 | 5 | 4 | 3 | 4 | 3 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 4 | 5 | 3 | 4,17 | 0,99 |
| Loneliness-Togetherness | 5 | 1 | 1 | 3 | 2 | 1 | 5 | 1 | 1 | 1 | 3 | 5 | 5 | 2 | 1 | 2 | 2 | 4 | 2 | 3 | 5 | 1 | 5 | 5 | 3 | 1 | 5 | 4 | 1 | 2 | 2,73 | 1,64 |
| Contentment-Discontent | 5 | 5 | 5 | 4 | 5 | 5 | 5 | 3 | 3 | 4 | 1 | 4 | 5 | 4 | 5 | 5 | 4 | 4 | 1 | 4 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 4 | 4 | 3 | 4,20 | 1,10 |
| Average | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 3,41 | 1,25 |

# C.2 SCORES OF IPHONE SURVEY

| Participant Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TABLE A1 Pragmatic Qualities related to Function | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | M | s.d. |
| Durable-Nondurable | 5 | 2 | 1 | 2 | 5 | 5 | 2 | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 4 | 5 | 4 | 4 | 4 | 5 | 4 | 5 | 2 | 4 | 3 | 4,07 | 1,17 |
| Robust-Easily breaking down | 5 | 3 | 3 | 4 | 5 | 4 | 4 | 5 | 5 | 4 | 5 | 5 | 4 | 4 | 4 | 2 | 5 | 5 | 5 | 3 | 4 | 4 | 4 | 5 | 4 | 5 | 5 | 2 | 5 | 5 | 4,23 | 0,90 |
| High performance-Low performance | 4 | 5 | 4 | 5 | 5 | 3 | 4 | 5 | 3 | 4 | 3 | 5 | 3 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 4 | 4 | 2 | 5 | 5 | 5 | 4 | 5 | 5 | 4,37 | 0,85 |
| Perfect manufacturing-Careless manufacturing | 5 | 3 | 4 | 4 | 5 | 3 | 5 | 4 | 2 | 3 | 4 | 4 | 3 | 3 | 4 | 4 | 5 | 5 | 4 | 2 | 5 | 3 | 4 | 5 | 5 | 5 | 5 | 3 | 5 | 4 | 4,00 | 0,95 |
| Sufficient functions-Insufficient functions | 5 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 3 | 5 | 5 | 5 | 4 | 5 | 5 | 4 | 5 | 5 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 4 | 5 | 5 | 4,73 | 0,52 |
| Functional-Not functional | 4 | 5 | 3 | 5 | 5 | 5 | 4 | 5 | 4 | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 5 | 4 | 5 | 5 | 5 | 5 | 4,60 | 0,56 |
| Useful-Useless | 5 | 3 | 4 | 5 | 5 | 4 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 3 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4,73 | 0,58 |
| Beneficial-Ineffectual | 4 | 5 | 1 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 5 | 5 | 3 | 5 | 4 | 3 | 5 | 3 | 5 | 5 | 4 | 3 | 3 | 2 | 5 | 4 | 4 | 5 | 5 | 5 | 4,23 | 1,07 |
| High quality-Poor quality | 5 | 2 | 3 | 5 | 5 | 4 | 4 | 4 | 5 | 3 | 4 | 5 | 3 | 4 | 4 | 3 | 5 | 4 | 5 | 5 | 5 | 4 | 5 | 4 | 5 | 5 | 2 | 5 | 5 | 5 | 4,23 | 0,94 |
| Powerful-Weak | 2 | 1 | 1 | 2 | 5 | 3 | 4 | 1 | 4 | 2 | 5 | 5 | 3 | 4 | 3 | 3 | 5 | 4 | 5 | 3 | 3 | 3 | 3 | 2 | 5 | 3 | 1 | 4 | 5 | 5 | 3,30 | 1,37 |
| Speedy-Slow | 3 | 5 | 3 | 5 | 5 | 4 | 5 | 5 | 5 | 4 | 3 | 5 | 4 | 3 | 4 | 4 | 5 | 5 | 2 | 3 | 5 | 4 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 5 | 4,33 | 0,88 |
| Economical-Wasteful | 4 | 5 | 2 | 1 | 5 | 5 | 4 | 1 | 5 | 4 | 5 | 5 | 2 | 3 | 2 | 4 | 3 | 1 | 5 | 4 | 4 | 4 | 3 | 2 | 2 | 2 | 3 | 3 | 2 | 3 | 3,27 | 1,34 |
| High technology-Low technology | 5 | 5 | 4 | 5 | 5 | 4 | 5 | 5 | 4 | 5 | 5 | 5 | 3 | 5 | 5 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 4,77 | 0,50 |
| Professional-Amateurish | 4 | 5 | 2 | 2 | 5 | 4 | 3 | 4 | 3 | 4 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 5 | 1 | 5 | 4 | 3 | 5 | 4 | 5 | 2 | 3 | 4 | 5 | 3 | 3,97 | 1,16 |
| Average | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 4,20 | 0,91 |

| Participant Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TABLE A2 Pragmatic Qualities related to Usability | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | M | s.d. |
| Easy to use-Difficult to use | 5 | 5 | 4 | 3 | 5 | 5 | 3 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 4,70 | 0,60 |
| Ergonomic-Not suitable to body dimensions | 4 | 5 | 3 | 2 | 5 | 5 | 3 | 1 | 2 | 4 | 3 | 5 | 3 | 4 | 4 | 4 | 5 | 5 | 5 | 3 | 5 | 4 | 3 | 5 | 4 | 4 | 2 | 5 | 2 | 5 | 3,80 | 1,19 |
| Easily understood-Challenging | 5 | 3 | 2 | 2 | 5 | 5 | 4 | 3 | 5 | 4 | 5 | 5 | 5 | 4 | 5 | 3 | 5 | 5 | 4 | 5 | 5 | 4 | 3 | 5 | 4 | 2 | 3 | 5 | 3 | 5 | 4,10 | 1,06 |
| Simple-Complex | 4 | 3 | 2 | 2 | 5 | 4 | 4 | 3 | 5 | 4 | 5 | 5 | 5 | 4 | 4 | 2 | 5 | 1 | 4 | 4 | 4 | 4 | 4 | 5 | 4 | 3 | 4 | 5 | 3 | 3 | 3,80 | 1,06 |
| Familiar-Strange | 4 | 2 | 1 | 2 | 1 | 4 | 3 | 1 | 2 | 2 | 4 | 5 | 5 | 4 | 2 | 1 | 3 | 1 | 1 | 2 | 4 | 4 | 2 | 3 | 1 | 1 | 3 | 5 | 4 | 5 | 2,73 | 1,44 |
| Predictable-Unpredictable | 1 | 5 | 1 | 2 | 5 | 4 | 1 | 1 | 2 | 2 | 1 | 5 | 4 | 4 | 2 | 2 | 4 | 1 | 3 | 2 | 2 | 2 | 5 | 3 | 5 | 3 | 1 | 5 | 5 | 5 | 2,93 | 1,57 |
| Manageable-Unruly | 4 | 2 | 3 | 2 | 5 | 4 | 3 | 1 | 5 | 1 | 5 | 5 | 4 | 4 | 4 | 2 | 4 | 3 | 5 | 4 | 2 | 2 | 3 | 5 | 1 | 4 | 2 | 5 | 3 | 5 | 3,40 | 1,35 |
| Efficient-Inefficient | 4 | 1 | 1 | 3 | 5 | 4 | 4 | 5 | 5 | 4 | 5 | 4 | 3 | 4 | 4 | 3 | 5 | 5 | 3 | 3 | 4 | 4 | 3 | 2 | 5 | 1 | 1 | 3 | 5 | 5 | 3,60 | 1,33 |
| Practical-Impractical | 5 | 5 | 3 | 4 | 5 | 4 | 2 | 4 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 5 | 4 | 5 | 5 | 5 | 5 | 4,60 | 0,72 |
| Comfortable-Uncomfortable | 4 | 1 | 4 | 1 | 5 | 4 | 3 | 2 | 5 | 4 | 4 | 4 | 4 | 5 | 5 | 4 | 5 | 4 | 3 | 2 | 2 | 2 | 3 | 3 | 5 | 2 | 5 | 5 | 4 | 5 | 3,63 | 1,27 |
| Reliable-Unreliable | 5 | 1 | 1 | 4 | 5 | 4 | 4 | 1 | 3 | 3 | 3 | 4 | 3 | 4 | 2 | 2 | 5 | 3 | 5 | 3 | 3 | 4 | 5 | 2 | 5 | 3 | 3 | 5 | 5 | 5 | 3,50 | 1,31 |
| Safe-Dangerous | 3 | 1 | 1 | 1 | 5 | 4 | 3 | 1 | 3 | 4 | 5 | 4 | 2 | 4 | 2 | 2 | 5 | 5 | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 5 | 5 | 2,60 | 1,59 |
| Easy to clean-Difficult to clean | 3 | 3 | 2 | 1 | 5 | 3 | 3 | 3 | 2 | 4 | 5 | 4 | 3 | 4 | 4 | 2 | 5 | 5 | 3 | 4 | 2 | 1 | 3 | 3 | 1 | 3 | 2 | 4 | 3 | 1 | 3,03 | 1,22 |
| Light-Heavy | 4 | 5 | 1 | 2 | 1 | 4 | 1 | 5 | 2 | 5 | 4 | 4 | 3 | 3 | 3 | 3 | 5 | 5 | 5 | 2 | 2 | 2 | 2 | 5 | 4 | 4 | 3 | 3 | 3 | 5 | 3,33 | 1,35 |
| Soft-Hard | 1 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 4 | 3 | 3 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 1 | 4 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1,63 | 0,93 |
| Technical-Human | 3 | 2 | 1 | 2 | 5 | 4 | 4 | 1 | 2 | 1 | 5 | 4 | 4 | 4 | 4 | 2 | 4 | 4 | 2 | 5 | 5 | 3 | 4 | 2 | 4 | 4 | 3 | 5 | 1 | 3 | 3,23 | 1,33 |
| Average | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 3,41 | 1,21 |

| Participant Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TABLE B1 Hedonic Qualities related to Symbolism | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | M | s.d. |
| Exciting-Calm | 3 | 2 | 2 | 2 | 5 | 4 | 4 | 1 | 2 | 4 | 3 | 5 | 5 | 1 | 3 | 2 | 4 | 2 | 1 | 1 | 4 | 4 | 4 | 3 | 4 | 2 | 3 | 5 | 1 | 3 | 2,97 | 1,33 |
| Attractive-Repulsive | 4 | 1 | 1 | 4 | 5 | 5 | 3 | 2 | 3 | 4 | 3 | 5 | 2 | 4 | 3 | 2 | 4 | 5 | 5 | 4 | 2 | 3 | 4 | 5 | 5 | 5 | 3 | 5 | 3 | 5 | 3,63 | 1,27 |
| Charismatic-Unimpressive | 4 | 2 | 3 | 3 | 5 | 5 | 2 | 4 | 4 | 2 | 1 | 4 | 4 | 3 | 4 | 2 | 4 | 2 | 5 | 3 | 4 | 3 | 5 | 5 | 5 | 4 | 3 | 5 | 4 | 5 | 3,63 | 1,16 |
| Proud-Humble | 4 | 3 | 2 | 4 | 5 | 4 | 2 | 5 | 3 | 2 | 1 | 4 | 4 | 3 | 4 | 3 | 4 | 5 | 5 | 4 | 2 | 4 | 5 | 5 | 5 | 3 | 3 | 5 | 3 | 5 | 3,70 | 1,15 |
| Presentable-Unpresentable | 4 | 1 | 2 | 4 | 5 | 5 | 2 | 1 | 2 | 1 | 1 | 1 | 4 | 4 | 4 | 2 | 1 | 1 | 2 | 3 | 3 | 1 | 2 | 2 | 1 | 1 | 2 | 1 | 3 | 5 | 2,37 | 1,40 |
| Open minded-Conservative | 3 | 5 | 1 | 3 | 5 | 5 | 4 | 1 | 2 | 5 | 5 | 5 | 1 | 1 | 1 | 3 | 4 | 1 | 1 | 1 | 2 | 4 | 4 | 5 | 1 | 1 | 2 | 4 | 5 | 5 | 3,00 | 1,70 |
| Luxurious-Modest | 5 | 2 | 3 | 3 | 5 | 4 | 3 | 4 | 3 | 3 | 5 | 5 | 3 | 3 | 4 | 4 | 5 | 3 | 5 | 5 | 4 | 5 | 4 | 3 | 5 | 3 | 4 | 3 | 2 | 5 | 3,83 | 0,99 |
| Valuable-Cheap | 5 | 1 | 1 | 3 | 5 | 4 | 3 | 5 | 2 | 3 | 4 | 5 | 2 | 3 | 5 | 2 | 5 | 5 | 1 | 5 | 4 | 2 | 5 | 3 | 5 | 3 | 4 | 5 | 3 | 5 | 3,60 | 1,40 |
| Prestigious-Not prestigious | 4 | 3 | 3 | 3 | 5 | 5 | 2 | 5 | 3 | 2 | 1 | 4 | 4 | 3 | 4 | 2 | 5 | 5 | 5 | 4 | 4 | 4 | 5 | 2 | 5 | 4 | 4 | 3 | 1 | 5 | 3,63 | 1,25 |
| Truthful-Exaggerated | 4 | 3 | 1 | 3 | 1 | 4 | 3 | 1 | 3 | 2 | 2 | 4 | 1 | 1 | 1 | 3 | 4 | 3 | 1 | 3 | 2 | 1 | 5 | 2 | 1 | 3 | 1 | 3 | 3 | 5 | 2,47 | 1,28 |
| High class-Low class | 4 | 2 | 1 | 2 | 5 | 4 | 1 | 3 | 2 | 3 | 3 | 5 | 3 | 4 | 4 | 2 | 4 | 3 | 5 | 5 | 4 | 4 | 4 | 2 | 5 | 3 | 4 | 3 | 1 | 3 | 3,27 | 1,23 |
| Reckless-Timid | 3 | 1 | 1 | 2 | 5 | 5 | 2 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 5 | 1 | 1 | 1 | 2 | 2 | 4 | 2 | 1 | 2 | 1 | 1 | 3 | 5 | 2,07 | 1,39 |
| Aggressive-Submissive | 2 | 1 | 1 | 2 | 3 | 4 | 2 | 1 | 2 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1,50 | 0,78 |
| Courageous-Cautious | 3 | 1 | 2 | 2 | 4 | 4 | 2 | 1 | 2 | 2 | 1 | 4 | 1 | 1 | 1 | 1 | 5 | 1 | 1 | 1 | 2 | 3 | 4 | 1 | 1 | 1 | 2 | 4 | 3 | 1 | 2,07 | 1,26 |
| Young-Old | 4 | 1 | 1 | 2 | 4 | 4 | 3 | 4 | 4 | 3 | 5 | 4 | 4 | 4 | 3 | 2 | 5 | 1 | 5 | 4 | 2 | 3 | 2 | 3 | 4 | 2 | 2 | 5 | 4 | 1 | 3,17 | 1,29 |
| Feminine-Masculine | 5 | 1 | 1 | 1 | 4 | 4 | 5 | 2 | 2 | 2 | 1 | 4 | 2 | 1 | 2 | 4 | 4 | 1 | 1 | 2 | 2 | 2 | 5 | 2 | 3 | 3 | 2 | 3 | 3 | 1 | 2,50 | 1,33 |
| Quiet-Noisy | 4 | 1 | 2 | 2 | 1 | 1 | 2 | 1 | 2 | 3 | 3 | 2 | 1 | 2 | 2 | 1 | 3 | 1 | 1 | 2 | 2 | 1 | 4 | 2 | 3 | 1 | 2 | 1 | 2 | 3 | 1,93 | 0,91 |
| Warm-Cold | 2 | 1 | 2 | 2 | 1 | 1 | 3 | 1 | 2 | 3 | 1 | 4 | 1 | 1 | 1 | 2 | 3 | 1 | 1 | 2 | 2 | 3 | 4 | 4 | 1 | 3 | 1 | 1 | 5 | 1 | 2,00 | 1,17 |
| Friendly-Unfriendly | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 5 | 5 | 3 | 1 | 1 | 4 | 1 | 1 | 4 | 1 | 3 | 3 | 2 | 1 | 5 | 3 | 1 | 3 | 5 | 1 | 2,23 | 1,45 |
| Integrating-Isolating | 4 | 1 | 1 | 3 | 5 | 4 | 3 | 1 | 5 | 5 | 5 | 5 | 5 | 1 | 1 | 1 | 5 | 1 | 1 | 2 | 2 | 1 | 5 | 3 | 5 | 2 | 3 | 4 | 4 | 4 | 3,07 | 1,66 |
| Bringing closer to people-Separating from people | 4 | 3 | 1 | 2 | 5 | 4 | 2 | 3 | 5 | 5 | 5 | 5 | 5 | 2 | 4 | 1 | 5 | 1 | 4 | 4 | 4 | 4 | 4 | 3 | 5 | 4 | 1 | 4 | 2 | 5 | 3,53 | 1,41 |
| Natural-Artificial | 4 | 2 | 1 | 1 | 1 | 5 | 2 | 1 | 2 | 3 | 4 | 1 | 2 | 2 | 1 | 2 | 4 | 1 | 1 | 3 | 2 | 3 | 3 | 2 | 1 | 4 | 1 | 1 | 1 | 1 | 2,07 | 1,20 |
| Sympathetic-Antipathic | 5 | 1 | 3 | 3 | 1 | 4 | 3 | 2 | 4 | 4 | 1 | 5 | 4 | 3 | 3 | 3 | 4 | 1 | 4 | 4 | 5 | 3 | 4 | 4 | 1 | 3 | 2 | 3 | 4 | 5 | 3,20 | 1,27 |
| Motivating-Discouraging | 4 | 3 | 1 | 1 | 1 | 4 | 1 | 1 | 2 | 1 | 1 | 1 | 4 | 1 | 1 | 1 | 5 | 1 | 1 | 1 | 2 | 1 | 2 | 4 | 4 | 1 | 1 | 3 | 5 | 5 | 2,13 | 1,50 |
| Interesting-Boring | 3 | 5 | 3 | 4 | 5 | 5 | 3 | 3 | 3 | 5 | 5 | 5 | 2 | 1 | 2 | 2 | 5 | 3 | 4 | 2 | 5 | 4 | 5 | 5 | 5 | 4 | 3 | 4 | 5 | 5 | 3,83 | 1,23 |
| Merry-Joyless | 4 | 5 | 3 | 4 | 5 | 5 | 2 | 3 | 5 | 3 | 5 | 5 | 5 | 1 | 2 | 4 | 5 | 3 | 1 | 5 | 5 | 4 | 5 | 5 | 5 | 2 | 3 | 5 | 5 | 5 | 3,97 | 1,33 |
| Heartwarming-Depressing | 4 | 2 | 1 | 2 | 4 | 5 | 2 | 1 | 2 | 1 | 1 | 5 | 5 | 1 | 1 | 1 | 5 | 1 | 2 | 1 | 3 | 1 | 3 | 3 | 5 | 3 | 1 | 5 | 5 | 5 | 2,70 | 1,66 |
| Stylish-Styleless | 5 | 1 | 2 | 3 | 5 | 5 | 3 | 1 | 2 | 4 | 5 | 5 | 4 | 4 | 4 | 1 | 5 | 1 | 5 | 4 | 5 | 5 | 5 | 4 | 5 | 4 | 4 | 5 | 5 | 5 | 3,87 | 1,43 |
| Ill-tempered -Compliant | 3 | 1 | 2 | 2 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 5 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1,37 | 0,85 |
| Average | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 2,87 | 1,29 |

| Participant Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TABLE B2 Hedonic Qualities related to Aesthetics | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | M | s.d. |
| Pleasant-Unpleasant | 5 | 3 | 3 | 3 | 5 | 4 | 4 | 5 | 4 | 3 | 4 | 5 | 4 | 4 | 4 | 3 | 5 | 5 | 5 | 4 | 5 | 4 | 4 | 5 | 5 | 5 | 4 | 5 | 4 | 5 | 4,27 | 0,74 |
| Aesthetic-Not aesthetic | 5 | 4 | 4 | 4 | 5 | 5 | 3 | 5 | 4 | 5 | 4 | 5 | 3 | 5 | 5 | 4 | 5 | 5 | 5 | 4 | 4 | 4 | 5 | 5 | 5 | 5 | 4 | 5 | 4 | 5 | 4,50 | 0,63 |
| Creative-Standard | 4 | 4 | 3 | 5 | 5 | 5 | 3 | 4 | 4 | 5 | 5 | 5 | 3 | 3 | 1 | 4 | 5 | 5 | 5 | 5 | 3 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 4,33 | 0,99 |
| Modern-Classic | 4 | 5 | 3 | 4 | 5 | 5 | 4 | 5 | 4 | 5 | 5 | 5 | 2 | 5 | 5 | 4 | 5 | 5 | 5 | 4 | 5 | 4 | 4 | 5 | 1 | 3 | 4 | 5 | 4 | 5 | 4,30 | 0,99 |
| Original-Ordinary | 4 | 3 | 2 | 4 | 5 | 3 | 4 | 5 | 4 | 5 | 5 | 5 | 1 | 4 | 4 | 3 | 5 | 5 | 5 | 4 | 5 | 5 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4,30 | 1,02 |
| Contemporary-Traditional | 4 | 4 | 2 | 4 | 5 | 5 | 4 | 4 | 4 | 3 | 4 | 5 | 1 | 4 | 4 | 3 | 5 | 1 | 5 | 4 | 5 | 5 | 3 | 5 | 1 | 2 | 4 | 5 | 1 | 5 | 3,70 | 1,37 |
| Futuristic-Nostalgic | 4 | 4 | 2 | 1 | 5 | 5 | 4 | 5 | 5 | 4 | 5 | 5 | 4 | 2 | 2 | 3 | 5 | 4 | 5 | 2 | 5 | 4 | 3 | 5 | 5 | 3 | 5 | 5 | 1 | 5 | 3,90 | 1,32 |
| Innovative-Imitative | 4 | 5 | 2 | 5 | 5 | 5 | 4 | 5 | 5 | 4 | 5 | 5 | 1 | 4 | 3 | 3 | 5 | 5 | 3 | 4 | 5 | 5 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4,37 | 1,03 |
| In fashion-Out of fashion | 4 | 3 | 3 | 2 | 5 | 5 | 2 | 5 | 5 | 5 | 3 | 5 | 3 | 5 | 5 | 2 | 5 | 5 | 2 | 5 | 5 | 3 | 3 | 5 | 5 | 4 | 5 | 1 | 1 | 5 | 3,87 | 1,38 |
| Artistic-Functional | 4 | 3 | 3 | 4 | 5 | 4 | 5 | 2 | 5 | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 5 | 5 | 1 | 4 | 5 | 1 | 5 | 5 | 5 | 4 | 5 | 5 | 1 | 5 | 4,07 | 1,28 |
| Admirable-The common run | 4 | 2 | 3 | 2 | 5 | 5 | 3 | 3 | 3 | 4 | 5 | 5 | 2 | 4 | 4 | 4 | 5 | 5 | 5 | 4 | 4 | 4 | 5 | 5 | 5 | 3 | 4 | 5 | 2 | 5 | 3,97 | 1,07 |
| Pleasurable-Tasteless | 4 | 3 | 3 | 4 | 5 | 5 | 3 | 1 | 3 | 5 | 5 | 5 | 2 | 5 | 4 | 4 | 5 | 5 | 5 | 5 | 3 | 4 | 5 | 5 | 5 | 3 | 4 | 5 | 4 | 5 | 4,13 | 1,07 |
| Elegant-Sloppy | 5 | 2 | 4 | 4 | 5 | 5 | 3 | 4 | 3 | 5 | 4 | 5 | 1 | 5 | 4 | 4 | 5 | 5 | 5 | 4 | 4 | 4 | 5 | 5 | 5 | 2 | 4 | 5 | 4 | 5 | 4,17 | 1,05 |
| Ornate-Plain | 4 | 3 | 2 | 3 | 5 | 4 | 3 | 3 | 4 | 4 | 4 | 5 | 1 | 2 | 3 | 2 | 5 | 5 | 5 | 4 | 2 | 4 | 5 | 3 | 5 | 3 | 3 | 3 | 3 | 4 | 3,53 | 1,11 |
| Compact-Large | 4 | 2 | 2 | 3 | 5 | 5 | 4 | 3 | 2 | 4 | 1 | 5 | 1 | 3 | 3 | 1 | 5 | 5 | 1 | 2 | 2 | 2 | 2 | 5 | 5 | 3 | 5 | 5 | 2 | 5 | 3,23 | 1,50 |
| Symmetrical-Asymmetrical | 4 | 1 | 3 | 1 | 5 | 5 | 2 | 1 | 4 | 4 | 4 | 5 | 1 | 2 | 1 | 2 | 5 | 5 | 1 | 1 | 2 | 2 | 4 | 5 | 4 | 3 | 2 | 4 | 2 | 5 | 3,00 | 1,55 |
| Organic-Geometric | 4 | 1 | 1 | 1 | 4 | 5 | 3 | 1 | 2 | 1 | 4 | 5 | 1 | 1 | 1 | 3 | 5 | 5 | 1 | 1 | 3 | 2 | 4 | 2 | 1 | 2 | 2 | 1 | 2 | 5 | 2,47 | 1,55 |
| Harmonious-Inharmonious | 4 | 1 | 2 | 2 | 5 | 4 | 3 | 1 | 4 | 3 | 5 | 5 | 1 | 1 | 1 | 1 | 5 | 5 | 1 | 1 | 2 | 4 | 3 | 4 | 1 | 2 | 2 | 1 | 2 | 5 | 2,70 | 1,58 |
| Shiny-Dull | 4 | 1 | 1 | 3 | 5 | 4 | 3 | 2 | 4 | 2 | 1 | 5 | 1 | 1 | 2 | 1 | 5 | 5 | 1 | 1 | 2 | 1 | 5 | 5 | 4 | 2 | 1 | 1 | 3 | 3 | 2,63 | 1,59 |
| Smooth-Rough | 5 | 1 | 2 | 2 | 5 | 5 | 3 | 1 | 4 | 2 | 4 | 5 | 3 | 1 | 1 | 4 | 5 | 5 | 3 | 1 | 5 | 3 | 5 | 5 | 1 | 3 | 1 | 5 | 4 | 5 | 3,30 | 1,62 |
| Average | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 3,74 | 1,22 |

| Participant Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TABLE C Emotional Reactions | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | M | s.d. |
| Gratification-Disappointment | 5 | 3 | 1 | 2 | 5 | 4 | 4 | 5 | 2 | 3 | 5 | 5 | 5 | 5 | 4 | 4 | 4 | 5 | 5 | 5 | 5 | 4 | 5 | 5 | 5 | 3 | 3 | 4 | 1 | 5 | 4,03 | 1,25 |
| Satisfaction-Dissatisfaction | 5 | 2 | 1 | 2 | 5 | 3 | 4 | 4 | 3 | 4 | 5 | 5 | 5 | 4 | 4 | 2 | 5 | 5 | 5 | 4 | 5 | 4 | 5 | 5 | 5 | 3 | 4 | 4 | 5 | 5 | 4,07 | 1,14 |
| Attraction-Disgust | 4 | 4 | 1 | 3 | 5 | 4 | 3 | 1 | 3 | 4 | 4 | 5 | 3 | 4 | 4 | 3 | 4 | 3 | 5 | 4 | 4 | 4 | 4 | 5 | 5 | 4 | 4 | 4 | 3 | 5 | 3,77 | 1,01 |
| Pleasure-Displeasure | 4 | 2 | 2 | 2 | 5 | 4 | 3 | 2 | 3 | 2 | 4 | 5 | 5 | 2 | 2 | 4 | 4 | 5 | 5 | 3 | 5 | 2 | 5 | 3 | 5 | 2 | 3 | 1 | 4 | 5 | 3,43 | 1,30 |
| Admiration-Contempt | 2 | 1 | 1 | 1 | 5 | 1 | 2 | 1 | 2 | 4 | 4 | 5 | 4 | 2 | 4 | 2 | 4 | 3 | 1 | 2 | 3 | 4 | 5 | 5 | 5 | 2 | 2 | 5 | 1 | 5 | 2,93 | 1,55 |
| Amazement-Dullness | 4 | 1 | 3 | 1 | 5 | 5 | 2 | 1 | 2 | 2 | 1 | 5 | 1 | 1 | 2 | 1 | 4 | 1 | 1 | 1 | 2 | 2 | 5 | 4 | 3 | 3 | 3 | 1 | 2 | 2 | 2,37 | 1,43 |
| Fascination-Indifference | 3 | 2 | 1 | 1 | 3 | 4 | 2 | 1 | 2 | 4 | 4 | 4 | 4 | 1 | 1 | 3 | 3 | 4 | 1 | 1 | 3 | 2 | 4 | 4 | 3 | 2 | 3 | 4 | 1 | 5 | 2,67 | 1,27 |
| Interest-Disinterest | 5 | 4 | 2 | 1 | 5 | 5 | 4 | 5 | 3 | 2 | 2 | 5 | 4 | 1 | 1 | 3 | 4 | 5 | 3 | 5 | 3 | 4 | 4 | 4 | 5 | 3 | 3 | 4 | 3 | 5 | 3,57 | 1,30 |
| Desire-Unwillingness | 4 | 3 | 1 | 1 | 2 | 4 | 3 | 1 | 2 | 2 | 1 | 5 | 4 | 1 | 1 | 1 | 4 | 1 | 3 | 4 | 3 | 2 | 4 | 4 | 5 | 3 | 3 | 4 | 1 | 5 | 2,73 | 1,41 |
| Entertainment-Boredom | 4 | 5 | 3 | 4 | 5 | 5 | 3 | 5 | 5 | 5 | 5 | 5 | 3 | 2 | 3 | 4 | 5 | 3 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 4 | 4 | 5 | 5 | 5 | 4,37 | 0,89 |
| Joy-Sadness | 3 | 1 | 1 | 1 | 5 | 4 | 2 | 1 | 3 | 2 | 4 | 5 | 3 | 1 | 1 | 4 | 5 | 4 | 1 | 5 | 3 | 1 | 3 | 1 | 5 | 1 | 2 | 4 | 3 | 5 | 2,80 | 1,56 |
| Relief-Distress | 4 | 1 | 1 | 2 | 3 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 5 | 1 | 1 | 3 | 4 | 4 | 1 | 2 | 2 | 1 | 3 | 1 | 5 | 2 | 2 | 1 | 5 | 5 | 2,23 | 1,48 |
| Calmness-Stress | 1 | 3 | 1 | 1 | 2 | 4 | 1 | 1 | 2 | 1 | 1 | 1 | 4 | 1 | 1 | 1 | 4 | 4 | 1 | 1 | 1 | 1 | 4 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1,63 | 1,16 |
| Pride-Modesty | 2 | 3 | 1 | 1 | 4 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 3 | 2 | 1 | 2 | 1 | 1 | 2 | 2 | 1 | 2 | 1 | 1,57 | 0,82 |
| Delight-Anger | 3 | 2 | 1 | 1 | 2 | 4 | 2 | 1 | 2 | 1 | 4 | 5 | 4 | 1 | 1 | 4 | 3 | 4 | 1 | 1 | 2 | 1 | 3 | 1 | 4 | 1 | 1 | 4 | 2 | 5 | 2,37 | 1,40 |
| Courage-Fear | 3 | 4 | 1 | 1 | 1 | 5 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 4 | 1 | 1 | 1 | 1 | 4 | 4 | 3 | 1 | 2 | 1 | 3 | 2 | 1,93 | 1,26 |
| Happiness-Unhappiness | 3 | 1 | 1 | 3 | 3 | 4 | 3 | 2 | 3 | 2 | 4 | 5 | 4 | 3 | 2 | 4 | 4 | 4 | 3 | 4 | 4 | 2 | 4 | 1 | 5 | 2 | 4 | 4 | 5 | 5 | 3,27 | 1,20 |
| Feeling of pride-Shame | 2 | 1 | 1 | 1 | 5 | 4 | 2 | 2 | 3 | 2 | 1 | 5 | 4 | 1 | 1 | 1 | 4 | 1 | 1 | 1 | 3 | 1 | 5 | 1 | 1 | 1 | 4 | 1 | 3 | 1 | 2,13 | 1,46 |
| Freedom-Addiction | 5 | 5 | 2 | 3 | 5 | 5 | 4 | 1 | 4 | 5 | 5 | 5 | 5 | 1 | 4 | 1 | 4 | 1 | 5 | 4 | 4 | 5 | 5 | 1 | 5 | 3 | 4 | 5 | 5 | 5 | 3,87 | 1,50 |
| Confidence-Anxiety | 4 | 1 | 1 | 1 | 5 | 3 | 3 | 1 | 2 | 1 | 5 | 5 | 3 | 1 | 3 | 4 | 4 | 1 | 5 | 1 | 4 | 1 | 5 | 1 | 5 | 1 | 3 | 4 | 3 | 2 | 2,77 | 1,59 |
| Enthusiasm-Stillness | 3 | 1 | 1 | 1 | 3 | 4 | 2 | 1 | 2 | 1 | 3 | 1 | 4 | 1 | 1 | 1 | 3 | 1 | 1 | 1 | 2 | 1 | 5 | 1 | 1 | 1 | 2 | 1 | 1 | 3 | 1,80 | 1,16 |
| Ease-Uneasiness | 5 | 1 | 1 | 2 | 4 | 3 | 3 | 1 | 2 | 1 | 1 | 5 | 4 | 1 | 3 | 4 | 4 | 4 | 1 | 1 | 2 | 1 | 3 | 1 | 5 | 3 | 2 | 1 | 1 | 5 | 2,50 | 1,50 |
| Loneliness-Togetherness | 5 | 3 | 1 | 2 | 5 | 4 | 2 | 1 | 4 | 3 | 5 | 5 | 3 | 1 | 1 | 3 | 4 | 5 | 1 | 1 | 4 | 2 | 5 | 1 | 5 | 1 | 3 | 1 | 1 | 1 | 2,77 | 1,63 |
| Contentment-Discontent | 4 | 2 | 1 | 2 | 5 | 4 | 4 | 5 | 2 | 3 | 4 | 5 | 4 | 4 | 1 | 3 | 4 | 4 | 5 | 5 | 5 | 3 | 5 | 1 | 5 | 3 | 4 | 4 | 1 | 5 | 3,57 | 1,38 |
| Average | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 2,88 | 1,32 |

# APPENDIX D

## D.1 RELEVANCY SCORES OF WORD PAIRS FOR AUTOMOBILES

| | | M | s.d. |
|---|---|---|---|
| 1 | Safe-Dangerous | 4,80 | 0,61 |
| 2 | Reliable-Unreliable | 4,77 | 0,43 |
| 3 | Robust-Easily breaking down | 4,77 | 0,50 |
| 4 | Economical-Wasteful | 4,70 | 0,65 |
| 5 | Modern-Classic | 4,67 | 0,61 |
| 6 | Comfortable-Uncomfortable | 4,63 | 0,56 |
| 7 | Quiet-Noisy | 4,57 | 0,63 |
| 8 | High quality-Poor quality | 4,57 | 0,68 |
| 9 | High performance-Low performance | 4,53 | 0,82 |
| 10 | Aesthetic-Not aesthetic | 4,50 | 0,68 |
| 11 | Luxurious-Modest | 4,33 | 0,76 |
| 12 | Perfect manufacturing-Careless manufacturing | 4,33 | 0,84 |
| 13 | High class-Low class | 4,30 | 0,84 |
| 14 | High technology-Low technology | 4,30 | 0,92 |
| 15 | Speedy-Slow | 4,30 | 0,99 |
| 16 | Relief-Distress | 4,27 | 1,01 |
| 17 | Useful-Useless | 4,23 | 0,90 |
| 18 | Pleasant-Unpleasant | 4,23 | 0,94 |
| 19 | Original-Ordinary | 4,23 | 1,04 |
| 20 | Sufficient functions-Insufficient functions | 4,20 | 0,61 |
| 21 | Confidence-Anxiety | 4,20 | 1,06 |
| 22 | Contentment-Discontent | 4,20 | 1,10 |
| 23 | Freedom-Addiction | 4,20 | 1,21 |
| 24 | Ease-Uneasiness | 4,17 | 0,99 |
| 25 | Ergonomic-Not suitable to body dimensions | 4,17 | 1,21 |
| 26 | Proud-Humble | 4,13 | 0,78 |
| 27 | Pleasure-Displeasure | 4,13 | 0,94 |
| 28 | Beneficial-Ineffectual | 4,10 | 1,24 |
| 29 | Pleasurable-Tasteless | 4,07 | 0,91 |
| 30 | Merry-Joyless | 4,07 | 1,17 |
| 31 | Gratification-Disappointment | 4,03 | 1,22 |
| 32 | Valuable-Cheap | 4,00 | 1,14 |
| 33 | Light-Heavy | 3,97 | 1,03 |
| 34 | Creative-Standard | 3,97 | 1,10 |
| 35 | Young-Old | 3,97 | 1,19 |

Table (continued)

| | | M | s.d. |
|---|---|---|---|
| 36 | Prestigious-Not prestigious | 3,93 | 0,98 |
| 37 | Entertainment-Boredom | 3,93 | 1,08 |
| 38 | Efficient-Inefficient | 3,90 | 1,03 |
| 39 | Desire-Unwillingness | 3,90 | 1,06 |
| 40 | Satisfaction-Dissatisfaction | 3,90 | 1,21 |
| 41 | Innovative-Imitative | 3,87 | 1,11 |
| 42 | Interest-Disinterest | 3,87 | 1,11 |
| 43 | Easy to use-Difficult to use | 3,87 | 1,17 |
| 44 | Powerful-Weak | 3,87 | 1,25 |
| 45 | Practical-Impractical | 3,83 | 1,18 |
| 46 | Functional-Not functional | 3,77 | 1,22 |
| 47 | Manageable-Unruly | 3,77 | 1,25 |
| 48 | Charismatic-Unimpressive | 3,70 | 1,18 |
| 49 | Shiny-Dull | 3,67 | 1,18 |
| 50 | Heartwarming-Depressing | 3,63 | 1,13 |
| 51 | Durable-Nondurable | 3,63 | 1,19 |
| 52 | Attraction-Disgust | 3,63 | 1,22 |
| 53 | Stylish-Styleless | 3,63 | 1,27 |
| 54 | Happiness-Unhappiness | 3,63 | 1,27 |
| 55 | Feminine-Masculine | 3,63 | 1,33 |
| 56 | Compact-Large | 3,63 | 1,33 |
| 57 | Attractive-Repulsive | 3,57 | 1,17 |
| 58 | Elegant-Sloppy | 3,53 | 1,07 |
| 59 | Sympathetic-Antipathic | 3,53 | 1,14 |
| 60 | Simple-Complex | 3,53 | 1,43 |
| 61 | Reckless-Timid | 3,43 | 1,48 |
| 62 | Ornate-Plain | 3,40 | 1,22 |
| 63 | Exciting-Calm | 3,40 | 1,33 |
| 64 | Enthusiasm-Stillness | 3,23 | 1,36 |
| 65 | Artistic-Functional | 3,23 | 1,38 |
| 66 | Admirable-The common run | 3,23 | 1,43 |
| 67 | Warm-Cold | 3,23 | 1,50 |
| 68 | In fashion-Out of fashion | 3,17 | 1,42 |
| 69 | Courage-Fear | 3,17 | 1,62 |
| 70 | Contemporary-Traditional | 3,10 | 1,35 |
| 71 | Futuristic-Nostalgic | 3,10 | 1,45 |
| 72 | Soft-Hard | 3,07 | 1,55 |
| 73 | Easy to clean-Difficult to clean | 3,03 | 1,22 |
| 74 | Professional-Amateurish | 3,03 | 1,54 |

Table (continued)

| | | M | s.d. |
|---|---|---|---|
| 75 | Truthful-Exaggerated | 3,00 | 1,39 |
| 76 | Ill-tempered -Complaint | 3,00 | 1,49 |
| 77 | Harmonious-Inharmonious | 2,87 | 1,48 |
| 78 | Fascination-Indifference | 2,83 | 1,26 |
| 79 | Joy-Sadness | 2,83 | 1,64 |
| 80 | Smooth-Rough | 2,80 | 1,35 |
| 81 | Admiration-Contempt | 2,77 | 1,19 |
| 82 | Symmetrical-Asymmetrical | 2,73 | 1,46 |
| 83 | Loneliness-Togetherness | 2,73 | 1,64 |
| 84 | Technical-Human | 2,70 | 1,37 |
| 85 | Predictable-Unpredictable | 2,67 | 1,45 |
| 86 | Calmness-Stress | 2,67 | 1,52 |
| 87 | Easily understood-Challenging | 2,67 | 1,60 |
| 88 | Familiar-Strange | 2,67 | 1,60 |
| 89 | Presentable-Unpresentable | 2,60 | 1,48 |
| 90 | Pride-Modesty | 2,57 | 1,36 |
| 91 | Interesting-Boring | 2,53 | 1,25 |
| 92 | Bringing closer to people-Separating from people | 2,50 | 1,43 |
| 93 | Motivating-Discouraging | 2,50 | 1,55 |
| 94 | Courageous-Cautious | 2,43 | 1,38 |
| 95 | Feeling of pride-Shame | 2,43 | 1,48 |
| 96 | Delight-Anger | 2,40 | 1,40 |
| 97 | Aggressive-Submissive | 2,37 | 1,45 |
| 98 | Friendly-Unfriendly | 2,37 | 1,59 |
| 99 | Natural-Artificial | 2,33 | 1,65 |
| 100 | Integrating-Isolating | 2,23 | 1,59 |
| 101 | Amazement-Dullness | 2,07 | 1,14 |
| 102 | Organic-Geometric | 1,83 | 1,23 |
| 103 | Open minded-Conservative | 1,77 | 1,25 |
| | **Averages** | **3,52** | **1,19** |

## D.2 RELEVANCY SCORES OF WORD PAIRS FOR THE IPHONE

| | | M | s.d. |
|---|---|---|---|
| 1 | High technology-Low technology | 4,77 | 0,50 |
| 2 | Sufficient functions-Insufficient functions | 4,73 | 0,52 |
| 3 | Useful-Useless | 4,73 | 0,58 |
| 4 | Easy to use-Difficult to use | 4,70 | 0,60 |
| 5 | Functional-Not functional | 4,60 | 0,56 |
| 6 | Practical-Impractical | 4,60 | 0,72 |
| 7 | Aesthetic-Not aesthetic | 4,50 | 0,63 |
| 8 | High performance-Low performance | 4,37 | 0,85 |
| 9 | Entertainment-Boredom | 4,37 | 0,89 |
| 10 | Innovative-Imitative | 4,37 | 1,03 |
| 11 | Speedy-Slow | 4,33 | 0,88 |
| 12 | Creative-Standard | 4,33 | 0,99 |
| 13 | Modern-Classic | 4,30 | 0,99 |
| 14 | Original-Ordinary | 4,30 | 1,02 |
| 15 | Pleasant-Unpleasant | 4,27 | 0,74 |
| 16 | Robust-Easily breaking down | 4,23 | 0,90 |
| 17 | High quality-Poor quality | 4,23 | 0,94 |
| 18 | Beneficial-Ineffectual | 4,23 | 1,07 |
| 19 | Elegant-Sloppy | 4,17 | 1,05 |
| 20 | Pleasurable-Tasteless | 4,13 | 1,07 |
| 21 | Easily understood-Challenging | 4,10 | 1,06 |
| 22 | Satisfaction-Dissatisfaction | 4,07 | 1,14 |
| 23 | Durable-Nondurable | 4,07 | 1,17 |
| 24 | Artistic-Functional | 4,07 | 1,28 |
| 25 | Gratification-Disappointment | 4,03 | 1,25 |
| 26 | Perfect manufacturing-Careless manufacturing | 4,00 | 0,95 |
| 27 | Admirable-The common run | 3,97 | 1,07 |
| 28 | Professional-Amateurish | 3,97 | 1,16 |
| 29 | Merry-Joyless | 3,97 | 1,33 |
| 30 | Futuristic-Nostalgic | 3,90 | 1,32 |
| 31 | In fashion-Out of fashion | 3,87 | 1,38 |
| 32 | Stylish-Styleless | 3,87 | 1,43 |
| 33 | Freedom-Addiction | 3,87 | 1,50 |
| 34 | Luxurious-Modest | 3,83 | 0,99 |
| 35 | Interesting-Boring | 3,83 | 1,23 |
| 36 | Simple-Complex | 3,80 | 1,06 |
| 37 | Ergonomic-Not suitable to body dimensions | 3,80 | 1,19 |
| 38 | Attraction-Disgust | 3,77 | 1,01 |
| 39 | Proud-Humble | 3,70 | 1,15 |

Table (continued)

| | | M | s.d. |
|---|---|---|---|
| 40 | Contemporary-Traditional | 3,70 | 1,37 |
| 41 | Charismatic-Unimpressive | 3,63 | 1,16 |
| 42 | Prestigious-Not prestigious | 3,63 | 1,25 |
| 43 | Comfortable-Uncomfortable | 3,63 | 1,27 |
| 44 | Attractive-Repulsive | 3,63 | 1,27 |
| 45 | Efficient-Inefficient | 3,60 | 1,33 |
| 46 | Valuable-Cheap | 3,60 | 1,40 |
| 47 | Interest-Disinterest | 3,57 | 1,30 |
| 48 | Contentment-Discontent | 3,57 | 1,38 |
| 49 | Ornate-Plain | 3,53 | 1,11 |
| 50 | Bringing closer to people-Separating from people | 3,53 | 1,41 |
| 51 | Reliable-Unreliable | 3,50 | 1,31 |
| 52 | Pleasure-Displeasure | 3,43 | 1,30 |
| 53 | Manageable-Unruly | 3,40 | 1,35 |
| 54 | Light-Heavy | 3,33 | 1,35 |
| 55 | Powerful-Weak | 3,30 | 1,37 |
| 56 | Smooth-Rough | 3,30 | 1,62 |
| 57 | Happiness-Unhappiness | 3,27 | 1,20 |
| 58 | High class-Low class | 3,27 | 1,23 |
| 59 | Economical-Wasteful | 3,27 | 1,34 |
| 60 | Technical-Human | 3,23 | 1,33 |
| 61 | Compact-Large | 3,23 | 1,50 |
| 62 | Sympathetic-Antipathic | 3,20 | 1,27 |
| 63 | Young-Old | 3,17 | 1,29 |
| 64 | Integrating-Isolating | 3,07 | 1,66 |
| 65 | Easy to clean-Difficult to clean | 3,03 | 1,22 |
| 66 | Symmetrical-Asymmetrical | 3,00 | 1,55 |
| 67 | Open minded-Conservative | 3,00 | 1,70 |
| 68 | Exciting-Calm | 2,97 | 1,33 |
| 69 | Admiration-Contempt | 2,93 | 1,55 |
| 70 | Predictable-Unpredictable | 2,93 | 1,57 |
| 71 | Joy-Sadness | 2,80 | 1,56 |
| 72 | Confidence-Anxiety | 2,77 | 1,59 |
| 73 | Loneliness-Togetherness | 2,77 | 1,63 |
| 74 | Desire-Unwillingness | 2,73 | 1,41 |
| 75 | Familiar-Strange | 2,73 | 1,44 |
| 76 | Harmonious-Inharmonious | 2,70 | 1,58 |
| 77 | Heartwarming-Depressing | 2,70 | 1,66 |
| 78 | Fascination-Indifference | 2,67 | 1,27 |

Table (continued)

| | | M | s.d. |
|---|---|---|---|
| 79 | Shiny-Dull | 2,63 | 1,59 |
| 80 | Safe-Dangerous | 2,60 | 1,59 |
| 81 | Feminine-Masculine | 2,50 | 1,33 |
| 82 | Ease-Uneasiness | 2,50 | 1,50 |
| 83 | Truthful-Exaggerated | 2,47 | 1,28 |
| 84 | Organic-Geometric | 2,47 | 1,55 |
| 85 | Presentable-Unpresentable | 2,37 | 1,40 |
| 86 | Delight-Anger | 2,37 | 1,40 |
| 87 | Amazement-Dullness | 2,37 | 1,43 |
| 88 | Friendly-Unfriendly | 2,23 | 1,45 |
| 89 | Relief-Distress | 2,23 | 1,48 |
| 90 | Feeling of pride-Shame | 2,13 | 1,46 |
| 91 | Motivating-Discouraging | 2,13 | 1,50 |
| 92 | Natural-Artificial | 2,07 | 1,20 |
| 93 | Courageous-Cautious | 2,07 | 1,26 |
| 94 | Reckless-Timid | 2,07 | 1,39 |
| 95 | Warm-Cold | 2,00 | 1,17 |
| 96 | Quiet-Noisy | 1,93 | 0,91 |
| 97 | Courage-Fear | 1,93 | 1,26 |
| 98 | Enthusiasm-Stillness | 1,80 | 1,16 |
| 99 | Soft-Hard | 1,63 | 0,93 |
| 100 | Calmness-Stress | 1,63 | 1,16 |
| 101 | Pride-Modesty | 1,57 | 0,82 |
| 102 | Aggressive-Submissive | 1,50 | 0,78 |
| 103 | Ill-tempered -Compliant | 1,37 | 0,85 |
| | **Averages** | **3,31** | **1,22** |