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ATTRACTIVE OR NOT - WHAT'S THE DIFFERENCE? INTER- AND INTRA-GROUP COMPARISONS IN THE KANO MODEL

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1. Introduction

Understanding user needs is the first step in product development. In coming years, Western societies will be confronted with the challenges and merits of an aging population. Therefore, we should try to understand what the needs of older users might be. Not being able to use electronic devices in terms of interactive products puts older adults at a disadvantage with respect to upholding an independent lifestyle and being fully integrated in today's society. There is great potential, but only if older people adopt technology in their everyday lives. This is a design challenge: developing useful and usable technology is one thing, but ensuring that it will also be used is quite another.

A number of issues must be considered when designing for older adults, like appropriate usability and ergonomic solutions or accessibility [Fisk 2004]. But what leads to user satisfaction in older adults compared to younger adults? Insights into the *needs* that must be addressed are of interest, but equally important are the *wants* and *wishes* – those that might motivate potential users to interact with technology and that will enhance the likelihood of acceptance.

In a previous study, younger and older adults gave a number of reasons in an open question format concerning what it is that motivates them to use technology and what, on the other hand, de-motivates them [Pohlmeyer 2009]. These statements were systematically categorized by the means of a qualititative content analysis. The variety of derived categories illustrated the parallel importance of pragmatic (e.g. usability) and hedonic (e.g. aesthetics) attributes for product appraisal [Hassenzahl 2004] and technology adoption.

It turned out that motivating and de-motivating reasons were independent of each other (different proportions of statements/frequency analysis; significant interaction effect of appraisal category by valence; independent rank order). Consequently, they might lie on different dimensions of user satisfaction. The authors concluded that ensuring that "nothing de-motivates" a potential user does not necessarily equate to motivation. Reasons for technology adoption and resistance, respectively, are not necessarily bipolar opposites on *one* dimension. Therefore, user satisfaction and motivation cannot be sufficiently explained by one linear dimension with higher satisfaction if system performance increases and vice versa. The topic seems to be more sophisticated than that. Motivating attributes might have to be addressed separately.

Here, the Kano Model of Customer Satisfaction comes to mind [Kano 1984]. It is based on the idea of Herzberg's dual-factor theory of work motivation [Mikulic 2007]. Herzberg claims that there are factors causing satisfaction when present, but not dissatisfaction when absent, while other factors cause dissatisfaction when absent but not satisfaction when present. In the Kano model these factors are coined *attractive* and *must-be* features, respectively. The model additionally incorporates the possibility of bivalent, one-dimensional factors where customer satisfaction is proportional to fulfilment. It has been successfully integrated in product development processes and applied in various

fields of product- and service design [CQM 1993], but also in website design [van Dran 1999], therefore, it seems equally applicable for users as well as customers.
Six categories identified in the previous study (Functionality, Ease of Use, Ergonomics, Quality, Aesthetics, and Emotional Involvement) [Pohlmeyer 2009] shall be investigated in terms of the Kano model in the present study. The aim is to look into the distribution of the requirements in greater detail, especially with respect to age differences. What must be guaranteed as a baseline (prevent de-motivation) upon which users can be attracted to technology? In contrast to the previous study where participants named whatever reasons came to their mind, here, all participants will be confronted with the same (six) product characteristics.

1.1 Requirements in the Kano Model

According to the Kano Model, product characteristics can be classified into one of six requirement features, each of which has a distinct pattern regarding the level of customer satisfaction. The pattern depends on the the degree of product characteristic achievement [Matzler 1996].

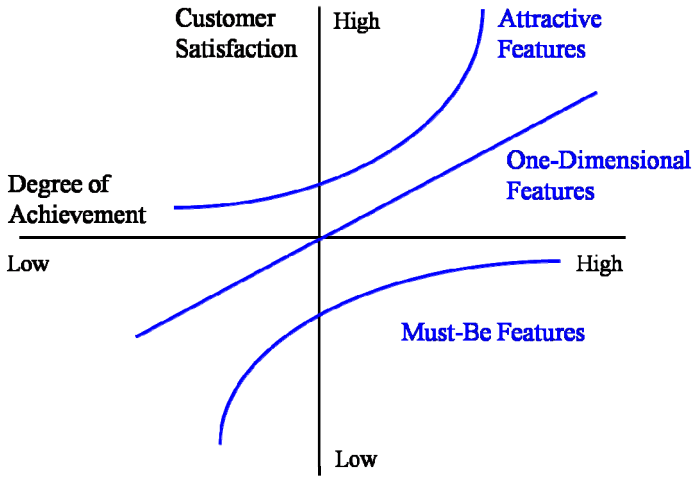

Figure 1. The Kano Diagram

1. *Must-be* features (M): Basic needs that cause over-proportional dissatisfaction if not fulfilled. They are taken for granted. Hence, even high fulfilment of such attributes only leads to a state of "not dissatisfied" (see Figure 1). If Must-be requirements are not met, the customer is not interested in the product at all [Matzler 1996].
2. *One-dimensional* requirements (O): The higher the performance of product attributes, the higher the customer satisfaction and vice versa. The impact on customer satisfaction is proportional to the extent of fulfilment [Mikulic 2007] (see Figure 1).
3. *Attractive* features (A): Delight features cause an over-proportional increase in customer satisfaction if present. On the other hand, absence of such features does not lead to dissatisfaction [Matzler 1996] (see Figure 1).
4. *Indifferent* requirements (I): Whether fulfilled or not these product qualities neither result in satisfaction nor in dissatisfaction [Mikulic 2007].
5. *Reverse requirements* (R): Quality elements that result in dissatisfaction when fulfilled and in satisfaction when not fulfilled [Mikulic 2007].
6. *Questionable* requirements (Q): Attributes should not fall into this category since it implies questionable results. This can be due to incorrectly phrased or misunderstood questions [Matzler 1996].

1.2 Kano Questionnaire

In order to assign procuct characteristics to requirement classifications, pairs of questions are presented for each product / interaction characteristic. A so-called *functional* question asks how the

customer - or in this case, the user - would feel if a specific feature was available. A *dysfunctional* question captures the user's opinion if the feature was missing. There are five answer-choices: (1) I like it; (2) I expect it; (3) I'm neutral; (4) I can live with it; (5) I dislike it [CQM 1993]. These are not considered to represent a continuous rating scale. They are rather seen as independent options, from which the most appropriate is to choose. Each feature can be classified to one of the above-mentioned Kano categories with the evaluation table shown in Table 1 by combining the two answers. Subsequently, overall frequencies are determined [Matzler 1996].

Table 1. Kano Evaluation Table

Customer requirements		dysfunctional question				
		like	must be	neutral	live with	dislike
functional question	like	Q	A	A	A	O
	must be	R	I	I	I	M
	neutral	R	I	I	I	M
	live with	R	I	I	I	M
	dislike	R	R	R	R	Q

A: Attractive M: Must-be R: Reversed
I: Indifferent O: One-dimensional Q: Questionable

Concerning the Kano evaluation Timko criticizes the categorization only by the highest frequency [CQM 1993]. Usually, a product characteristic is allocated to the requirement classification with the maximum number of agreement, regardless of how big or small the difference is to the second-runner-up. In other words, it is labelled the requirement classification with the largest group of customers, while ignoring the classification of all other customers. To our knowledge, we are the first to address this issue by considering intra-group proportions. As a result, tied ranks can now be taken into account, which allows for the possibility to detect different market segments that are represented similarly often, but with different expectations.

In sum, the aim of this study is twofold: Firstly, it is of interest whether younger and older adults have the same expectations, and distribution thereof, regarding the appraisal of interactive products. As a representative example of interactive products, a digital camera was chosen to be the subject of evaluations. Previously determined categories [Pohlmeyer 2009] will be integrated in the Kano model of satisfaction. Findings could help designers to set priorities in the development process when designing for different age groups. Differences regarding classification, prioritization order, and average impact on dis-/satisfaction will be considered as well as statistical inter-group effects within the same category. Secondly, statistical intra-group comparisons are introduced to enable more elaborate interpretations of the data. Instead of arbitrarily assigning a requirement feature based on the frequency maximum, multimodal distributions will be appreciated. These indicate worthwhile investigations of future market segmentations.

2. Methods

2.1 Participants

The sample consisted of 104 participants all living in Berlin, Germany. Two age groups were recruited: 52 younger adults (20-30 years, M_Y= 25.88, SD_Y= 2.73) and 52 older adults (65-75 years, M_O= 67.9, SD_O= 2.38). Half of each age group were women. The sample was well-educated as the majority of the sample (43.3%) named a university degree as the highest degree achieved, followed by 26% with a high school diploma ("Abitur"). There were no significant age-differences in self-reported

current physical well-being (5-point-Likert scale (very good = 5): M_Y= 4.10, SD_Y = .57; M_O= 3.88, SD_O= .65; t (101) = 1.77, p > .05), nor with respect to experience in years with digital photography (M_Y=5.33, SD_Y=2.05; M_O= 5.23, SD_O= 3.76; t (78,76) = .18, p > .05). However younger adults were more likely (in percent) to do hobby photography than older participants (M_y=62.88%, SD_y=26.37; M_o=47.50%, SD_o=30.86; t (102) =2.73, p= .007).
Younger adults were recruited through an online database of study volunteers. Older adults were additionally recruited through an advertisement in a weekly newspaper. Experience with digital cameras was a prerequisite for the study, but not ownership.

2.2 Scenario

A digital camera was selected as an interactive product for the study. This seemed to be a good representative of technological, interactive products since younger and older adults alike are familiar with cameras and photography (whereas, for example: elderly might be at disadvantage concerning familiarity with digital music players). Different settings (e.g. professional photography, snapshots) call for different needs and can affect ratings in an uncontrollable manner. For this reason, participants were instructed to put themselves into the role of a hobby photographer while filling out the questionnaire. This standardized scenario should ensure that possible group differences could be interpreted as an effect of age and not possibly due to different contexts in mind.

2.3 Variations of Product Characteristics in the Kano Questionnaire

Functional (*fu*) and dysfunctional (*dy*) questions of our previously identified appraisal criteria [Pohlmeyer 2009] were formulated. Exclusively verbal material was used because most categories are subjective perceptions and would be biased by a visual finishing. Plus, it is a utopian venture to build systems with only one attribute varied at a time and all other elements remaining constant:

- *Functionality*: A camera has either only primary features (*dy*) such as taking pictures and making videos or includes additional secondary features (*fu*) that go beyond the core of camera-typical functionalities, such as internet access.
- *Ease of Use*: Variations with respect to an initial learning phase: the camera can be intuitively understood and used (*fu*), or the user has to first become familiar with the device (*dy*).
- *Ergonomics*: Hindered physical ergonomics (*dy*) stand in contrast with ease of handling of operating controls (*fu*).
- *Quality*: High product quality with long durability and high quality of the pictures (*fu*) was the counterpart to an average quality product (*dy*).
- *Aesthetics*: The design of the camera could either be of average appearance (*dy*) or subjectively perceived as overly appealing (*fu*). It was emphasized that *aesthetics* not only stands for visual appearance but incorporates the appreciation of all senses (e.g. auditory / tactile sensations).
- *Emotional Involvement*: At last, users can be emotionally involved with a camera. Is the experience itself pleasant or even joyful? Is there an emotional association attached to the specific device (*fu*)? Or is only the outcome (photography), but neither the experience itself, nor the personal attachment to the device of relevance (pragmatic approach) (*dy*)?

2.4 Technology Affinity and Self-Stated Importance (SSI)

TA-EG is a 19-item multidimensional scale assessing four dimensions of technology affinity [Karrer 2009] in German: (1) enthusiasm towards electronic devices, (2) subjective competence in using electronic devices, (3) perceived positive and (4) negative consequences associated with the use of electronic devices. Statements were rated on a 5-point-Likert scale ranging from 1 (does not apply at all) to 5 (applies exactly).
Participants also rated the subjective, self-stated importance (SSI) [CQM 1993] for each of the six product characteristics on a 10-point-Likert Scale (1= not important at all; 10= extremely important).

2.5 Procedure

Data was collected at the University of Technology Berlin. Participants gave informed consent and provided information regarding demographics and attitudes toward technology (TA-EG). Before answering the Kano questionnaire, participants were introduced in detail to the six product / interaction categories (see section 2.3) and were engaged in an associated conjoint analysis. Therefore, participants were well acquainted with the categories that were the focus of evaluation. Data was collected in paper-pencil format. Participation was reimbursed with €10 / hour. Sessions took approximately 1-1.5 hours and were administered with only one participant present at a time.

2.6 Analysis

By combining the two answers for each category according to the evaluation matrix (see Table 1), requirement classifications were inferred and overall frequencies and proportions determined. The classic Kano evaluation classifies the feature in compliance with the maximum frequency.

As a novelty, we tested for tied ranks. In other words, in addition to the classic Kano classification, which only considers the feature requirement with maximum frequency, we analyzed whether the subsequent rankings differed significantly from the maximum with a z test for a population proportion [Sheskin 2004]. If the intra-group pairwise comparisons were found not to differ significantly, then multiple Kano classifications were assigned to one product feature.

Since we were primarily interested in group comparisons, we also tested whether the proportions of classification differed significantly between the two age groups with the z test for two independent proportions [Sheskin 2004]. Thus, we tested within single requirement categories but between groups.

The average impact of a product attribute on customer satisfaction if it is realized can be calculated by the coefficient of satisfaction - CS (1). This measure indicates to what extent a product feature has the potential to increase satisfaction when present by computing the overall share of those classifications that increase with fulfilment (attractive / one-dimensional). The coefficient of dissatisfaction - CD (2) illustrates how strongly an attribute affects dissatisfaction when missing by the overall share of those classifications that result in lower customer satisfaction when the attribute is absent (one-dimensional / must-be). In contrast to classifications by maximum frequencies, these two coefficients include the entire sample (apart from those participants who rated features to be “reversed” or “questionable”) and are therefore used as a reference for the average potential of a product attribute.

$$satisfaction = \frac{A + O}{A + O + M + I} \tag{1}$$

$$dissatisfaction = (-1) * \frac{O + M}{A + O + M + I} \tag{2}$$

The minus in the formula for the coefficient of dissatisfaction indicates the negative influence if product requirements are not met. Coefficients range from 0 to |1|. The closer the value is to zero, the lower the influence on satisfaction or dissatisfaction, respectively [Matzler 1996].

In general, data was analyzed using SPSS software. Z tests were administered with a macro written in Excel’s visual basic; α-level was considered .05.

3. Results

3.1 Technology Affinity

Younger and older adults did not differ in three subscales of the TA-EG questionnaire: enthusiasm (M_Y= 3.38, SD_Y = .86; M_O= 3.22, SD_O= .99; t (102) = .86, p > .05), perceived positive consequences (M_Y= 3.85, SD_Y= .42; M_O= 3.76, SD_O= .59; t (102) = .89, p > .05), and perceived negative consequences (M_Y= 3.63, SD_Y= .57; M_O= 3.49, SD_O= .82; t (91.57) = 1.03, p > .05). However,

younger adults showed significantly higher scores than older adults concerning perceived subjective competence (M_Y= 3.80, SD_Y= .68; M_O= 3.34, SD_O= .72; t (102) = 3.36, p = .001).

3.2 Self-Stated Importance

A ranking according to self-stated importance leads to the following order

- for the younger cohort:
- Quality (M_Y= 8.58, SD_Y= 1.71) > Functionality (M_Y= 8.33, SD_Y= 2.17) > Ergonomics (M_Y= 7.81, SD_Y= 1.39) > Ease of Use (M_Y= 7.23, SD_Y= 1.71) > Aesthetics (M_Y= 5.13, SD_Y= 2.37) > Emotional Involvement (M_Y= 4.71, SD_Y= 2.36)
- and for the older cohort:
- Ergonomics (M_O= 9.10, SD_O= 1.24) / Ease of Use (M_O= 9.10, SD_O= 1.40) > Functionality (M_O= 9.04, SD_O= 1.27) > Quality (M_O= 8.67, SD_O= 1.52) > Aesthetics (M_O= 6.60, SD_O= 2.23) > Emotional Involvement (M_O= 5.08, SD_O= 2.91)

There were significant differences between the two age groups with respect to the SSI of ease of use (t (102) = -6.08, p < .001), ergonomics (t (102) = -4.99, p < .001), functionality (t (102) = -2.04, p = .04), and aesthetics (t (102) = -3.24, p = .004). Older adults regarded those aspects as more important than younger adults did.

3.3 Kano Classification

Table 2 summarizes the results for each age group: Classification according to the maximum frequency without further intra-(age-)group comparisons (Kano classic), classification by taking tied ranks into account (Kano new), as well as coefficient of satisfaction (CS) and dissatisfaction (CD).

Table 2. Kano Classification Young vs. Older Adults

		Kano Classic	Kano New	CS	CD			Kano Classic	Kano New	CS	CD
FU	Young	A/R	A/R/I	0.54	- 0.11	QU	Young	A	A	0.67	- 0.37
	Old	A	A/I	0.45	- 0.11		Old	A	A/I	0.60	- 0.14
EA	Young	A	A	0.74	- 0.12	AE	Young	A	A	0.69	- 0.10
	Old	A	A	0.73	- 0.17		Old	A	A	0.71	- 0.15
ER	Young	O	O/M/A	0.63	- 0.63	EM	Young	A	A	0.71	0.00
	Old	M	M/O/A	0.55	- 0.73		Old	A	A	0.7	-0.07

(FU= Functionality, EA = Ease of Use, ER = Ergonomics, QU = Quality, AE = Aesthetics, EM = Emotionality, CS= Coefficient of Satisfaction, CD = Coefficient of Dissatisfaction)

3.3.1 Functionality

Younger participants evaluated functionality equally often as an 'attractive' requirement (Y_A: 32.7%) as well as a 'reversed' requirement which stands for a preference of only primary functionalities (Y_R: 32.7%). Only 15.4% of the older participants assigned functionality a 'reversed' value. This inter-group difference is statistically significant (z= 2.07; p = .039). The second most frequent classification after 'attractive' (O_A: 38.5%) within the older subsample was 'indifferent' (O_I: 36.5%). 26.9% of younger adults agreed with this classification. In summary, there is no single classification possible for functionality: a comparable percentage of younger adults assigned the feature to be 'attractive', 'reversed', or 'indifferent', while equal percentages of older adults evenly considered it to be 'attractive' or were 'indifferent' about it.

CS and CD reflect a moderately high influence on satisfaction when secondary features are integrated and a small effect on dissatisfaction when only primary features are realized.

3.3.2 Ease of Use

According to the classic Kano evaluation as well as to our approach, ease of use was considered to be an 'attractive' feature. The frequencies of 63.5% in the younger subsample and 59.6% in the older subsample each differed significantly from the second runner up, 'indifferent' (Y_I: 21.2%, z_{young}= 3.32, p = .001; O_I: 23.1%, z_{old}= 2.90, p = .004). As a result, a univocal classification is possible. There were also no inter-group differences found.

CS and CD reveal the disproportional impact on satisfaction if the system can be used intuitively compared to the low impact on dissatisfaction when an initial learning phase is necessary. Such a distribution fits the classification of an 'attractive' feature.

3.3.3 Ergonomics

The classic Kano evaluation, which merely appreciates the maximum frequency, suggested that younger adults see ergonomics as a 'one-dimensional' feature while older adults would classify it as a 'must-be' requirement. However, taking a closer look at intra-group differences, we concluded, that for both subsamples the three classifications of 'must-be' (Y_M: 26.9%, O_M: 36.5%), 'one-dimensional' (Y_O: 36.5%, O_O: 34.6%), and 'attractive' (Y_A: 26.9%, O_A: 19.2%) did not differ significantly from each other. Neither were there indications of inter-group differences.

CS and CD illustrate a more or less balanced impact on satisfaction and dissatisfaction, which generally points to a proportional relationship of system performance (level of ergonomic fulfilment) and customer satisfaction. However, this should not come as a surprise since the the coefficients are based on the ratio of 'attractive' and 'one-dimensional' features on the one hand and 'must-be' and 'one-dimensional' on the other from all classifications. Ergonomics was equally often assigned as an 'attractive' and as a 'must-be' feature.

3.3.4 Quality

Quality also fell into the category 'attractive' by solely applying the classic evaluation (Y_A: 53.8%, O_A: 51.9%). However, within the subsample of older adults, there were, statistically speaking, just as many participants who were 'indifferent' about quality (O_I: 30.8%; z_{old}= 1.68, $p > .05$). For younger adults, this was not the case (Y_I: 9.6%; z_{young}= 4.00, $p < .001$). This is a significant inter-group difference (z= -2.69; p = .007). Another group difference was found in the classification frequencies as a must-be requirement: younger adults declare high quality significantly more often to be essential for a digital camera (Y_M: 23.1%, O_M: 7.7%; z= 2.17, p = .03).

Within younger participants, CS and CD show a relatively high impact on satisfaction given a pronounced quality standard and a relatively high impact on dissatisfaction when such a standard is not realized. In contrast, older adults appreciate a high quality product, but are not very much affected if the product is only of average quality.

3.3.5 Aesthetics

The aesthetical appeal is categorized as an 'attractive' feature for both age groups, independent of classification procedure (Y_A: 61.5%, O_A: 55.8%). No age differences were observed.

CS and CD also confirm a response of delight by an aesthetically appealing product via an over-proportional impact on satisfaction, in comparison to the low degree of dissatisfaction in the case of an average appearance.

3.3.6 Emotional Involvement

The asset of an emotional involvement is also considered to be an 'attractive' feature (Y_A: 61.5%, O_A: 55.8%). This still holds true when examining intra-group proportions. In other words, all other classification percentages differ significantly from the group that viewed emotional involvement to be an 'attractive' requirement. No effects of age were found to be of significance.

Again, CS and CD indicate the 'attractive'-typical skewed impact on satisfaction if the user encounters an emotional involvement and basically no effect on dissatisfaction when there is no emotional involvement.

3.4 Evaluation rule for product development

In addition to the proportions of classifications, the coefficients of satisfaction and dissatisfaction, and the self-stated importance ratings we also looked at the prioritization order *over all attributes* investigated. Such a ranking can serve as guidance for designers who have to prioritize desirable aspects when developing a new product or designing for a new market.

The following rule has been recommended for product development: M > O > A > I [CQM 1993, Matzler 1996]. The order accounts for the necessities of meeting basic needs first before addressing attractive features in order to delight the customer. However, this simple rule is not applicable in the present study because tied ranks were taken into consideration. Furthermore, several attributes were assigned the same label (e.g. attractive). We therefore decided to rank by the coefficient of dissatisfaction (1). This mimics the idea behind the above-mentioned rule to ensure no dissatisfaction before triggering satisfaction. In case CD coefficients do not differ by more than |0.05|, the values of CS coefficients (2) are taken into account additionally (the attribute with the higher CS will be prioritized). Lastly, if the order is still ambiguous at this point because the CS scores also do not differ by more than |0.05|, self-stated importance ratings resolve the final order.

The following order of prioritization has been identified:

- for younger adults: ER, QU, EA, AE, FU, EM and
- for older adults: ER, EA, AE, QU, EM, FU.

4. Discussion

The study shows that the Kano questionnaire is a valuable technique for studying user expectations regarding interactive products, here exemplified with a digital camera. In a paper study, users were asked about single-attribute importance, and also expressed their responses to fulfilment and absence of product / interactive attributes that have been identified as crucial aspects of technology adoption and resistance [Pohlmeyer 2009]. The integration of multiple assessments proved to be particularly helpful: Single-attribute ratings that only report means (such as SSI) oftentimes override intra-group differences. An average might be a compromise that does not really relate to any stated user judgement. However, the combination of Kano classification, prioritization, and SSI enabled us to detect and confirm differences of user preferences. Such knowledge is a means for designers to amplify the likelihood of technology adoption and should be considered in the design of interactive systems.

The first priority of older users is ergonomics in the sense of comfortable handling followed by an intuitively usable interface that makes an initial learning phase redundant (ease of use). This finding is in accordance with the picture illustrated by the self stated importance ratings: older adults gave ergonomics and ease of use the highest importance values and rated them significantly more important than younger adults did. Furthermore, the observation is in accordance with age-related declines known from the literature [Fisk 2004] and with the finding that older adults in this study perceived themselves as less competent when interacting with electronic devices than their younger counterparts (TA-EG) did. This matches the pronounced need of usable products. Surprisingly, the next criterion older adults take into consideration is the aesthetic appeal. This proneness is also rated significantly higher (SSI) compared to younger adults.

Conversely, as soon as ergonomics is ensured, younger adults demand high quality in a product. This requirement is requested more strongly by younger than by older adults. Elderly are equally often interested and indifferent concerning the quality standard. Not so younger adults: quality is the attribute with the highest SSI rating in the younger sample and significantly more younger adults than older adults classify high quality as a must-be requirement, resulting in a higher coefficient of dissatisfaction for this agegroup. What seems to be ease of use for older adults might be quality for younger adults. Combined with a good handling it builds the basis for a potential satisfying product for younger adults. Keep in mind that younger participants were more likely to do hobby photography. This might be the reason for a greater interest in excellent picture quality and a reliable camera. Whether the differences regarding quality demand are truly an age effect or rather moderated by the level of expertise need to be clarified in future studies with controlled levels of expertise.

There were also opposing results regarding functionality with an equal number of younger users who think that a product improves by incorporating secondary features compared to a group who is indifferent about this matter and a third group who believes that it is better to only offer primary functionalities. Overall, functionality was rated as one of the most important features (SSI), which gives reason to believe that a further investigation of this market segmentation appears to be a worthwhile endeavour. This example also demonstrates that it is advisable to include 'reversed' (and 'questionable') responses in the analysis. Some studies ignore these Kano elements, arguing that they are less relevant. In this case, however, they would have missed a substantial group of users who have 'reversed' expectations in order to be satisfied with a product. In sum, the approach described in this paper extends the amount and quality of information gained from user research.

Classic Kano evaluation assigns the corresponding label to the requirement category with the majority of responses. In this study, we have extended this procedure by considering multiple labels if the frequencies did not differ significantly. As shown above, this can give insights into possible market segments. Designers and marketeers might be interested to follow up on this finding and to investigate *who* wants *what* (and *why*).

The limitations due to the nature and material of this study should not be left unmentioned: verbal assessment of subjective evaluations might lead to different results than external observations of behaviour or objective physiological measurements. Complementing studies with different assessment methods need to validate the present findings.

As an example of interactive technology, a digital camera was evaluated. Consequently, results can only be generalized to digital cameras or, at most, to other tangible-digital devices with similar characteristics. Ergonomics, for instance, are less of a concern in the context of web design.

Category specifications needed to be simplified. Ease of use, for instance, is certainly much more than the skipped necessity of a familiarization period. In an industrial setting, more concrete and diverse categories need to be tested in order to make sound decisions in a product development process.

To conclude, even though the entire sample reported to be in good physical condition, easy handling had to be guaranteed. Apart from the common basic requirement of ergonomics, we found different priority orders for the two age groups. Younger adults put great emphasis on high quality and were rather dissatisfied if it is not ensured. Older adults, to the contrary, were equally often pleased and indifferent about the quality standard. Their second highest priority was found to be an intuitively usable interface. The two fields of ergonomics and usability are already exhaustively addressed when designing for the elderly [Fisk 2004]. However, this is apparently not sufficient to motivate this group to use technology. "What is more" beyond necessities? Older adults liked the idea of an aesthetically appealing product and even rated aesthetics to be more important (SSI) than the younger sample did. This attractive feature, addressing hedonic product attributes, might be a promising motivator.

The fine granularity of the results, thanks to inter- and intra-group comparisons, enables a further exploration of the field. This study and especially the introduced method of analysis can serve as a basis for future research, expanding to other products, applications, and user groups (e.g. experts vs. novices). The next step for our research group will be the integration of the presented results with the co-conducted conjoint analysis, which additionally provides relative weights in a trade-off setting.

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