# Feature-oriented vs. Needs-oriented Product Access for Non-Expert Online Shoppers

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**Abstract**: Most online shops today organise their product catalogue in a feature-oriented way. This can cause problems for shoppers who have only limited knowledge of product features. An alternative is to organizing product information in a needs-oriented way. Here possible ways of using the product build the focus of attention. In this study we compared reported preference of catalogue access of non-expert shoppers when confronted with either feature-oriented or needs-oriented access to a catalogue of digital cameras.

**Key words**: e-commerce, product selection, needs-oriented product access, feature-oriented product access, online shopping

## 1. INTRODUCTION

An important success factor for online shops is the way in which they help shoppers identify appropriate purchases (Hagen et al, 2000). Currently we can identify three main ways in which online shops help visitors find the products they desire:

– Hierarchically organised catalogues,
– Feature-oriented catalogues (search & browse based on product features),
– Needs-oriented catalogues (search & browse based on shopper needs).

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The traditional way of supporting a product search in an online shop is to present the products in a *hierarchically organised online-catalogue*. The challenge for hierarchically organised online-catalogues is to match category labels to shopper expectations and interests. A shopper looking for a video camera might wonder whether TV or Photo is the correct section to search. Similarly, a shopper looking for a computer with at least 50 GB of hard-disk space and at least 900 MHz CPU might not be well served by having to make a premature commitment about whether he prefers a desktop or a laptop computer (Stolze 1999).

This latter issue is addressed by *feature-oriented online-catalogues* (Steiger and Stolze, 1997). Here shoppers are presented with a form for specifying their requirements and preferences with respect to the desired features of a product. Once completed, the form is used to compile a query that is run against the database of all available products. The matching products are then returned in a list for inspection by the shopper. Feature-oriented search of products in the online catalogue can be problematic if shoppers are not experts in the product domain. For example it can be difficult for a non-expert in the domain of digital cameras to specify the mega-pixel resolution the camera should support, or how many photos the camera should be able to store.

This problem is addressed by *needs-oriented online-catalogues*. Instead of asking shoppers about desired features of a product, these catalogues elicit shoppers' needs and the way shoppers intend to use the desired product. Thus, a needs-oriented catalogue would try to determine what kind of photos the shopper intends to take and whether he or she plans to take the camera on extended trips.

To our knowledge only few online shops support shoppers in their search for products in a needs-oriented way. One of the exceptions is the IBM online store (http://commerce.www.ibm.com) that uses the metaphor of a sales assistant to guide users through an interview in order to determine their needs and ultimately presenting them with a personalised selection of products. Recently some of the feature-oriented catalogues (e.g. the CNet desktop decision maker: http://computers.cnet.com) have added support to help potential shoppers identify their feature-oriented requirements profile based on a fixed set of questions about the intended use of the product.

## 2. GOAL

The starting point of our investigation was the hypothesis that communicating with a non-expert shopper in a needs-oriented way would be more appropriate than approaching him or her in a feature-oriented way. We

expected that due to the lacking knowledge of the domain, especially product novices (cf. Figure 1) would be better served when presented with a needs-oriented organization of the online-catalogue. To investigate this hypothesis we performed an experimental study. Below we first describe the experimental setup, then present the results and discuss our conclusions.

| | **Domain Knowledge** | **Familiarity with Product Range** |
|---|---|---|
| **Expert** | *Profound*<br>knows all terms<br>knows relevance of product features | *Partial*<br>specific expectations about range of products offered by a shop |
| **Advanced User** | *Limited*<br>basic understanding of concepts<br>knows most terms and many product features | *Limited*<br>rough expectations about range of products offered by a shop |
| **Novice** | *None*<br>limited knowledge of terms in that domain<br>not able to map individual needs to product feature preferences | *None*<br>no expectations about the range of products offered by a shop |

*Figure 1*. Three categories of online shoppers.

## 3. TEST SETUP

The test consisted of two test series. Each series consisted of a sequence of two system-guided question-and-answer sessions, one in which needs-oriented questions were asked, and the other, in which feature-oriented questions were asked. In order to investigate the influence of the sequence of these sessions, the test subjects were split into two groups, one group (Series A) began the test with the needs-oriented, the other (Series B) with the feature-oriented questions. After each session the data sheets of the three top-ranked cameras were presented to the users. Depending on the type of session, the information on these sheets was presented in a different order. If the questions were needs-oriented, then information on how well the given camera supported different uses was presented first. Otherwise the information about camera features was presented first.

### 3.1 Test Subjects

Twenty volunteers (aged 20 to 60) where tested. All subjects owned a traditional photo camera, but none of them owned a digital camera. All subjects were non-experts with respect to the domain of digital cameras.

## 3.2 Test Procedure

The tests were structured as follows. In the first step, test persons were asked to answer a set of questions regarding their expertise in the area of digital cameras. Only non-experts were admitted to the actual test.

Then, the first advice session was conducted: The test persons had to use the sales assistance system described below. The system asked ten questions concerning the person's needs or the features of the desired digital camera, depending on which of the two groups the subject belonged to. Based on the answers given, the 25 available digital cameras were ranked. The subjects then received the data sheets of the three top-ranked digital cameras, from which they were asked to select the camera they found the most appealing. The subjects were then asked to answer a questionnaire to assess the quality of the sales consultation for that session.

For the second session, the procedure was repeated with the other type of sales consultation (needs-oriented or feature-oriented). After completing both sessions, a questionnaire for final evaluation was presented. This allowed the subjects to compare the two modes of advice and to indicate their preference. At the end of the test the subjects received a small compensation for their time invested.

## 3.3 Sales Assistance System

In our tests we used the same system to ask ten needs-oriented and ten feature-oriented questions. The question screens were simple HTML pages that contained only a title, the question texts and the set of potential answers as active hyperlinks. The HTML pages were generated by a Java Server Page (JSP) that called a custom inference engine that identified the next best question to be presented to the user. Single clicking on an answer led to the display of the next question, i.e. only a single answer could be given to each question. Most questions included a "don't care" response.

The inference engine stored user answers and computed the current "best" question among the remaining unanswered questions. For this it used the stored "ability profiles" of the cameras. The profiles list the answers that affect the suitability of a camera in a positive or negative way. For the needs-oriented dialogs the profiles referenced to the needs-oriented questions and for the feature-oriented dialogs the profile referred to the feature-oriented questions. Figure 2 shows a sample (needs-oriented) profile of a camera. In the test we used an elimination strategy to determine the next best question. According to this strategy the best question is that with the highest potential for collecting negative evidence about the siutability of all the cameras under consideration.

```
<product id="23">
  <name>"Camera 23"</name>
  <url>camera23.html</url>
  <relevanceRules>
    <rule>
      <questionId Idref="Q_usage"/>
      <answerId Idref="A_usage_private"/>
      <relevance> + </relevance>
    </rule>
    <rule>
      <questionId Idref="Q_weight"/>
      <answerId Idref=" A_weight_light"/>
      <relevance> – – </ relevance>
    </rule>
    …
  </relevanceRule>
</product>
```

*Figure 2.* Example of a camera description that contains needs-oriented rules of how answers given by a user affect the relevancy of the camera for that user.

## 4. RESULTS

In tables 1 and 2, the results of the two test series are listed. These results are discussed in the subsequent section.

| Subject No | Satisfaction with (first) session **N** | Satisfaction with (second) session **F** | Which session was more pleasant to use? | Which type of advice is better suited for novices? | Which session yielded better results? |
|---|---|---|---|---|---|
| 1 | 2 | 2 | F | N | F |
| 2 | 1 | 1 | F | F | F |
| 3 | -1 | 1 | F | N | F |
| 4 | 1 | 2 | F | N | F |
| 5 | 1 | 1 | F | F | F |
| 6 | 0 | 1 | F | N | F |
| 7 | 2 | 2 | N | N | N |
| 8 | 1 | 1 | F | N | N |
| 9 | 1 | 1 | N | N | N |
| 10 | 1 | 1 | F | N | F |
| Average | **0,9** | **1,3** | **8F/2N** | **2F/8N** | **7F/3N** |

*Table 1.* Results of test series A, where in the first session needs-oriented (N) and in the second session feature-oriented (F) questions were asked. Satisfaction is rated from very high (2) to very low (-2).

| Subject No | Satisfac-tion with (first) session **F** | Satisfac-tion with (second) session **N** | Which session was more pleasant to use? | Which type of advice is better suited for novices? | Which session yielded better results? |
|---|---|---|---|---|---|
| 11 | 1 | 2 | N | N | Both |
| 12 | 1 | 1 | N | N | Both |
| 13 | 1 | 1 | N | N | F |
| 14 | 1 | 0 | F | N | F |
| 15 | -1 | 0 | N | N | F |
| 16 | 1 | 1 | N | N | N |
| 17 | 1 | 0 | N | N | F |
| 18 | 1 | 0 | F | N | F |
| 19 | -1 | 1 | N | N | N |
| 20 | 0 | 1 | N | N | N |
| Average | **0,5** | **0,7** | **2F/8N** | **10N** | **5F/3N** |

*Table 2.* Results of test series B, where first feature-oriented (F) and then needs-oriented (N) questions were asked. Satisfaction is rated from very high (2) to very low (-2).

## 5. DISCUSSION

Given the relatively low number of test subjects a quantitative interpretation of the data must be approached with caution. Initially, when designing the experiment, we had hoped to confirm the almost 'trivial' hypothesis, i.e. that novices prefer a needs-oriented style of dialog vs. a feature-oriented. In fact we expected this result to be so strong that even a small number of test subjects would be sufficient to prove the point. After analysing the test data, however, we were surprised to find that the situation was not as clear-cut as we had initially assumed. Nevertheless, 18 out of the 20 non-experts we tested recommended the needs-oriented interviewing style for novices.

If we focus on the first session in each series–which reflects the situation of a client starting to use a Web site–our test data is still consistent with the hypothesis that non-expert users prefer the needs-oriented style of advice (average satisfaction level N 0.9 vs. F 0.5). However, with a difference of 0.4 on a scale from -2 to 2, the observed effect is quite small. Given the number of test subjects, the difference is not significant and could be coincidental.

The situation even reverses if we examine the average satisfaction levels after the second session. Here the feature-oriented dialog style received a higher average score (1.3) than the needs-oriented style (0.7).

Interestingly, eight users (six in series A, two in series B, whom we categorised as novices in the domain of digital cameras) did not seem to

consider themselves novices, because at the end of the test they all personally preferred F but recommended N for novices. We believe that this is because these eight subjects are advanced users (cf. Fig. 1) who feel they understand the feature-space of digital cameras. After they underwent both kinds of advisory processes, they preferred to specify products directly in terms of features.

At least in some cases, however, the self-reported preference did not match the observations of the experimenter. In a number of cases persons were observed to have difficulty answering the feature-oriented questions, but still reported an overall preference for the feature-oriented dialog style. Part of the reason for this might be that advertising for digital cameras currently focuses on product features. This might precondition people into believing that these products should be selected in a feature-oriented way. We found evidence in support of this when one of our test persons mentioned (even before starting the test) that he just seen an advertisement for "3-Mega Pixel Cameras" and thus was predisposed to look for this feature.

## 5.1 Learning Effect

A proposed explanation for the phenomenon that users perceived themselves as advanced users after having completed the test might be that during the two sessions the subjects experienced a learning process. This interpretation is supported by the fact that in both series the second session received higher satisfaction scores than the first one. Closer inspection reveals that answering the needs-oriented before the feature-oriented questions, as in series A, enhanced the acceptance of the feature-oriented approach more (from N 0.9 to F 1.3) than if users started with the feature-oriented questions (test series B: from F 0.5 to N 0.7). However, this effect is not strong enough to be statistically significant given our sample size. Thus, while data suggests that non-expert users gain more domain knowledge from first answering needs-oriented questions, a larger sample size would be needed to prove this point.

We believe that the learning effect between sessions is partially caused by the fact that test persons after the first session had the opportunity to review the resulting set of cameras that were best suited to their stated needs. Thereby they were able to perform contextualised learning. This means that they could derive the relationship of needs and features from the three camera fact sheets presented: it was possible for them to see how the selected needs (series A) referred to the presented features and vice versa (series B).

## 5.2 Design Implications

From this test, we can derive the tentative recommendation can that non-expert shoppers should start with a needs-oriented style of advice. However, they should not be locked in the 'beginner mode' but should be given the option of switching between feature-oriented and needs-oriented ways of specifying their product requirements.

Related to the flexibility of switching modes is the insight–confirming a well-known postulation in the field of Human Computer Interaction–that visitors to a commercial Web site selling complex products should be given the option of (implicitly or explicitly) classifying their level of experience. The Web site then should provide an adapted user interface including targeted product selection advice in a needs- or feature-oriented way.

In addition to this more static adaptation it might also make sense to explore methods that opportunistically combine needs-oriented and feature-oriented ways of addressing shoppers.

## 5.3 Further Research

This study is a first step towards understanding how information about expected product-use can be exploited in online-catalogues to guide shoppers more effectively to desired products. Further research is needed in other domains and in other countries to gain additional insight into the relationship between the needs-oriented and the feature-oriented approaches of helping users select appropriate products. It should also be interesting to extend the focus of the investigation and explore whether other dialog styles and the presentation of other types of product information would show a greater effect. Given our current results, it seems promising to regard the navigation of non-expert shoppers as a learning process that needs to be supported.

# 6. REFERENCES

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