

Product Context in EC Websites: How Consumer Uncertainty and Purchase Risk Drive Navigational Needs

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ABSTRACT

Little attention has been attributed to *product context* in the design of EC environments. Even though extensive marketing research has shown product context to be a major driver of consumer search behavior in the physical world of shopping, most EC websites seem to ignore this. EC sites generally offer the same type of corporate layout, interactive functionality, dialogue system and information depth regardless of the product on sale. This article presents an experimental study with 150 subjects conducted at Humboldt University Berlin (Germany). The study shows how consumers have distinct navigational needs when they search for different product types online. Specifically, we observe how users seek ‘deeper’ levels of interaction for product categories with higher purchase uncertainty. Equally, we prove that different interactive functionality is needed to address different dimensions of product risk. Consequently, we argue for more product context recognition in EC website design and make some recommendations on how this could be done.

Categories & Subject Descriptors: H. Information Systems, H.5 Information Interfaces and Design, H.5.2 User Interfaces, Interaction styles, User-centered design

General Terms: Design, Human Factors, Management

1. INTRODUCTION

Customer loyalty to EC websites is a the big challenge for online marketers. Consequently, understanding consumer interaction with these is a vital field of research. How can the online medium optimally support a consumer’s buying process?

In order to understand customer ‘bondage’ to websites, considerable focus has been put on ‘user centric’ design [12]. Data-mining techniques [14] as well as recommender systems [18] have been developed and leading online marketers such as Yahoo! [13] and Amazon have pioneered the deployment of these personalization techniques.

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Lengthy debates have taken place on interface agent use in websites versus direct manipulation [19] and more information flow control [2]. Little attention has been attributed to the most basic parameter of any purchase process: the product itself. In fact, today’s EC-environments display a strong lack of product context recognition. Not only do they often fail to effectively support product choice [21], but site design and interactive functionality also tend to follow a ‘one-size-fits all’ approach. The same type of information is displayed no matter what product. Dialogue-systems focus on product attributes only, but neglect softer purchase needs. Product description or visualization is mostly identical in a domain for all goods on offer. No attention is paid, for example, to the fact that photographs or interactive functionality is extremely important for some products potentially superfluous for others. Short: While offline retail outlets have traditionally recognized the product itself as *the* primary factor for determining location, storefront, store design and service level [22], EC-environments up to now have widely ignored this point. From most store designs one would not know what is being sold in them.

As a critical response to this defect the current article aims to prove the relevance of product context for online purchases. An empirical study is presented that shows how consumers search differently online depending on the level and type of purchase risk and uncertainty associated with a product.

The level of uncertainty and type of risk associated with a product were shown to influence the purchase process in offline markets. To operationalize the level of uncertainty in a purchase process a categorization of goods into search and experience goods has been widely accepted [16]. Products with strong search characteristics can be fully judged upon through inspection or information search *prior to* purchase. Therefore, they imply lower levels of uncertainty. Products with dominant experience characteristics can only fully be judged upon *after* purchase. They thus imply higher uncertainty at the moment of purchase. The construct of search and experience goods has been used in marketing research and different marketing strategies were shown to be more or less effective depending on the type of good [3, 10, 11, 23, 24]. Equally, goods have been distinguished on the basis of their perceived risk structure [5, 6]. Researchers differentiate products with a view to functional, financial, psychological and social risk associated with product choice [9].

In order to investigate the impact of uncertainty and risk-type on online interaction we chose compact cameras and winter jackets as a study focus. Compact cameras entail strong search good characteristics as their qualities can be well described prior to purchase. Apparels in contrast are experience goods, because one has to wear and feel them before judging on personal fit. In addition to the perception of compact cameras and winter jackets as respective search and experience goods, we also chose the two products for different dominant risk dimensions: Jackets have higher levels of social and psychological risk associated with them and cameras higher levels of functional risk. The study questions were: Do online users interact more with websites when they perceive higher levels of uncertainty prior to purchase? And is the online information search process in line with the dominant dimensions of perceived risk?

This paper proceeds as follows: In section 2 an experiment is described which was carried out to investigate user interaction for the two different products. In section 3, the results from this experiment are presented. Section 4 comments on the results obtained. Recommendations are made for context-adjusted dialogue systems as well as product representation. Section 5 concludes and presents limitations and suggestions for future research.

2. METHOD

In winter 2000 an experiment was carried out to investigate drivers and impediments of online interaction. In this experiment, 197 subjects were observed during an online shopping trip for cameras and winter jackets. The hypothesis was that consumers have distinct navigational needs when they search for different types of products online. Specifically, we postulated that subjects would seek 'deeper' degrees of interaction for higher-risk products and 'different' types of interactive functionality according to dominant risk dimensions.

2.1. Participants, Incentive Scheme and Briefing

The experiment was conducted in the PC-pool of Humboldt University Berlin. Participants were told that a new shopping system would be tested. People could buy a camera or winter jacket in an experimental store. They had to spend their own money. The main incentive to participate was a 60% discount offered on all cameras and jackets displayed in the store.¹ Buying implied a minimum expenditure of 80 DM (around \$60 to \$80). 92.4% of the participants were students while the remaining 7.6% held different jobs. 146 shopped for a camera, 51 for a jacket. Of these, 56.2% decided to buy a camera during the shopping session. 21.6% bought a winter jacket.

¹ Since project finances did not allow us to offer this discount to all buyers, however, the incentive structure was slightly refined such that a lottery after the shopping session decided on one out of 10 participants who would have the right to take the product for the 60% off. The remaining participants received a small financial compensation. If someone had not bought, but won the lottery, he or she would go out empty. Students were made aware of this procedure verbally before the actual shopping session.

2.2 Materials and Apparatus

The central material for the experiment was an online store with two different versions, one offering compact cameras and one offering winter jackets. In addition to this online store a questionnaire was answered by participants before and after the shopping session.

The online store was programmed explicitly for the experiment, using Meta-HTML and Java. In order to encourage product search, the shop had a vast range of models on offer including more than 50 compact cameras and 100 winter jackets (50 models for women and men). The navigation in the store was organized in three phases: When participants entered they had a space for *orientation* (phase 1). Here, they could view all products on offer one by one from a list. Then, users proceeded to a search engine where an anthropomorphic 3-D shopping bot called 'Luci' enrolled the user in a *dialogue* phase (phase 2). Interaction included 56 purchase related multiple-choice bot questions. They were organized in 7 cycles of 7-10 questions. The 7 question cycles were displayed to the user on a category survey page. He could run through them in any order or depth desired. Users were not forced to provide any answers. Through a 'dialogue control box' (situated on the upper left part of the screen) users were aware of questions still to come and control for questions unanswered. Based on any number of answers shoppers could ask Luci to calculate a top-10 ranking of products. From this ranking, customers could view a more *detailed description* of each product and enlarge its photograph (phase 3). The detailed product description contained a brief marketing text on the respective model, an enlargeable photograph and a fact sheet with product attributes.

The three shopping stages (orientation, dialogue and detailed inspection) resembled an offline store visit. The shopping process could be ended any time. No brand information was displayed in the store in order to avoid information chunks and have people investigate products 'neutrally'.

2.3 Development of Shopbot dialogue

All shopbot questions were developed with 'real-world' sales agents selling compact cameras and winter jackets. They were linked to the purchase context, but went beyond simple product attribute checks and 'softer' purchase needs. Specifically, they addressed three different purchase risk dimensions: functional, financial and socio-psychological. Functional risk stands for the uncertainty that a product might not perform as expected, financial risk that the product will not be worth the financial price and would have been available cheaper elsewhere. The socio-psychological risk implies that poor product choice will harm the consumer's ego or may result in embarrassment before one's friends, family or work group [9]. Furthermore, bot questions were formulated in such a way that they would directly address the user (e.g. Do *you*...) and they were developed to fit into four content categories: 1) questions addressing product attributes (*pd*), 2) those looking into envisaged usage (*u*), 3) personal questions completely independent of the product, but related to the context (*peip*) and 4) personal questions related to the product (*pepr*). With this design the dialogue went far beyond today's ordinary EC environments where marketers usually confine themselves to a few product attributes as a search basis [21]. Table 1 gives an overview of question types employed.

2.4 Identical Store Design for Compact Cameras and Winter Jackets

In order to attribute navigational differences to product nature and not the store environment, it was vital to design the two store versions for cameras and winter jackets as similar as possible. We therefore ensured identical navigational options and product display, a similar quantity of products on offer, an identical number of attributes used to describe each product as well as identical depth of bot communication. More importantly, we made a considerable effort to provide for comparable levels of interaction quality encountered by users with the sales bot. For this purpose, interaction was characterized and manipulated on three dimensions:

Table 1. Question categories integrated in the shopbot dialogue

Question category purchase risks	Compact Camera	Jacket
Financial risk	Are you ready to pay more for a branded product? (pepr) In what price range do you want products to be displayed? (pd)	Are you ready to pay more for a branded product? (pepr) In what price range do you want products displayed? (pd)
Functional risk	How strong do you want the zoom of the camera to be? (pd) What picture programs are important to you? (pepr)	How often will the jacket be put on? (u) What tissue do you prefer for the jacket? (pd)
Socio-psycholog risk	Are cameras a subject of discussion in your group of friends? (peip) Why do you want to buy a camera? (peip)	How important are trend models to you? (pepr) Do you like to attract attention? (peip)

First, we ensured that perceived accuracy of the bot as well as overall satisfaction with bot communication would be comparable for the two store versions. The perceived accuracy of bot feedback was judged by asking participants after the experiment how well the shopbot had succeeded in addressing their needs. For the subjects considered in this analysis there was no significant difference in the perception of recommendation quality for jackets versus cameras (Kolmogorov-Smirnov-Z = 1.144, p= .146), nor were subjects more or less satisfied with bot

communication for the two products (Mann-Whitney-U = 1769.5, p= .724).

Second, we needed a similar nature of information exchanged. Naturally, however, the nature of information exchange differs for compact cameras and winter jackets. We therefore ensured that perceived question legitimacy and importance would be distributed equally in both store versions. For this purpose we conducted an independent pre-study where 39 subjects rated all bot questions (for both store versions) on a 10-point scale with respect to legitimacy and importance in an Internet sales context [1]. Mann-Whitney U-test on the mean perceived question legitimacy of the 56 bot questions confirmed non-significant differences for the two store versions (p= .386). A T-test on mean perceived question importance of the two bot-question catalogues rendered a similar result (F = .577, p=0.386). Thus, the ‘degree of relevance’ or the ‘quality of exchange’ inherent in the sales dialogue was perceived similarly for the two store versions.

Finally, navigation can be effected by the order of information display [8]. For this reason, the 7 question cycles were arranged identically for both products in an order of decreasing importance.

2.5 Procedure

Before and after shopping participants filled out a paper-and-pencil questionnaire (identical for both shoppers types). The first questionnaire dealt with demographics, Internet experience, e-privacy concerns as well as product perception. The second one asked participants to comment on their perception of the sales agent, actually encountered purchase risk and flow.

Since we wanted all people to have a comparable time agenda we asked them to remain in the PC-pool for at least 30 minutes. By employing this time-manipulation we artificially avoided some of the influence time cost can have when people surf and buy online [8]. Because everybody had to stay anyways, time spent in the store would be due to the products and not due to some other activities scheduled outside the experiment. In order not to adversely affect their personal interaction feedback, however, we also told them to remain no longer than necessary in the store and leave it once they felt shopping to be over.

3. RESULTS/FINDINGS

3.1. Data

In order to investigate *product nature* as the independent variable driving interaction we had to avoid personal factors influencing interaction. To ensure this construct validity, the original dataset of 197 observations (146 cameras, 51 jackets) was investigated with a view to three factors: privacy concerns, satisfaction with the search engine and perceived time cost.

The analysis of privacy concerns revealed that most subjects, even though they stated to be privacy conscious, revealed a lot about themselves by answering many of the bot’s questions [20]. Yet, for the purpose of the current research it is important to note that 5 participants (4 camera shoppers, 1 jacket shopper) expressed considerable privacy concerns and also acted consistently with their attitude by refusing most of the interaction with the bot. These subjects have been excluded from the analysis. Their behavior cannot be interpreted as a response to the product.

Furthermore, the perception of the search engine's accuracy had a significant influence on interaction. It was measured by asking participants after shopping how valuable and accurate they had found the shopbot to be. While 78.1% of the participants (group 1) felt that the search engine made either very good (7.8%), good (29.2%) or at least sufficiently good (41.1%) recommendations, 21.9% were not fond of the search aid (group 2). Mann-Whitney-U-Test used to investigate the impact of this distinct search engine perception on the total number of page requests yielded significant differences for the two perception groups ($Z = -2.716$, $p = 0.007$). As a consequence, 23 camera shoppers and 19 jacket shoppers have been excluded from the analysis presented hereafter.

Finally, we asked participants after the shopping session whether they had rather done something else instead of shopping for a compact camera or winter jacket in our experimental store. 6 subjects admitted a relatively strong de-motivation. Mann-Whitney-U-Test for the impact of this de-motivation on the number of page requests, however, did not yield significant differences in behaviour ($z = -.341$, $p = .733$), nor did a T-test on the time spent shopping ($F = 1.776$, $p = .886$). As a result, we left the 6 subjects in the sample investigated.

Considering the eliminations made from the original data set in accounting for privacy concerns and perception of the search engine, 150 observations remained for the analysis: 119 camera shoppers and 31 jacket shoppers.

3.2. Perception of Products

We chose compact cameras and winter jackets for the experiment, assuming that they can be considered relatively good representatives of search and experience goods. Cameras entail strong search good characteristics as their quality can be well described prior to purchase. In contrast, we considered jackets to be a typical experience good, because one has to wear them to judge on personal fit. To confirm the assumptions we used measures developed by Weiber et al. [23] asking subjects how comfortable they felt [q1] and how probable it would be [q2] to fully judge on the quality of the product sought with the help of the Internet. We also asked them how uncertain they generally felt that the product would meet their expectations [q3]. The answers provided are summarized in table 2. They show that even though participants are feeling on average less certain to judge jackets, this feeling is only close to statistical significance for q2. Thus, the perception of winter jackets as an experience good and compact cameras as a search good is marginally supported by the data. Cross-checking this finding with a larger data-set (where an additional 119 answers were available) slightly improved the significance.

In addition to the perception of cameras and jackets as search and experience goods, we also chose the two products with a view to different types of dominant risk. As was outlined above, risk can be captured on multiple dimensions. The most renowned dimensions are functional, financial, sociological and psychological risk. We expected cameras to be perceived as functionally more risky than jackets. At the same time, we associated more socio-psychological risk with the purchase of jackets.

In order to measure the risk associated with cameras and winter jackets, we used a scheme developed by Cunningham [6, 17] which suggests that Overall Perceived Risk (OPR) contains two components: the probability of a loss and the severity when purchasing the wrong good.

$$OPR_j = \sum_{i=1}^n (PL_{ij} \cdot IL_{ij})$$

with

- ORP_j = overall perceived risk for product j
- PL_{ij} = probability of loss i from the purchase of product j
- IL_{ij} = importance of loss i from purchase of product j
- n = risk facets (here, n=4)

Table 2. Perception of products as search or experience goods

	Mean Value Winter Jackets	Mean Value Cameras	Sig. (sample: 150)	Sig. (sample: 269)
Q1: How comfortable are you that, with the help of the Internet, you'll be able to fully judge on all quality characteristics important to you [in the winter jacket]? (1= not at all comfortable (...2,3,4,5) 6= very comfortable)				
	3,35	3,81	Z = .726 P = .668	Z = 1.505 P = .022
Q2: Please indicate, how probable it is that in the context of an Internet purchase you'll be able to fully judge on all quality characteristics [of the winter jacket]! (1= not at all probable (...2,3,4,5) 6 = very probable)				
	2,61	3,36	Z = 1.339 P = .055	Z = 1.459 P = .028
Q3: Please indicate on a 6-point scale how uncertain you generally feel now, before the purchase of a new winter jacket/compact camera, that [the product] will fully meet your expectations! (1 = very uncertain ... 6 = not at all uncertain)				
	3,35	3,45	Z = .414 P = .995	Z = .759 P = .613

PL_{ij} and IL_{ij} were measured before shopping with the help of a 15-point scale. In order to calibrate the way in which different people respond to scales, we had participants rate not only cameras and jackets, but also toothpaste and used automobiles. Table 3 shows that the two products chosen for the experiment raise different buyer concerns. While compact cameras have a relatively high functional and financial risk, jackets display higher

risk levels in the socio- and psychological area. The overall level of perceived risk (OPR) is similar for both products.

Table 3. Perceived risk of products on multiple dimensions

Funct. risk (median)	Finan. risk (median)	Psych. risk (median)	Sociol. risk (median)	OPR
Winter jackets				
72	72	63	99	318
Compact Cameras				
99	96	35	75	316
Sig. (sample: 150) (*Wilcoxon Test)				
T = 4.380 p = .000	T = 3.738 p = .000	T = -4.349 p = .000	Z = -4.938* p = .000*	T = -.343 p = .732

3.2. Observed Interaction Behavior

Interaction behavior can be analyzed on the basis of depth and breadth. Breadth refers to the quantity of information exchanged while depth refers to the quality or type of revelation [15]. In order to operationalize subjects' breadth of interaction, we analyzed the total time users spent in the online store as well as the time for the three distinct phases of shopping (orientation, dialogue and detailed product inspection). In addition, we measured product inspection behavior. Table 4 gives an overview of the findings.

Table 4 shows that jacket shoppers invested around 19% more time in the shopping trip than camera shoppers; on average an additional 4,7 minutes. Particularly interesting is to what part of the shopping session time was dedicated. Participants looking for jackets attributed considerably more importance to detailed product inspection. On average they spent 30% more time here than camera shoppers did. Jacket shoppers in particular viewed a significantly larger number of objects (73 versus 40) and enlarged more than twice as many photographs. However, they required only a fraction of time on individual objects when compared to camera shoppers. Thus, jacket shoppers seem to have quickly 'sifted through' the offer spending relatively little time per product and judging stronger on visual perceptions than camera shoppers who viewed much less products, but on average invested about twice as much time in the inspection of each product. The significantly larger time investment by camera shoppers per product indicates that they must have read most of the fact sheets and marketing texts presented with each product.

All in all, the findings summarized in table 4 suggest that jacket shoppers (who felt slightly less certain in their product judgment) displayed significantly higher levels of activity in the search process. At the same time, they searched in a different manner than camera shoppers did.

In order to understand the *quality* or type of interaction sought by the two shopping groups we analyzed the dialogue that participants sought with the shopbot. We did so using two indices: a communication and a modification quota. The *communication quota* (Q_f), is a set-based measurement indicating the relative importance of communication with the shopbot versus

obtaining information through detailed product descriptions. The communication quota is defined as:

Table 4. Comparison of breadth of interaction for cameras and jackets

Interaction Indicators (Mean Investment in Product Identification)	Compact Cameras (119)	Winter Jackets (31)	Sig. (p)
Time Investment			
Mean time investment, total (t)	24,5 min (109)	29,2 min (30)	.009
Mean time for orientation (t _o)	0,7 min (112)	0,4 min (36)	.303
Mean time for communication (t _d)	12,1 min (115)	13,8 min (31)	.013
Mean time for detailed product inspection (t _i)	11,5 min (120)	14,9 min (37)	.010
Product Inspection			
N° of products inspected	40	73	.000
Time per product	0,25 min	0,14 min	.000
N° of photo enlargements	7,4	16,9	.000

$$Q_f = C/I$$

with

C = total number of requests for a bot question page (including: those pages that were not answered and return hits to correct initial answers given, question category survey page and requests for Top-10 consideration set)

I = total number of requests for pages giving product information, photo enlargements and required return hits to the top-ten set from both phases (orientation and product inspection)

Table 5 shows that camera shoppers have a significantly higher communication quota than jacket shoppers. Thus, subjects searching for a camera relied relatively more on the exchange with the shopbot in their information search process than jacket shoppers did. Even though both groups consulted the shopbot with a similar frequency (e.g. answered a similar amount of questions and made a similar number of modifications to initial specifications), jacket shoppers displayed a significantly higher need for detailed product inspection.

As was outlined above, bot questions were not only product related, but also addressed the user in person and asked for the goals of search (table 1). Seen the wide spectrum of 56 bot questions, one goal of the analysis was to find out what *type* of question people would answer for one or the other product. We

expected to see a correlation between the dominant risk dimensions of a product (e.g. social risk for jackets) and users motivation to answer bot questions best suited to address them. However, as the 150 participants answered in average more than 85% of total bot questions, there is a strong ceiling effect present in the analysis of the number and share of questions answered. As a result, we tried to ‘grasp’ users’ qualitative purchase concerns by investigating the type of question modified. For this purpose, we developed a *modification quota* for those subjects that made adjustments to initial specifications:

$$MQ_R = \left(\sum_{i=1}^{n_p} (M_i^{pR} \div Q_i^p) \right) \div I^p$$

with MQ_R ²= Average modification quota to be found in a question category R, where R refers to a bundle of questions addressing either functional (fun), financial (fin), social (soc) or psychological (psy) risk **or** where R refers to a bundle of questions that represent either directly product related issues (pd), indirectly related ones (pepr), are of purely personal nature (peip) or are concerned with usage envisaged for the product (u)

M_i^{pR} = Number of modifications made in one question category R by an individual i searching for a product p

Q_i^p = Number of questions encountered by an individual i in a category R for a product p

I^p = Number of individuals who shopped for product p **and** made modifications to any of the categories

The modification quotas summarized in table 5 show that jacket shoppers modified the calculation basis of the bot only slightly more often than their camera counterparts. This finding goes in line with the fact that jacket shoppers also perceived only slightly higher levels of uncertainty connected to their purchase.

Looking in more detail into the type of modifications made it turned out that the higher level of financial risk associated with cameras led subjects to adjust price parameters more often in the search engine. More precisely the data shows that 11% of camera shoppers adjusted the price range in which they wished to buy at least once. Subjects searching for a jacket had a relatively firmer idea of what they wanted to spend (only 5% changed the price range once at a maximum).

² MQ_R is divided through the number of questions in a category (Q_i) in order to take account of different question types (pd, pepr, peip, u or fin, func, psy, soc) were not distributed equally in the two store versions.

Another finding that suggests perceived purchase risk to be in line with risk reduction behavior is evident with a view to psychological risk. Jacket shoppers modified significantly more bot questions that addressed psychological risk. Surprisingly, however, this type of consistent behavior could not be observed for the sociological risk construct. Obviously, camera buyers felt a need to modify just as many bot questions concerning ‘social acceptance’ of their product than jacket shoppers.

Table 5. Comparison of depth of interaction for cameras and jackets

	Cameras	Jackets	Sig. (p)
Dialogue			
Mean communication quota [C _f]	1,47	0,76	.000
Share of questions answered	85,98%	87,85%	.699
median of modifications made	6	7,5	.608
Type of risk-modification made			
○ $MQ_{R=fin}$	0,55	0,29	.070
○ $MQ_{R=func}$	0,30	0,40	.099
○ $MQ_{R=psy}$	0,08	0,13	.009
○ $MQ_{R=soc}$	0,23	0,23	.120
Type of modification made to different question types			
○ $MQ_{R=pd}$	0,34	0,37	.844
○ $MQ_{R=pepr}$	0,47	0,35	.454
○ $MQ_{R=u}$	0,18	0,45	.028
○ $MQ_{R=peip}$	0,09	0,12	.019

Besides analyzing the relationship between perceived risk and search behavior we also looked at what type of bot question users would find important for product selection. Here the data suggest that consistent with the ‘experience characteristic’ of apparels, jacket shoppers made significantly more modifications to usage related bot questions. Looking at the relative number of modifications made to personal and usage related questions, jacket shoppers seem to put more emphasis on these ‘relatively private’ issues of purchase. Seen that usage related and personal questions were rated as rather illegitimate and unimportant in the independent pre-study, the modification quotas could suggest that users allow for more insight into their private lives when product nature justifies this. More research is needed to confirm this preliminary evidence.

6. DISCUSSION OF RESULTS

The measurement of product perception confirmed that participants felt less certain to judge the quality of winter jackets prior to purchase. Jackets for the purpose of this study can therefore be regarded as a representative experience goods. However, the level of overall perceived risk (OPR) was not higher for jackets than for cameras.³ Therefore, the observed levels of

³ It is important to notice that the acquisition of experimental participants allowed for some self-selection bias: Only those subjects may have registered for the purchase of a winter jacket

deeper interaction for winter jackets can not be attributed to the absolute amount of perceived risk prior to purchase. Instead, they seem to be attributable to the 'experience' nature of the product and the concurrent need of users to extensively inspect and visualize all product alternatives on offer, trying to anticipate the experience.

An alternative explanation for the relatively big search effort for winter jackets, especially in the form of detailed product inspection is the distinct risk structure of the product. While functional and financial risk can be addressed efficiently through agent interaction and dialogue (dominant for cameras), psychological and social risk imply the need for more time intensive visualization and comparison of a greater number of product alternatives. Thus, social and psychological risk are addressed through the viewing of a purchase object and the more intuitive determination of whether one like the product or not. A generalization of this argument is, of course, not feasible on the basis of the restricted data set we presented here with only 2 products under study. More research is needed to investigate this issue.

Taken together, the empirical findings confirm the hypothesis that consumers have different navigational needs when they are searching for different products online.

4.1. Product related focus of dialogue-systems

It was shown that customers associate different types of purchase risks with products. In the current study, cameras were associated with a higher functional and financial risk while jacket shoppers felt the socio-psychological side of the product to be more important. In line with this product perception, camera shoppers modified relatively more functional and financial preferences. In contrast, jacket shoppers put significantly more focus on the appropriateness of socio-psychological variables. As a result, it may be argued that dialogue systems could be enhanced if they respected the risk dimensions inherent in a product.

4.2. Context adjusted representation of products

Furthermore, the results suggest that dialogue-systems can be relatively detailed and lengthy. Not only do online users obviously welcome to specify many product attributes when they are involved in a high-involvement purchase (see the surprisingly big share of bot questions answered and additional modification rate), but they even display a readiness to adjust 'softer' and even personal variables addressed by the bot. This is surprising, seen

who were already less averse to the risk of deciding for the wrong product. In fact, taking together all participants that registered for the IWA experiments (276), the existence of a self-selection process seems to be supported by the fact that (without experimenter intervention) not even half as many participants registered for winter jackets than for compact cameras. As a result, the level of OPR measured in the current sample may not be transferable to represent product perception among the whole of the studentship. At the same time, the OPR might, however, still be a viable mirror of the attitude of current Internet shoppers who are subject to the same self-selection process before they decide to buy online.

that many participants also expressed privacy concerns prior to the shopping trip. The results suggest that there is room in dialogue-systems to respect the context of the product purchase without inducing a feeling of intrusion among users.

4. CONCLUSION

The experimental findings support the main hypothesis made in this article: that consumers have distinct navigational needs when they search for different types of products online. First, it was shown that consumers invest more time and activity into the interaction process for a product category like apparels which entails higher levels of purchase uncertainty. Second, different navigational paths were observed for consumers that searched for two different types of products in one identical online store environment. The results obtained underline the fact that consumers with different product purchase goals intuitively also look for different navigational and interactive functionalities. In this context, the distinct product nature as a search or experience good may server as an explanatory variable that should be confirmed by more research. The construct of perceived risk, finally, helps to explain some of the interactivity encountered with the bot system and suggests that dialogue-systems should take more account of this theoretical construct of product distinction.

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6. REFERENCES

- [1] Annacker, D., Spiekermann, S., Strobel M., „E-privacy: Evaluating a new search cost in online environments”, in: Proceedings of the 14th Bled Conference of Electronic Commerce, Blet, Slovenia, 2001
- [2] Ariely, D., “Controlling the Information Flow: Effects on Consumers' Decision Making and Preferences”, *Journal of Consumer Research*, 27(2), 2000, pp. 233-248
- [3] Arnthorsson, A., Berry, W. , Urbany, J.E.; Difficulty of Prepurchase Quality Inspection: Conceptualization and Measurement; in: Advances in Consumer Research; Vol. 18; 1991; p.217-224
- [4] Berendt, B., “Web usage mining, site semantics, and the support of navigation”, Working Notes of the Workshop Web Mining for E-Commerce Challenges and Opportunities, 6th ACM SIGKDD Int. Conf. on Knowledge Discovery and Data Mining, Boston, MA, 2000, pp. 83-93
- [5] Cox, D.F., Risk Taking and Information Handling in Consumer Behavior, eds. D.F. Cox, Harvard University Press, Boston, 1967
- [6] Cunningham, M., “The Major Dimensions of Perceived Risk”, in: Risk Taking and Information Handling in Consumer Behavior, eds. D. Cox, Harvard University Press, Boston, 1967

- [7] Darby, M.R., Karni, E.; Free Competition and the Optimal Amount of Fraud, *The Journal of Law and Economics*, 1973, Vol. 16, p.67-89
- [8] Hoque, A. and G. Lohse, "An Information Search Cost Perspective for Designing Interfaces for Electronic Commerce", *Journal of Marketing Research*, vol. 36, 1999, pp. 387-394
- [9] Jacoby, J. and L.B. Kaplan, "Components of perceived risk in product purchase: A Cross-Validation", *Journal of Applied Psychology*, vol.59, no. 3, 1974, pp. 287-291
- [10] Kaas, K.P.; Marketing als Bewältigung von Informations- und Unsicherheitsproblemen im Markt, in: *Die Betriebswirtschaft*, Vol 50, Nr. 4, 1990, pp. 539-548
- [11] Kaas, K.P., Marketing und Neue Institutionenökonomik, in: *ZfbF, Sonderheft 35*, 1995, pp.1-17
- [12] Kramer, J., Noronha, S., Vergo, J., "A User-Centric Design Approach to Personalization", *Communications of the ACM*, special issue on Personalization, August 2000, pp.44-48
- [13] Manber, U., Patel, A., Robinson, J., "Experience with Personalization at Yahoo!", *Communications of the ACM*, special issue on Personalization, August 2000; pp.35-40
- [14] Mobasher, B., Cooley, R., Srivastava, J., "Automatic Personalization Based on Web Usage Mining", *Communications of the ACM*, special issue on Personalization, August 2000, pp.142-151
- [15] Moon, Y., "Intimate Exchanges: Using Computers to Elicit Self-Disclosure from Consumers", *Journal of Consumer Research*, Vol.27, No.4, March 2000
- [16] Nelson, P., "Information and Consumer Behavior", *Journal of Political Economy*, vol. 78, 1970, pp.311-329
- [17] Peter, P., Tarpey, L., "A Consumer Analysis of Three Consumer Decision Strategies", *Journal of Consumer Research*, Vol. 2, June 1975, pp. 29-37
- [18] Schafer, J. Ben, Konstan, Joseph, Riedl, John; "Recommender Systems in E-Commerce", *Proceedings of the ACM Conference on Electronic Commerce EC'99*, 1999, pp. 158-166
- [19] Shneiderman, B, and Maes, P., "Direct Manipulation Vs. Interface Systems: a Debate", *ACM Interactions*, vol. 4, no. 3, 1997, pp. 42-61
- [20] Spiekermann, S., Grossklags, J., Berendt B, "Stated Privacy Preferences versus actual behaviour in EC environments: A Reality Check"; *Proceedings of Wirtschaftsinformatik 2001*
- [21] Spiekermann, S., Parachiv, C., "Motivating Human-Agent Interaction : Transferring Insights from Behavioral Marketing to Agent Design", in: *Proceedings of the 3rd International Conference on Telecommunications and Electronic Commerce, ICTEC3*, November 2000, pp. 387-402
- [22] Underhill, P., *Warum kaufen wir? Die Psychologie des Konsums*, München, 2000
- [23] Weiber, R. and Adler, "Ein Einsatz von Unsicherheitsreduktionsstrategien im Kaufprozeß: Eine informationsökonomische Analyse", *ZfbF, Sonderheft 35*, 1995a, pp. 61-77
- [24] Weiber, R. , Adler, J., „Informationsökonomisch begründete Typologisierung von Kaufprozessen“, *Schmalenbachs Zeitschrift für betriebswirtschaftliche Forschung*, Jg. 47, 1995b, pp.43-65