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Warm-ups before preference measurement

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Warm-ups before preference measurement

Abstract

This study proposes two new methods to familiarize respondents with innovative attributes and thereby ensure their stable preference statements within customer tests in the product development process. These warm-up phases differ in how the participants gather information about the product category, namely, independently or in the lab. A qualifying examination tests the appropriateness of study participants as respondents in a following preference measurement task. Both approaches effectively prepare respondents, though the independent search version offers slight advantages. Our study offers useful tools for evaluating the warm-up phases of preference measurement studies.

1. Why warm up?

Preference elicitation methods are critical for determining the potential of new product concepts in market research (Ding, 2007), but to be effective, preference measurements should reflect real decision processes as closely as possible to offer valid results and recommendations for marketing. Prior research contains little consideration of respondents' ability to provide valid measurement results, even though consumers clearly cannot formulate stable preferences for products that are not in their evoked set and thus for new product concepts that involve innovative, unknown attributes (Bettman, Luce, & Payne, 1998; Hoeffler & Ariely, 1999; Payne, Bettman, & Schkade, 1999). When they confront uncertainty in their evaluations of unfamiliar product attributes, respondents tend to construe their preferences within the measurement tasks. Such preference construction leads to instability, such that minor variations in the measurement context can lead to completely different partworths for the innovative attribute levels.

To ensure respondents truly understand the benefits of innovative product features, it is necessary that they gain product knowledge before providing estimates of their preferences. Surprisingly, only a few authors consider whether respondents understand product attributes and their levels, though this understanding is fundamental to preference measurement (Huber, Wittink, Fiedler, & Miller, 1993; Jaeger, Hedderley, & McFie, 2000; Louviere, 1988; Steenkamp & Wittink, 1994).

We design two alternative information search and learning stages for respondents in preference measurement tasks who confront innovative product features. These methods help ensure that participants have the knowledge that they might gain from a real buying process during the preference measurement task. For our first approach, we exploit the advantages of self-navigated information search in real conditions accompanied by the presentation of innovative features. For the second, the whole information search takes place in controlled laboratory conditions: We design an interactive presentation and learning program in which respondents individually click on attributes to gather information prior to their buying decision. We compare these two approaches against an uninfluenced control group to discern which is the best way to prepare potential consumers for a preference evaluation task using real innovative products that were unknown at the time of the survey.

In Section 2, we outline our two warm-up methods for preference measurements of innovations. Then we introduce the evaluation criteria for these warm-up methods and our

study design in Section 3. After testing our methods in Section 4, we conclude in Section 5 with a discussion of the results, limitations, and outlooks for further research.

2. Warm-up methods for preference measurement

2.1 Previous research

As our methodological starting point, we use the first stage of the evoked set-based attribute selection (EVAS; Helm & Steiner, 2007), in which respondents inform themselves independently about a particular product category to formulate their stable preferences. The consumers thus identify their own evoked set that includes relevant alternatives for a purchase decision. After this stage, Helm and Steiner (2007) establish target group-specific attribute sets for the preference measurement. Compared with other common methods of attribute selection (e.g., elicitation, dual questioning), EVAS performed better in terms of applicability and the internal validity of the subsequent preference measurement.

Warm-up phases generally consist of explanations of the scales, tasks, and attributes (Louviere, 1988). The respondents usually participate in test evaluation tasks in a product category similar to the product category of interest (Jaeger et al., 2000). Only the EVAS warm-up stage considers the respondents' evoked sets and ability to formulate stable preferences by instructing them to gather information about the relevant product attributes for a purchase decision before beginning the preference elicitation. However, this first EVAS stage cannot confirm if consumers actually inform themselves; they might not be sufficiently motivated to follow the instructions. Furthermore, Helm and Steiner (2007) concentrate on established products. In our new methods we also address the presentation formats needed for innovative attributes, about which consumers cannot inform themselves independently.

Prior work has established the superiority of realistic presentation formats (prototypes, virtual presentations, multimedia) over verbal and pictorial descriptions of product attributes (Burke, Bari, Kahn, & Lodish, 1992; Dahan & Srinivasan, 2000; Jiang & Benbasat, 2007; Vriens, Loosschilder, Rosbergen, & Wittink, 1998). With regard to the presentation of innovative features, Moreau and colleagues (Moreau, Lehman, & Markman, 2001; Moreau, Markman, & Lehmann, 2001) find positive effects on adoption if the explanations of these features address respondents' existing knowledge structures. Similarly, Feiereisen, Wong, and Boderick (2008) and Hoeffler (2003) show positive learning effects and reduced uncertainty when the explanations of really new product attributes use analogies (i.e., by comparing the

innovation with attributes of different product categories) and mental simulation techniques (i.e., by asking the respondents to imagine using the new product).

Urban, Weinberg, and Hauser (1996) suggest a learning phase for innovative attributes, in which they present interactive video material to explain new features of electric cars. To forecast future sales, they conduct a conjoint analysis with a subsample that has completed this "Information Acceleration", which enables them to visit virtual showrooms, read magazine or newspaper articles, and talk with anticipated users of the new products. Using an internal validation, these authors compare the virtual information provision with real-life information sources but find no significant differences with regard to the effects on the consumer, including in their purchase probabilities. Thus, a virtual showroom seems to provide realistic effects. Their external validation of sales forecasts shows that the estimation predicted retail sales quite well. Urban and Hauser (2004) also have introduced "Listening In," a tool for directly identifying opportunities for new product concepts by analyzing customer interactions with virtual buying advisers. Compared with preference measurements such as conjoint studies, this method offers advantages in terms of costs and number of possible feature combinations, though conjoint analyses still provide more accurate estimates. Both "Information Acceleration" and "Listening In" suggest the potential of connecting virtual and multimedia warm-up tasks to preference measurement tasks for innovative features.

In summary, prior literature has already acknowledged the need for tasks prior to preference measurement. These tasks might entail independent information search activities, which help to build an evoked set but neglect innovative attributes (Helm & Steiner, 2007), or focus on innovative attributes using a multimedia or virtual presentation in the lab but without segmentation of the respondents' evoked sets (Urban et al., 1997). We attempt to merge a target group-specific approach based on respondents´ evoked sets with the integration of innovative attributes in preference measurement. Thereby, we compare a holistic, lab-based presentation format for all product attributes (including the innovative ones) with an independent information search for conventional attributes accompanied by the exclusive presentation of innovative attributes.

2.2 New methods

As people can articulate stable preferences only for products in their evoked sets (Hauser & Urban, 1977; Helm & Steiner, 2007; Howard & Sheth, 1969), a warm-up method needs to ensure that study respondents have one. However, innovative features are unknown

to consumers, so no one's actual evoked set includes innovations during the early stages of market development. The more an innovative product differs from existing offerings, the greater is the deviation of the evoked sets and preferences of consumers that are characterized by different degrees of familiarity. That is why respondents in a preference measurement task need individual ways to gain familiarity with innovative features to understand their benefits and evaluate them suitably.

We anticipate that consumers might not be able or motivated enough to gather information independently about (innovative) product features and therefore consider two alternative methods to ensure they can conduct an appropriate purchase decision process for innovations. Before evaluating product concepts, they need all relevant information about the product category, so our first potential approach follows the independent search stage (Helm & Steiner, 2007) with an extension to unknown, innovative product attributes presented in lab conditions. The second approach aggregates the information process with a multimedia concept that presents all relevant attributes, including the innovative features, as adapted from the "Information Acceleration" (Urban et al., 1996) multimedia virtual buying environment.

In our independent search and presentation (ISP) approach, people inform themselves using their preferred information sources and only innovative attributes appear in the lab settings. Respondents in the extensive information provision (EIP) group instead receive information about all attributes through an interactive presentation, designed by the market researcher. Within our empirical study, we tested these new methods in the sample category "innovative game consoles".

2.2.1 Warm-up method 1: Independent search and presentation (ISP)

2.2.1.1 Independent search

In order to form an evoked-set and to formulate stable preferences, consumers have to be in a purchase decision process (Bettman et al., 1998), which typically is not the case when they take part in common preference measurement studies. Therefore, the independent search stage gives consumers a certain amount of time (e.g., one week) to perform autonomous information research about the product category. In advance of the self-determined information research, the researcher should explain basic terms, such as attributes and levels. Within the independent search, consumers may use their preferred information sources to identify relevant attributes and levels for their purchase decision (Helm & Steiner, 2007). In this stage, respondents have the opportunity to familiarize themselves with the category tested.

A critical factor is whether the respondents actually do as the market researcher asks them to do. Incentives can help to motivate respondents to undertake the effort to simulate a purchase decision process. For example, all our respondents had the chance to win innovative games consoles and equipment. Yet the winning probability was reduced when respondents did not know anything about games consoles (see the qualifying test in the appendix) or when they made totally inconsistent choices within the preference measurement (measured by the adjusted R^2, see Table 10). It was communicated to the respondents that there are no right or wrong answers in the preference measurement but that we will check participant´s knowledge and a minimum of consistency before we run the lottery.

2.2.1.2 Presentation of innovative attributes

Typically, consumers have trouble informing themselves about all attributes on their own. For innovative attributes in particular, the benefits are not known by respondents, so they must be presented by the market researcher. The presentation of innovative features should be as realistic as possible. Multimedia and virtual presentations or the use of prototypes, if available, best activate the respondents' senses and enhancing their comprehension of new features (Jiang & Benbasat, 2007).

As an illustration, we include the design of the proposed methods in reference to our sample product category. Within the presentation stage of ISP, we explained the functionality and benefits of three innovative controllers for game consoles (Figure 1). In laboratory settings, respondents tested the Nintendo Wii Controller and the Sony Playstation Eye-Toy. For the Wii-fit Balance Board, which was not available at the time our research, we showed a product video explaining how to use this device.

By actually using the innovative features (resp. watching the video) respondents´ uncertainty about product functionality and benefits should be reduced (Hoeffler, 2003).

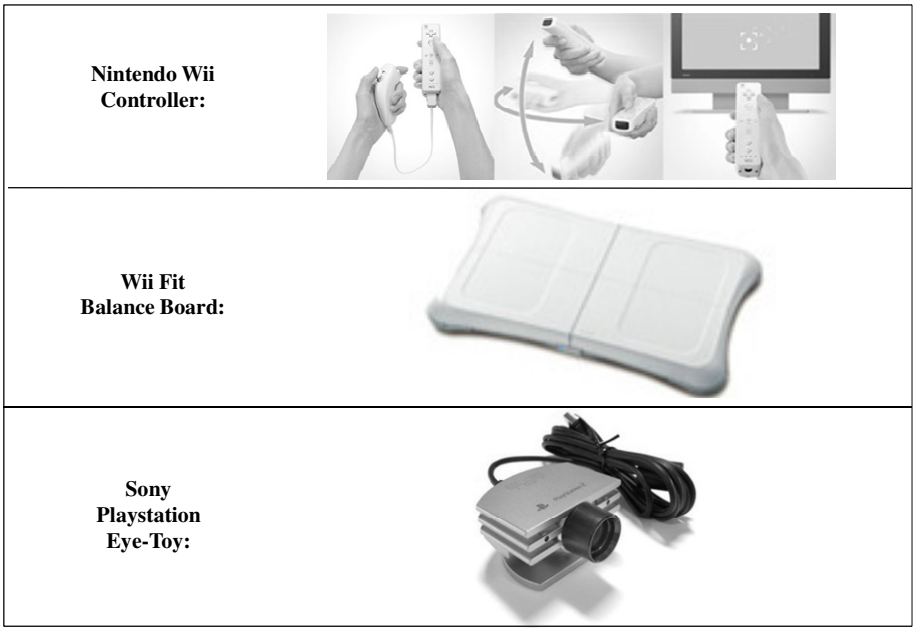

Figure 1: Innovative attributes for game consoles

2.2.2 Warm-up method 2: Extensive information provision (EIP)

In our second method, we suggest a multimedia-based presentation and learning program to ensure that respondents establish an evoked set for innovative products. The software can be self-navigated by participants, who click on information boxes, depending on their interests, to enhance their knowledge about game consoles, including their innovative attributes. This approach is related to "Information Acceleration," for which participants enter multimedia showrooms, converse with virtual salespeople, and review computer presentations (Urban et al., 1996, 1997).

On the basis of our conversations with experts and review of trade journals, we integrated all common product features of game consoles, including their innovative attributes, in our interactive presentation. The structure and design of the presentation was similar in appearance to an information display board (Dhar, Nowlis, & Sherman, 1999), and the navigation capabilities were reminiscent of a Web site. Participants read descriptions of the attributes and levels to enhance their knowledge about the products' functionality. Their actual information search related to their previous knowledge and interests. They could use the presentation as long as they wanted to gain knowledge to support their purchase decision.

In Figure 2, we provide a screenshot of the presentation for game consoles. With simple Office-based techniques, we integrated photos, videos (e.g. the Balance Board video),

verbal descriptions, and three-dimensional representations. The main menu appeared at the beginning of the presentation and provided access to subcategories. For each attribute and level, including innovations (Figure 1), the test participants could find information by clicking on the related page.

Moreover, respondents could try out the prototypes of relevant products if they were available. The design of the product testing was identical to the ISP presentation phase. Yet in the EIP product try-out, participants could also use conventional games consoles (besides the innovative ones) because in the EIP version we did not integrate any independent search phase previous to our presentation and learning program.

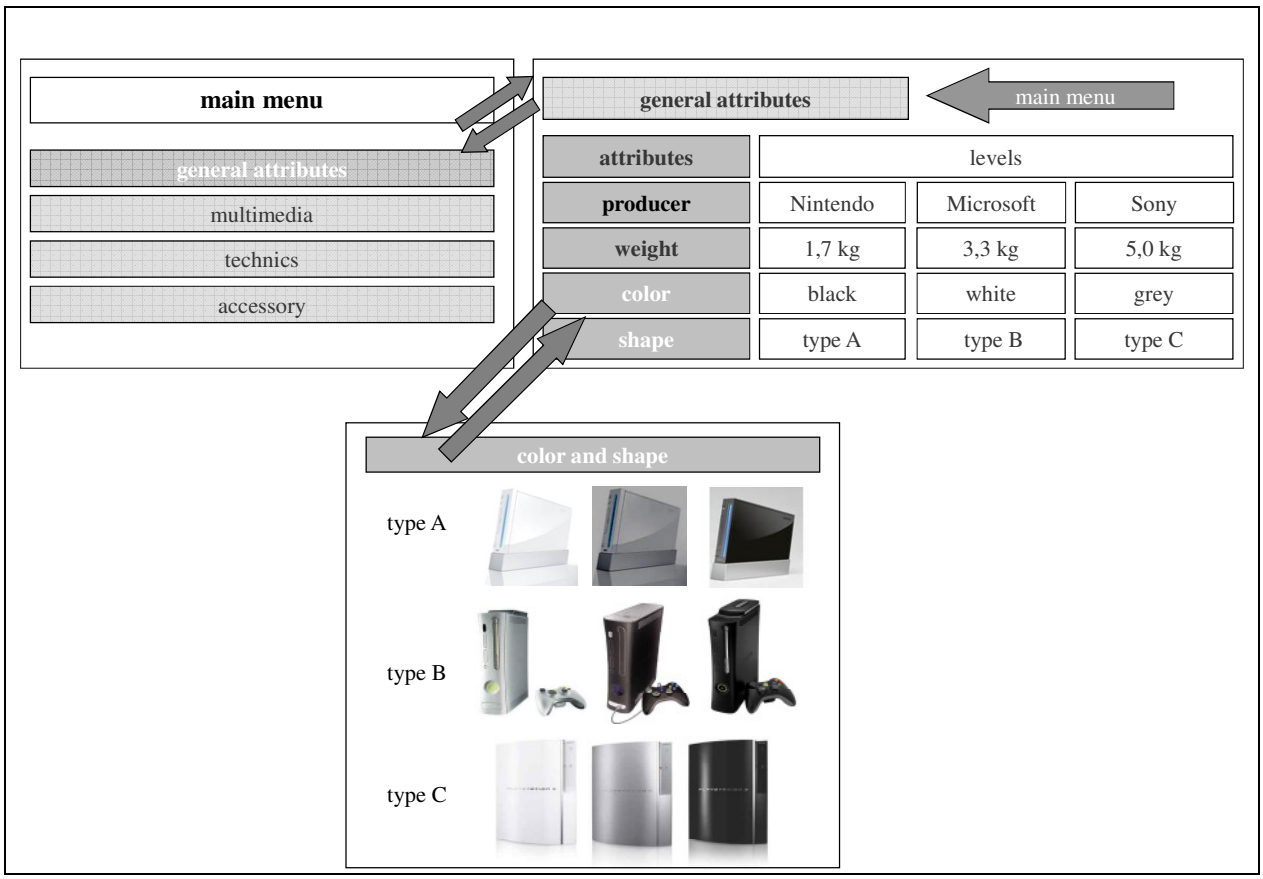

Figure 2: EIP screenshots

3. Evaluation criteria and study design

As argued before, respondents must be able to understand and evaluate innovative product concepts for valid and reliable preference measures. As retail sales of innovative products often take time, we identify different evaluation criteria that can be applied directly before and after preference measurement. On the basis of behavioral aspects of respondents

facing a purchase decision for innovative products, we develop evaluation standards to measure the influence of our two proposed warm-up approaches on the stability of preferences and quality of their measurement. Accordingly, we analyze participant-specific factors, e.g., from adoption theory, that are essential to preference construction for innovative products. To our knowledge, these variables have not been used previously to evaluate warm-up tasks for preference measurements. Furthermore, we consider the effects on the results and standard validity measures of subsequent preference measurements (see Scholl et al., 2005).

At first, any empirical method might be evaluated by asking respondents which method they consider most suitable (Scholl et al., 2005). To have a closer look on the suitability of warm-up methods, we also analyze whether our proposed warm-up methods enable respondents to evaluate innovations within a preference measurement task. Adoption theory suggests that the most important factors are judgment uncertainty (Hoeffler, 2003), perceived risk (Hauser & Urban, 1977), objective/subjective product knowledge, product experience (Braun & Srinivasan, 1975; Brucks, 1985; Zhou & Nakamoto, 2007), and involvement (Zhang & Markman, 2001). The levels of these factors should correlate with the perceived innovativeness of attributes (Cooper, 2000; Hoeffler, 2003). If a warm-up method influences these variables in the right way (e.g., reducing uncertainty by enhancing knowledge), the requirements for preference measurement are fulfilled: Participants can match their subjective utilities to (objective) attributes and express stable preferences. Only measures of stable preferences produce valid and reliable results (Darmon & Rouziès, 1994). Although the selected variables are standard in adoption theory, they have - to our knowledge - never been used to evaluate (warm up phases for) preference measurements on innovative products before. The impact of warm-up methods on judgment uncertainty, product knowledge, and involvement can be measured using comparisons with a control group that was not exposed to warm-up tasks. Therefore, we used similar groups of participants (e.g., similar ages, education levels) and controlled for their homogeneity as a precondition for our comparisons.

Since good warm-up methods should enhance the validity of subsequent preference measurements, we conducted a conjoint analysis and compared validity measures to test the relative advantages of our proposed warm-up methods. As judgment criteria, we used the average adjusted R^2, average Spearman rank correlation (reference method ranks versus conjoint ranks), and average hit rate 1 (best product of the reference method task identified by conjoint analysis). As a comparison against the estimated partworths and observed preferences (Helm et al., 2004), we employed a direct rating of the purchase probabilities of

four randomly assigned alternatives for each conjoint analysis. Superior validity should be accompanied by trade-off decisions instead of heuristics (Ratneshwar, Shocker, & Stewart, 1987). As strictly applied heuristics also might generate good forecast validities, we can generalize this claim: Good validity measures reflect systematic instead of random decisions.

In Table 1, we provide an overview of our overall empirical analysis. For our evaluation of the proposed warm-up methods, we solicited the participation of students from the University of *[insert name]*. Student samples are not only easy to acquire but they also represent a key target group for game consoles. After the warm-up tasks, they completed a survey, as well as the relevant attribute selection tasks and preference measurements.

<table>
<tr><th>Preparation</th><th>Group (sample size)</th><th>Survey 1</th><th>Survey 2</th><th>Attribute selection</th><th>Preference measurement</th></tr>
<tr><td rowspan="2">Warm-up phase</td><td>Independent search and presentation group (136)</td><td rowspan="3">Control variables (e.g., risk taking)

Product knowledge
Qualifying test
Involvement
Perceived risk
Judgment uncertainty</td><td rowspan="2">Applicability measures

Perceived innovativeness of attributes</td><td>ISP-EVAS</td><td rowspan="2">Graphical supported pairwise conjoint comparisons</td></tr>
<tr><td>Extended information provision group (222)</td><td>EIP-EVAS</td></tr>
<tr><td>Uninfluenced</td><td>Control group (80)</td><td></td><td></td><td></td></tr>
<tr><td></td><td>(∑438)</td><td></td><td></td><td></td><td></td></tr>
</table>

Table 1: Structure of the empirical analysis

4. Evaluation

4.1. Applicability measures

By analyzing the applicability measures, we determine the practicality of our empirical study from respondents' perspective (Scholl et al., 2005). To compare the two different warm-up methods, the participants revealed their motivation, information content, and the clearness of the methods, as we show in Table 2.

Construct	Items	ISP	EIP
Motivation	The general impression of the presentation is diversified.	5.68*	4.98*
	My enjoyment with the presentation is high.	6.10**	5.08**
Information content	The provided information was sufficient to evaluate the consoles.	5.48*	4.90*
	Due to the presentation of product attributes, I could realistically imagine a purchase decision.	5.76**	4.98**
Notes: 1 = totally disagree; 7 = totally agree. *: $p < .05$, **: $p < .01$ (two-tailed t-test). Kolmogorov-Smirnov tests of normality: $p > .05$.			

Table 2: Mean comparisons of applicability measures

Compared with the EIP group, participants in the ISP group perceived significantly more diversity and enjoyed the presentation more, probably because of the different approaches of the warm-up methods: After a week of independent information search, participants of the ISP group tested the innovative attributes and watched a product video. Those in the EIP group instead engaged in more comprehensive presentations. The additional requirement of information search and processing may have reduced the motivation of the EIP group. Furthermore, the ISP group claimed to have a better information foundation than the EIP group. They also were able to imagine the innovative attributes more realistically.

4.2. Product knowledge

Product knowledge entails measures of both subjective and objective knowledge, as well as product category experience. To elicit product experience, we simply asked how often our respondents use products of the relevant category (from never to every day). Questions of the subjective assessment of knowledge asked how much participants feel to know about the product category (Brucks, 1985). This measure can be influenced by subject´s self confidence (Rao & Monroe, 1988). For objective knowledge, we used a comprehensive qualifying test (open-ended and multiple choice questions; see appendix) to assess the availability of preference-related knowledge content, and we transformed the resulting points of the questionnaire to a scale from 0 to 7 (to match the other factors). This qualifying test included knowledge questions about terminology, brands in the product category and their features, existing schemata, the abundance of familiar attributes and their levels, and the ability to judge their benefits (see appendix). These elements of knowledge are crucial for assessing stable preferences.

We assume that respondents with sufficient knowledge structures can solve judgment tasks and process new information about innovative attributes. Some respondents could have some prior knowledge about the product category, whereas others might not. Any warm-up method should provide a comparable knowledge foundation that is likely for consumers in a (future) purchase decision. For the highly innovative attributes, usually all respondents need high levels of information.

Table 3 shows the mean comparisons across the control group and our experimental groups, with t-tests for all three dimensions of knowledge. We use t-statistics instead of analyses of variance, because variance homogeneity cannot be assured by Levene or Box's M tests, and the numbers of observations differ remarkably across groups.

Construct	Control group vs. ISP	Control group vs. EIP	ISP vs. EIP
Subjective knowledge	2.89/5.35**	2.89/4.90**	5.35/4.90**
Qualifying test (0–7 scale)	3.16/5.86**	3.16/5.68**	5.86/5.68
Experience (single item)	2.25/4.04**	2.25/3.87**	4.04/3.87
Notes: Cronbach's alpha of subjective knowledge = .897. **: $p < .01$ (two-tailed t-test), seven-point rating scale. Kolmogorov-Smirnov tests of normality: $p > .1$			

Table 3: Mean comparisons of knowledge

As these results show, either of the warm-up methods produces significantly better results for all three dimensions of product knowledge than emerge from the uninfluenced control group. The higher knowledge of those respondents who pass through the warm-up stage implies their potential for greater ability to evaluate the utility of attribute-based product concepts, because they have more cognitive resources available (Moreau et al., 2001). Established cognitive structures also enable evaluations of actual versus innovative attributes (Johnson & Russo, 1984). Furthermore, it facilitates comprehension of new product information. Therefore, high product knowledge is an important precondition for preference measurement.

With the aid of either warm-up method, respondents' knowledge and ability to evaluate the specific products improve. Having a look on subjective knowledge, we observe significantly better results for the ISP compared with the EIP group though (see Table 3). A reason might be that people stopped their independent searches of ISP when they subjectively considered their knowledge high enough. Respondents in the EIP group could have thought

there might be more information necessary. However, the objective knowledge test yielded no significant difference between the two experimental groups.

4.3. Involvement

Whereas knowledge refers to a general product evaluation ability, involvement pertains to the motivation to expend cognitive resources in the evaluation process. The extent to which respondents undertake the purchase decision process - that is, by processing assessment-relevant information during the warm-up stage - depends on their involvement, and a warm-up method should enhance involvement.

The personal commitment of both ISP and EIP groups is significantly better than that of the control group (see Table 4). Between the two experimental groups, we observe no significant differences.

Construct	Control group vs. ISP	Control group vs. EIP	ISP vs. EIP
Involvement	2.03/3.71**	2.03/3.46**	3.71/3,43
Notes: Cronbach's alpha = .773, **: $p < .01$ (two-tailed t-test), seven-point rating scale. Kolmogorov-Smirnov tests of normality: $p > .2$.			

Table 4: Mean involvement comparisons

The general effect of increasing involvement in forthcoming purchases thus can be achieved by simulating a purchase decision process in the warm-up stage. Participants are more likely to solve complex cognitive processes using attribute-based evaluations (Zhang & Markman, 2001). Using Sanbonmatsu and Fazio's (1990) degrees of involvement, participants who engage in warm-up methods are more willing to use new product information for their evaluations, whereas participants of the control group take their existing preferences into account. Warmed-up participants should thus evaluate product concepts more extensively than the control group. In summary, the warm-up methods improve the conditions for preference measurement by increasing involvement.

4.4. Perceived risk

The perceived risk associated with innovations can be reduced by increasing familiarity and developing preference structures for these products (Hauser & Urban, 1977; Ratneshwar et al., 1987). The different dimensions of perceived risk (Jacoby & Kaplan, 1972) produced a very low reliability measure, so we consider single risk dimensions, namely,

functional, financial, and social risk. As Table 5 (as well as Table 7) reveals, our results are mainly driven by functional risk perceptions - which is a reasonable result for our tested product category "game consoles".

Construct	Control group vs. ISP	Control group vs. EIP	ISP vs. EIP
Functional risk	3.38/2.32**	3.38/2.64**	2.32/2.64*
Financial risk	5.38/4.86*	5.38/5.18	4.86/5.18
Social risk	1.66/1.97	1.66/1.93	1.97/1.93
*: $p < .05$, **: $p < .01$ (two-tailed t-test), seven-point rating scale. Kolmogorov-Smirnov tests of normality: $p > .05$.			

Table 5: Mean comparisons of perceived risk

Compared with the levels in the control group, perceived risk is significantly lower among respondents in the experimental groups. In contrast with to EIP, the ISP participants perceived significantly lower functional risk. Lower perceived risks likely reflect greater product knowledge, achieved from the warm-up methods (Mourali, Laroche, & Pons, 2005; Srinivasan & Ratchford, 1991). These respondents have a better knowledge base for product evaluation, which reduces the risk of undesirable consequences as a result of their purchase. The low perceived risk of warmed-up respondents indicates that they searched actively for information and processed it to find the optimal product alternative.

4.5. Judgment uncertainty

In this section, we concentrate on a different dimension of uncertainty that may be more relevant for the validation of a warm-up method. That is, any warm-up method for preference measurement on innovative products should aim to reduce the respondents´ judgment uncertainty about evaluations of innovative attributes. Judgment uncertainty correlates directly with preference instability and thus with context dependability. Reducing this uncertainty should make the preference measurement more valid. After warming up, we asked the test respondents in the experimental groups directly about their ability to evaluate attributes and their reference levels (Hoeffler, 2003). Compared with that of respondents in the control group, judgment uncertainty in both experimental groups was significantly lower (see Table 6).

Construct	Control group vs. ISP	Control group vs. EIP	ISP vs. EIP
Judgment uncertainty	4.84/3.06**	4.84/3.21**	3.06/3.21
Notes: Cronbach's alpha = .753 for two items: "It is difficult for me to assess the benefits of the attributes and reference levels of games consoles" and "I am uncertain about evaluating and comparing different game consoles." **: $p < .01$ (two-tailed t-test), 7-point rating scale. Kolmogorov-Smirnov tests of normality: $p > .2$.			

Table 6: Mean judgment uncertainty comparisons

To test if this direct measurement of judgment uncertainty reflects the strength of the respondents' decisions in the preference measurement, we analyzed its correlations with standard validity and reliability values in our conjoint analysis (Hoeffler, 2003; Hoeffler & Ariely, 1999). The Pearson correlation coefficients with judgment uncertainty were negative for the adjusted R^2 of conjoint analysis and the Spearman's rank correlation[1] that compares the conjoint results to a reference task (see Section 3). With this reference method, we assess the convergence of estimated conjoint partworths and observed preferences (Helm et al., 2004). Therefore, respondents who stated, apparently honestly, that they had low judgment uncertainty attained to some extent better values on the validity measures of preference measurement. Small increases in the adjusted R^2 and Spearman's rank correlation are desirable, in that they imply consistent preference judgments.

Thus, our measure of judgment uncertainty is able to assess the validity of preference measures of our innovative products. The next question thus is: Which variables reduce this uncertainty most effectively? As Table 7 shows, the reduced judgment uncertainty for both experimental groups (ISP/EIP)[2] is strongly and significantly influenced by product knowledge, in support of our intuitive hypothesis that warm-up tasks must secure sufficient product knowledge.

[1] All participants in the conjoint analysis (ISP and EIP groups) are included in this analysis. The coefficients are small (-.146 for R^2, -.172 for Spearman's rank) but significant on the 1% level (two-tailed t-test). They do not differ significantly across groups.

[2] Separate regression results for the EIP and ISP groups yield no substantial differences.

Judgment Uncertainty	Coefficient		*p*		Tolerance value	
	ISP/EIP	**Control group**	**ISP/EIP**	**Control group**	**ISP/EIP**	**Control group**
Subjective knowledge	-.449***	-.156	.000	.303	.352	.230
Qualifying test	-.168***	-.176*	.000	.049	.552	.501
Experience	-.023	-.079	.585	.624	.303	.294
Involvement	-.063	-.399#	.228	.052	.235	.230
Functional risk	.122**	.084	.001	.367	.811	.868
Financial risk	.013	.132	.664	.110	.918	.903
Social risk	.002	-.045	.951	.679	.950	.836
Risk taking	-.139**	.027	.001	.825	.877	.911
Constant	6.929***	5.854	.000	.000		
R^2 (adjusted R^2)	**ISP/EIP**	.623 (.615)		**Control group**	11.048 (.000)	
F (p)		77.713 (.000)			.562 (.511)	

Notes: Ordinary least squares regression; N = 358 (ISP/EIP) and 80 (Control group). Marginal effects of two-limit Tobit models were nearly identical to the OLS coefficients. #: $p < .1$, *: $p < .05$, **: $p < .01$, ***: $p < .001$

Table 7: Judgment uncertainty in the experimental groups (ISP and EIP) and in the control group, regressed on subject-specific factors for preference construction

The regression analysis also indicates that our proposed qualifying test for objective knowledge is suitable to control for judgment uncertainty and we can reduce decision uncertainty by lessening the perceived risk of innovations. The subjective indication of knowledge has the highest negative coefficient in our regression model, which is a plausible result because people feel uncertain about evaluating products they perceive as unfamiliar. This result confirms that our test participants provided honest, fair self-assessments, considering the correlation with validity measures of preference measurement. Subjects who feel that they know enough about a product category think that they are able to evaluate its products and buy one of them. This is a necessary condition for valid preference measurements. The influence of experience and involvement are not significant (though in the expected direction). With regard to multicollinearity, the tolerance values of every variable exceed .1 (Hair, Black, Barry, & Anderson, 2010).

As we argued in Section 3, participants' predispositions should be very similar across the three groups. For example, risk taking influences evaluations of innovative products (Helm & Landschulze, 2009) but cannot be influenced by warm-up phases. As our regression shows, more risk-prone respondents express significantly lower judgment uncertainty. We integrated risk taking as a control variable because of its close connection with uncertainty and preferences for innovations. Therefore, we determined whether our test participants were homogeneous in their risk taking and found, as expected, no significant differences in the means and variances of risk taking across any groups.

The regression results for the control group (see Table 7) differ markedly in two aspects: The coefficient of involvement turned out to be significant (although the number of observations is essential smaller) and the subjective knowledge plays no role for the uncertainty of the control group. Indeed, the only two variables, that have a significant impact on judgment uncertainty in the control group, are objective knowledge (the results of the qualifying test) and especially involvement. After being warmed up, the ISP and EIP participants had high and homogeneous objective knowledge and involvement measures (Tables 3 and 4). Yet in the control group the qualifying test results were very heterogeneous and the respondent´s involvement were very low (Table 2). That is why the qualifying test (as opposed to the subjective knowledge measure) might explain differences in judgment uncertainty of the control group. However, the highest negative effect on uncertainty is due to the low motivation of participants of the control group who cannot imagine buying the innovations.

4.6. Perceived innovativeness

The ISP and EIP groups stated their perceptions of the innovativeness of the three controllers after the warm-up task. We measured these perceptions on two dimensions: product newness (Atuahene-Gima, 1995; Danneels & Kleinschmidt, 2001) and product uniqueness (Ali, Krapfel, & LaBahn, 1995; Salavou, 2005). A high degree of perceived newness after warming up implies that further behavioral change and learning effort is necessary for product use (Atuahene-Gima, 1995). In contrast, a low degree of perceived newness would imply the compatibility of the innovative features and their comparability to actual usage patterns. When we compare the ISP and EIP groups, a significant lower degree of perceived newness would indicate better warm-up results. Product knowledge and intensity of information processing during the warm-up stage also determine how new the innovative attributes seem.

New product uniqueness has less impact, because unique attributes do not preclude the degree of newness for customers (Salavou, 2001). Even a high degree of uniqueness does not mandate difficulties in evaluating attribute-based product concepts. However, this dimension indicates whether people perceive the advantages of the three innovative attributes differently when they adopt a specific warm-up method.

ISP vs. EIP	Wii Controller	Wii Balance Board	Sony Eye Toy
New product uniqueness (Cronbach's alpha = .837)	5.99/5.89	5.60/5.34*	5.11/4.81*
Product newness to customers (Cronbach's alpha = .636)	2.57/3.05**	2.98/3.49**	2.94/2.98
* $p < .05$, ** $p < .01$ (two-tailed t-test), seven-point rating scale. Kolmogorov-Smirnov tests of normality: $p > .05$.			

Table 8: Mean comparison of perceived innovativeness of innovative attributes

The ISP group evaluated the Wii Balance Board and Sony Eye Toy as significantly more unique than did the EIP group.[3] Compared with the EIP group, product newness for ISP customers is much lower when it comes to the Wii Controller and Wii Balance Board (Table 8). In this sense, ISP better warms up respondents because it requires less behavioral change (Atuahene-Gima, 1995).

As expected, the perceived innovativeness of these innovative attributes correlates with judgment uncertainty. Respondents feel more uncertain about evaluating products that they perceive to contain a high level of innovativeness (Hoeffler, 2003). The product newness of the Balance Board, Eye Toy, and Wii Controller exhibited significantly positive (but small) Pearson correlation coefficients.[4] For uniqueness of the Wii Controller, we found no significant correlation with judgment uncertainty.

4.7. Validity of preference measurement

We can attain a conclusive comparison of the different warm-up tasks only by considering the "hard facts" of the subsequent preference measurements, namely its validity measures (see Section 3).

[3] These results were confirmed in the subsequent preference measurement.
[4] The correlation of judgment uncertainty with product newness for the Balance Board, Eye Toy, and Wii Controller were .245, .193, and .119, respectively. The correlation of judgment uncertainty with the perceived uniqueness of the Balance Board and Eye Toy were .113 and .124.

After warming up with the ISP method, the attribute selection method EVAS (Helm & Steiner 2007) detected two target groups for the preference measurement: a large segment for which all three innovative attributes are relevant for the purchase decision (ISP 1) and a small segment that focuses mainly on price and the Wii Controller (ISP 2). The ISP 1 target group indicates that the ISP presentation phase focused the respondents´ attention on the three innovative features. In the EIP group, EVAS separated three groups: two segments in which only one innovative controller was relevant (i.e., the Wii Controller in EIP 1 and the Balance Board in EIP 3) and one segment (EIP 2) that considered both the Wii Controller and the Eye Toy important for its decision.

Separately in every target group, we conducted traditional full profile conjoint analyses with each 12 paired comparisons that are graphically supported by an online environment.[5] To evaluate predictive validity, we implemented a reference task where consumers sorted four products (holdout stimuli) according to their buying probabilities. As we show in Table 9, comparisons of standard validity measures (Scholl et al., 2005) imply the superiority of the ISP method over the EIP method. On average, the ISP method generated higher adjusted R^2 in the individual OLS regressions of conjoint measurement. Furthermore, it yielded higher Spearman rank correlations that compare the predictions of the individual conjoint results with the according ranks of product stimuli in the reference task. Hence, we observed better first choice hit rates in the ISP group than in the EIP group: The individual part worths of ISP subjects predicted more often the most preferred product in the reference task.

We also measured the time that respondents needed for the conjoint tasks; the correlations of this duration with the validity measures in Table 9 were significantly positive.[6] These positive correlations might indicate that respondents that used trade-off decisions instead of heuristics, and therefore needed more time, provided more valid judgments (Rubinstein, 2007). However, this connection is rather complex. Subjects who needed too much time could also have problems in understanding the evaluation tasks. What is more, if subjects use heuristics consistently in the conjoint measurement and reference tasks, the

[5] To compare the validity of preference measurement it is just important to use the same method for eliciting preferences. Therefore, it is convenient to use a traditional approach for both groups. It is not necessary to use hybrid methods as we already add two phases before preference measurement (warming up and attribute selection). A CBC-approach could have improved the validity measures reported in Table 9 for both groups.

[6] Pearson correlation coefficients of the time needed with the adjusted R^2 and Spearman's rank correlation equalled .197 and .183. The nonparametric correlation of Kendall's tau for the time needed with the hit rate 1 was .417. However, the average ranks of time needed to answer the conjoint task do not differ between ISP and EIP according to a Mann-Whitney-test.

predictive validity could be good although the heuristic might violate assumptions of conjoint measurement.

ISP vs. EIP	**Ø adjusted R^2**	**Ø Spearman rank correlation (RC)** **(reference vs. conjoint ranks)**	**Ø hit rate 1 (HR 1)** **(dummy variable: best product in reference task identified by conjoint analysis)**
Validity	**.738/.667****	**.704/.584****	**.833/.662^{+}**

**$p < .01$ (two-tailed t-test), $^{+}$ $p < .01$ (Fisher's exact test, two-tailed). Kolmogorov-Smirnov tests of normality: $p > .1$

Segments	ISP 1	ISP 2	EIP 1	EIP 2	EIP 3
N	102	34	95	92	35
Ø adjusted R^2	.728	.768	.647	.713	.595
Ø RC	.715	.669	.547	.637	.544
Ø HR 1	.873	.735	.621	.717	.600

Table 9: Comparison of validity measures in the conjoint analysis

Therefore, we consider a sample decision heuristic: 3.68% of ISP versus 4.44% of EIP respondents always preferred product stimuli that were cheaper, regardless of the attribute levels, indicative of a price-based heuristic (see Table 10). The difference in the experimental groups is mainly driven by the small target segment EIP 3 (35 respondents), of whom 20% (7 respondents) always preferred the less prized product in paired comparisons in the conjoint analysis. This segment achieved the worst internal (adjusted R^2) and predictive (RC and HR 1) validity measures in our study. That is, EIP 3 decided somewhat randomly concerning other attributes than the price. With regard to subject-specific factors, EIP 3 had significantly lower knowledge, lower involvement, and higher judgment uncertainty.

Segments	ISP 1	ISP 2	EIP 1	EIP 2	EIP 3
Price heuristic	3.92%	2.94%	1.05%	2.17%	20.00%
	3.68%		4.51%		
Notes: No significant ISP versus EIP difference, according to Fisher's exact test (two-tailed)					

Table 10: Price heuristic usage

5. Discussion and recommendations

Our proposed warm-up methods both performed well in terms of preparing respondents for preference measurement tasks with innovative products. Such suitable warm-up stages can help ensure a realistic information search process, similar to the future buying decision process for an innovation. Especially for highly innovative products, warm-up stages are inevitable, because judgment uncertainty must be reduced for marketers to acquire valid and reliable results.

In line with adoption theory, we employed useful tools to evaluate the effect of warm-up phases on preference measurements of innovations. The best way to warm up respondents seems to be an information stage about conventional attributes that is as natural as possible, combined with a multimedia presentation of the innovative attributes.

The superiority of the ISP group (i.e., applicability, subjective knowledge, and validity measures for conjoint) is highly dependent on the motivation of the participants. The results indicated that our respondents conducted extensive, target-aimed searches about game consoles. Indeed, they stated an average information search time of nearly three hours.[7] Further research with various samples is needed to generalize this outcome though. If it is uncertain whether respondents search for relevant information on their own, a qualifying test before the preference measurement might be appropriate. However, eliminating respondents based on such test results could restrict the representativeness of the sample. Another limitation regarding the superiority of the ISP method pertains to the product category. When people can easily gather information about the category, and only a few innovative attribute levels are relevant for a purchase decision, the ISP method is the best way to warm up respondents. However, if a product category is characterized by a lot of really new product features, a lab-based warm-up phase using EIP could be more suitable. To validate this hypothesis, we recommend comparisons of our results with research in different product categories.

After being warmed up, the EIP (compared with ISP) group indicated lower average perceptions of the innovativeness for the three new attributes. Therefore, it may appear that the EIP method familiarizes respondents with these attributes better. But another effect also seems relevant: The exceptional presentation of innovative attributes by the ISP method (after the independent search stage) focuses people's attention on their newness. In the EIP group,

[7] However, the variance of their statements was very high; the median was 55 minutes.

they gather information about the innovative features while also searching for other important product information within the interactive learning program of EIP.

Considering the rather marginal previous knowledge of our respondents (see the control group results in Table 3), the EIP method provides a good alternative to the ISP method. After this warm-up phase, nearly all respondents (except for some participants of EIP 3) had enough product knowledge to evaluate attributes consistently in the preference measurement.

In the control group, we did not conduct any conjoint analysis, because no warm-up phase (including attribute selection) was run. Thereby, no attribute sets are calculated for the control group and a comparison with the preference measurement of our experimental groups would have made no sense. Apart from this, that comparison would have played to the gallery if you take into account the high judgment uncertainty of the control group (see table 6).

Our study employs only a subsample of respondents in the two attribute selection tasks. After calculating the different attributes sets, we used them for preference measurements with bigger samples. However, the ISP or EIP warm-up method applies to every respondent except for the control group. Therefore, we can well contrast their results for the whole sample. The different sizes of the experimental groups reflect different results of the attribute selection phases, in that the ISP method detected two target groups, whereas the EIP method identified three. Consequently, more respondents are needed for the preference measurement task in the EIP group.

Further research should address the optimal combinations of different warm-up, attribute selection, and preference measurement phases to develop an integrated framework for the preference measurement of innovative products.

Appendix

Qualifying test (translated)

1) What are the names of the new game consoles of the following producers? _____ Microsoft _____ Nintendo _____ SONY O No idea	2) In which attributes do these consoles differ the most _____ _____ O No idea.
3) Do you know two new games for these consoles (besides the one depicted here)?  1._____ 2. _____ O No idea	4) What means "backwards compatibility" for game consoles? O It is possible to play old games on new consoles. O It is possible to play new games on old consoles. O It is possible to play games that are created for game consoles of other producers. O No idea.
5) What is needed to store data like savegames, pictures or music on the game console? _____ O No idea	6) What influences the speed and quality of the game console´s image transmission the most? _____ _____ O No idea
7) Which of the two abbreviations indicate the better image resolution? O SD-TV O HD-TV O No idea.	8) Which connection is used to link external devices to game consoles? _____
9) What is <u>NOT</u> feasible with game consoles at the moment? O Internet surfing O Communicating with other gamers O Picture editing O Playing video games O Watching DVDs O Recording TV-shows O Hearing music O No idea.	10) Which storage medium can save the most data? O CD O Blu Ray Disc O DVD O No idea.
11) Which equipment for game consoles do you know (besides the one depicted here)? 1._____  2._____ 3._____ O No idea	12) What is the "rumble function"? _____ O No idea

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