Gender-Specific Kansei Engineering: Using AttrakDiff2

Bianka Trevisan[1], Anne Willach[2], Eva-Maria Jakobs[1], and Robert Schmitt[2]

[1] Institute of Linguistics and Communication Studies,
RWTH Aachen University,
Templergraben 83, 52062 Aachen, Germany
[2] Laboratory for Machine Tools and Production Engineering WZL,
RWTH Aachen University,
Steinbachstraße 19, 52074 Aachen, Germany
{b.trevisan,e.m.jakobs}@tk.rwth-aachen.de
{a.willach,r.schmitt}@wzl.rwth-aachen.de

Abstract. Users of medical devices attach not only great importance to the functionality, but also to the joy of use, which is subject of the product design. Up to now, approaches in industrial design mainly take pragmatic aspects (functionality) into account and neglect hedonic aspects (attractiveness). Thus, to consider pragmatic and hedonic aspects in the process of product design, there is a need to develop approaches that combine the perspectives of users and designers. The aim of the interdisciplinary project "Gender-Specific Kansei Engineering" is to detect methods, which can support designers in identifying important information about users' gender-specific product perception. One method for product-related evaluation is the AttrakDiff2-questionnaire. In a study with three participant groups (users, medical experts, designers) it is revealed that AttrakDiff2 can be used for identifying role- and gender-related differences in product perception. It was found that especially male designers are sensitive to the product stimulation (hedonic aspects).

Keywords: product design, gender, role, Kansei Engineering, AttrakDiff2.

1 Introduction

When a user buys a product, he assumes that it is of high quality, his needs and desires are considered and that he will enjoy using it. These requirements are often not achieved in product design, which is the result of differences in gender-related mental product concepts and role-based perspectives that are not taken into account. The user is interested in the performance of his product concept that is based on a complex construct including e.g. personal expectations [1] whereas the designer creates products according to his professional (design guidelines) and personal view (mental concept of the object). It is necessary to incorporate customer requirements already in the process of product design in order to design better products and motivate customers for use. Thus, there is a need to close *perception* or *perspective gaps*. If customer wishes are not satisfied, the product won't appeal to customers [2]; a loss of customers followed by economic losses can be the consequence.

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User-centered approaches such as Kansei Engineering offer one way to close these gaps. In the interdisciplinary project „Gender-Specific Kansei Engineering“, funded by the German Excellence Initiative, this approach is adapted. Experts from communication science and mechanical engineering investigate which methods are appropriate for supporting designers in the process of product design. The aim is to define methods that allow designers to identify user requirements and to help transform these into product properties. In addition, the influence of gender on the process of product perception (*user perspective*) and product design (*designer perspective*) is investigated.

The following analysis focuses on one method of the projects' research portfolio, the AttrakDiff2-questionnaire [3]. To test the method, three exploratory investigations are conducted. Regarding the user's, the expert's and the designer's perspective two different blood pressure monitors are evaluated with the AttrakDiff2-questionnaire.

2 Aims and Objectives

2.1 Project's Objectives

The aim of the project is to evaluate appropriate methods for the collection of gender- and role-specific concepts, needs, and quality requirements for products with the intention of improving the process of product design. The perception of products depends on various parameters, such as aesthetic, functional and social aspects. A unilateral, technique-centered product design cannot consider user requirements holistically. Therefore, approaches like Kansei Engineering and AttrakDiff2 are modified according to the project's objectives and completed by the perspective of gender sensitivity. The outcome of this project will be an advancement of user-centered product development methods by including heretofore non-considered customer demands as well as a rethinking in engineering theory.

The basic assumption of the project is that people—depending on role and gender—evaluate and perceive products differently. Users have divergent demands concerning a product in comparison to product designers. In the same way, men and women evaluate products differently, which was also suggested in a previous study [4].

In the project, various methods are tested: AttrakDiff2- and Kano-questionnaires, couple interviews and focus groups. The examined methods will be evaluated with respect to various criteria like their impact on the collection of hedonic and pragmatic aspects.

2.2 Kansei Engineering

Developing more user-oriented and gender-sensitive products requires useful methods for the collection and transformation of users' quality requirements and impressions into product properties. We assume that Kansei Engineering—an approach developed by Nagamachi in the eighties—provides a suitable methodology for emotional product design.

Kansei Engineering describes a methodology by which customer impressions, feelings, and demands concerning a product can be collected and transferred into product properties during the development process [5]. The assumption is that

products—according to the Japanese expression *Kansei,* which means "total emotions"—are not only perceived via their functionality. Moreover, they are characterized by properties that can be felt and experienced. "Kansei is an individual's subjective impression from a certain artefact, environment or situation using all the senses of sight, hearing, feeling, smell, taste as well as recognition" [6].

The methodology consists of three consecutive steps: (1) The consumer's *Kansei* is measured by (2) the *Kansei Engineering System* and (3) transformed into *product properties* [7]. Figure 1 illustrates the Kansei Engineering process.

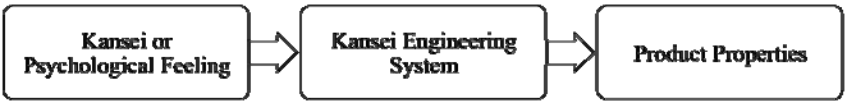

Fig. 1. Steps of the Kansei Engineering process adapted from Nagamachi (1995) [8]

(1) The consumer's Kansei can be described by *Kansei Words*, which are mainly represented by domain-specific adjectives (e.g. medical). Several words of the low hierarchy-level (simple, practical) can be summarized to a higher hierarchy-level (ergonomic). (2) The Kansei Words can be attributed to the identified product properties (e.g. simple for product's operating elements). The outcome of the synthesis of semantic descriptions and product properties is an exact representation of the customer's mental product concept. (3) Consequently, the customer requirement profile can be transferred into technical elements.

Using methods such as participant observation, physiological measurements, and semi-structured depth-interviews, data is collected. Furthermore, in many Kansei investigations questionnaires are used. Schütte recommends the usage of questionnaires with rating scales such as *Semantic Differential Scales* (SD-scales) [5]. Each scale consists of two opposite poles and seven rating levels in-between. This type of scale was also used in the present study.

2.3 Working Hypotheses

The working hypotheses are:

(1) People perceive and evaluate products from different perspectives depending on role and gender.
(2) AttrakDiff2 is a suitable method for measuring gender- and role-sensitive quality requirements.

The paper focuses on the following questions: How useful is the method for the collection of gender-specific product requirements and the support of the design process? What differences can be recognized in the perception of users, experts and designers? What are the gender-specific differences in the perception and conceptualization of blood pressure monitors?

3 Study

3.1 Method

AttrakDiff2 is a questionnaire for the evaluation of interactive products (e.g. software, websites, devices). The questionnaire especially takes non-utilitarian concepts of product design like fun and joy into account [3]. It consists of 28 contrasting word pairs (*semantic differentials*), which form the poles of the seven-level rating scales from +3 to -3. Each word pair is assigned to one dimension:

Pragmatic quality (PQ): The pragmatic quality describes the perceived ability of the product to achieve activity goals by providing useful and usable features.

Hedonic quality (HQ): There are two dimensions: The dimension *stimulation* (HQ-S) refers to the ability of a product to satisfy the need of improving personal knowledge and skills as well as to stimulate for use. The dimension *identity* (HQ-I) characterizes the product's ability to express and represent the identity of a person to others.

Attractiveness (ATT): This dimension measures the overall impression of the product.

To guarantee a variation in the participant's responses, the scales were not sorted by dimension. In addition, the poles are arranged randomly (Tab. 1).

Table 1. AttrakDiff2 questionnaire from the study. Explanation: 1=pragmatic quality, 2=hedonic quality-stimulation, 3=hedonic quality-identity, 4=attractiveness.

AttrakDiff2-Questionnaire							
Evaluation of the device "(NAME OF DEVICE)"							
Please express with the following wordpairs your impression of the (NAME OF DEVICE) blood pressure monitor.							
human	☐	☐	☐	☐	☐	☐	technical 1
isolating	☐	☐	☐	☐	☐	☐	**connective 3**
comfortable	☐	☐	☐	☐	☐	☐	uncomfortable 4
fancy	☐	☐	☐	☐	☐	☐	**conventional 2**
simple	☐	☐	☐	☐	☐	☐	complicated 1
professional	☐	☐	☐	☐	☐	☐	**unprofessional 3**
unsightly	☐	☐	☐	☐	☐	☐	nice 4
practical	☐	☐	☐	☐	☐	☐	**unpractical 1**
congenial	☐	☐	☐	☐	☐	☐	uncongenial 4
cumbersome	☐	☐	☐	☐	☐	☐	**direct 1**
stylish	☐	☐	☐	☐	☐	☐	in bad style 3
predictable	☐	☐	☐	☐	☐	☐	**incalculable 1**
low-grade	☐	☐	☐	☐	☐	☐	valuable 3
exclusionary	☐	☐	☐	☐	☐	☐	**including 3**
brings me closer to people	☐	☐	☐	☐	☐	☐	separates me from people 3
unrepresentable	☐	☐	☐	☐	☐	☐	**representable 3**
repudiative	☐	☐	☐	☐	☐	☐	inviting 4
unimaginative	☐	☐	☐	☐	☐	☐	**creative 2**
good	☐	☐	☐	☐	☐	☐	bad 4
confusing	☐	☐	☐	☐	☐	☐	**clear 1**
adhorrent	☐	☐	☐	☐	☐	☐	appealing 4
bold	☐	☐	☐	☐	☐	☐	**careful 2**
innovative	☐	☐	☐	☐	☐	☐	conservative 2
lame	☐	☐	☐	☐	☐	☐	**captivating 2**
artless	☐	☐	☐	☐	☐	☐	challenging 2
motivating	☐	☐	☐	☐	☐	☐	**frustrating 4**
novel	☐	☐	☐	☐	☐	☐	usual 2
unmanageable	☐	☐	☐	☐	☐	☐	**manageable 1**

3.2 Design

The AttrakDiff2 questionnaire was explored with three target groups: users, experts and designers (Fig. 2).

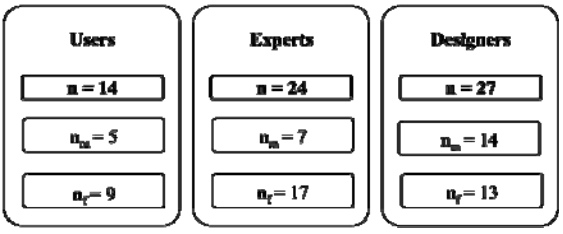

Fig. 2. Gender distribution in the target groups (m=male, f=female) of the AttrakDiff2 study

Users: The participants of the user group (n=14) are middle-aged individuals: scholars, students, and employees. None of the respondents uses a blood pressure monitor. Nevertheless, the participants belong to the group of future users (*user perspective*): all participants smoke; two persons have recently given up smoking.

Experts: People are referred to as experts when they often use health devices for professional reasons such as geriatric nurses do. They work every day with persons who need medical care and use medical devices. Thus, geriatric nurses know the needs and wishes of patients very well (*expert perspective*). We assume that geriatric nurses evaluate—based on their expert knowledge and their professional experience—medical devices differently from a need-oriented comprehension. Therefore, in the study geriatric nurses (n=24), predominantly female participants (n_f=17), are interviewed.

Designers: In this study, highly advanced design students (n=27) represent the professional guild of designers (*designer perspective*). The distribution of gender is balanced (n_m=14, n_f=13). Parallel to the study, the students have designed telemedical devices in class. Consequently, they evaluate blood pressure monitors based on previous knowledge about target group-centered ergonomics, medical design and material processing.

The participants were asked to evaluate two devices. Device A was tested by Stiftung Warentest (German consumer protection organization) and is in the price range between 20 and 25 Euros; device B can be purchased in discount shops for 10 to 15 Euros. For each device, there was a separate questionnaire prepared and handed out (Tab. 1). In case of comprehension difficulties, e.g. regarding the rating scales, the participants could address—also during the evaluation—the researchers. Lastly, the devices were given to the participants. Each participant was allowed to play with the devices before and during data collection (e.g. measuring blood pressure, testing functions); none of the devices were used or known by the participants prior to the study. The entire process took 25 to 30 minutes per target group.

4 Results

In the following, results of each participant group—users, experts and designers—are presented. The graphs in figures 3 to 8 show averages and error bars across all items of a dimension for a specific device (95% CI for the mean).

In the user group, no significant differences between the genders in the evaluation of product A and B are recognizable (Fig. 3-4). In the men-subgroup, the averages for both products are almost identical. However, considering the error bars it is evident that there is a wide variation in the product-specific evaluations. In the women-subgroup, there is a marked difference in the evaluations of the dimension PQ. This suggests a different perception of the products by the female users. The pragmatic quality of product A was rated higher than that of product B.

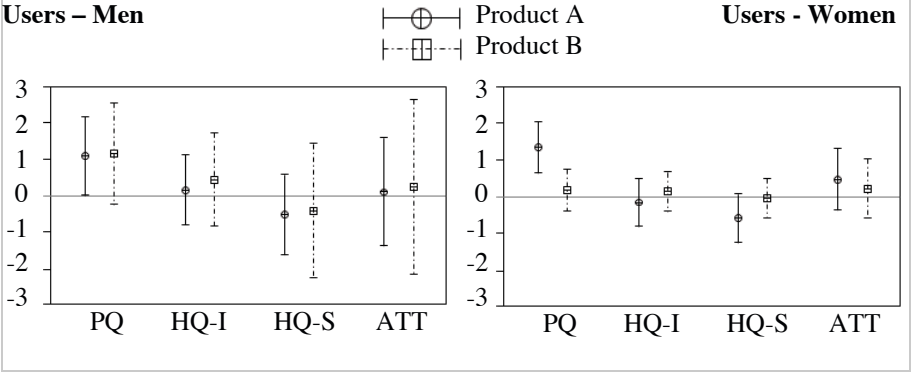

Fig. 3-4. Averages and error bars across all dimensions in the user group (men vs. women)

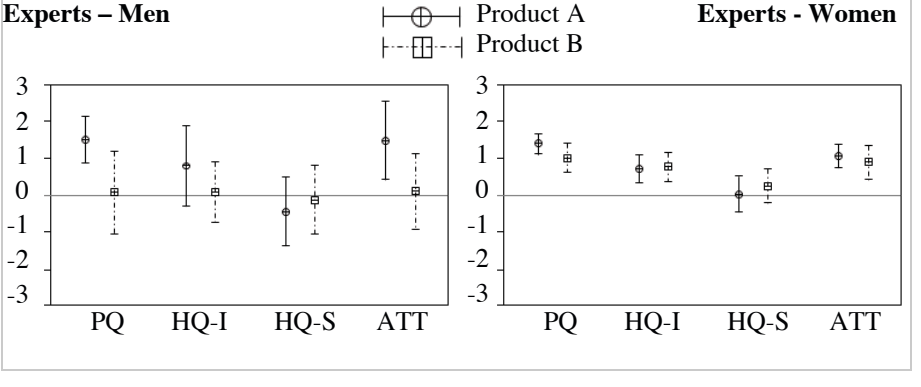

Fig. 5-6. Averages and error bars across all dimensions in the expert group (men vs. women)

The results of the experts show that men and women partly evaluate the products differently compared to the users (Fig. 5-6). However, no significant differences are identified. Nevertheless, the averages for product A and B in the men-subgroup lie far apart in the dimensions PQ and ATT. In comparison, the averages in the women-subgroup are close to each other with relatively little variation.

Among the designers, clear differences in the product perception between the genders can be seen (Fig. 7-8). The evaluation of men for product A and B in the dimensions HQ-I and HQ-S differ significantly. The hedonic quality of product B is rated significantly better than that of product A. In contrast, in the women-subgroup significant differences cannot be observed.

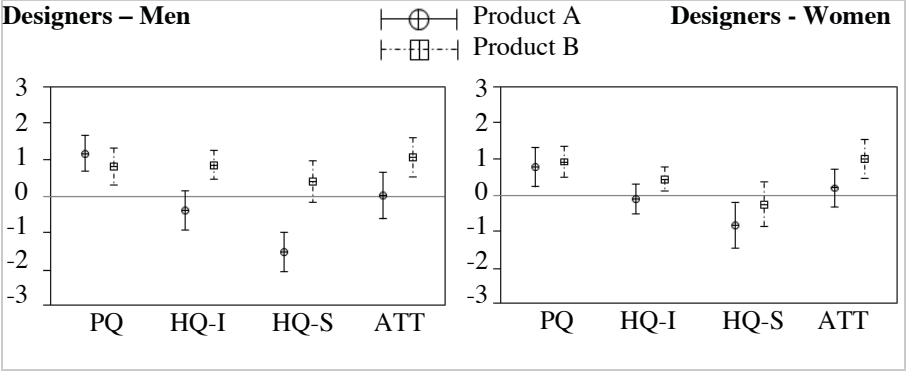

Fig. 7-8. Averages and error bars across all dimensions in the designer group (men vs. women)

5 Discussion

The results show that there is a difference in the perception and evaluation of blood pressure monitors between the genders as well as between the target groups. Differences are recognizable in the dimension of *pragmatic quality* (PQ); they are clearly visible for *hedonic quality-stimulation* (HQ-S) and *hedonic quality-identity* (HQ-I).

Gender-related differences in the dimension PQ are mainly recognizable in the group of users and experts. When judging pragmatic quality, male users give product A a better rating than female users. In the expert group the opposite is the case. Male users give product B a better rating than female users. These findings can be explained by the fact that women shy away from technical difficulties such as unusable interactive products because they fear of user barriers. In contrast to the men, women have no desire to deal with devices that are too technical. In consequence, female users judge a product more negatively than male users. The reversed finding in the expert group may result from the fact that geriatric nurses are experienced in the handling of medical devices and thus do not suffer from user barriers.

Comparing the results of the target groups, it was found that future and professional users of medical devices evaluate medical products similarly. In contrast, the study findings indicate that designers—especially male ones—perceive the stimulation and identity of a device particularly strongly. Compared to the users, they

are more susceptible to hedonic product properties. This fact hints at a perspective gap between users and designers. While users of medical devices focus on the pragmatic quality of a product, designers are interested in the stimulatory and identity effects. We assume that this susceptibility to hedonic product characteristics among the designers arises from their creativity, which is essential for the profession of a designer.

6 Conclusion

The AttrakDiff2-questionnaire was identified as a beneficial method for product design and for the detection of perspective divergence. However, with this method only the *attractiveness* as well as the *hedonic* and *pragmatic quality* can be evaluated. The fact that user satisfaction is a complex construct of numerous criteria such as expectations and likeability remains disregarded. Moreover, a direct linking of user ratings to product elements and properties is not possible. Thus, to support designers in the process of product design efficiently, additional methods have to be integrated into the methodical design.

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