

Association for Information Systems AIS Electronic Library (AISeL)

ICIS 2008 Proceedings

International Conference on Information Systems
(ICIS)

2008

Searching for Product Experience Attributes in Online Information Sources

Jahna Otterbacher

University of Cyprus, jahna@umich.edu

Follow this and additional works at: <http://aisel.aisnet.org/icis2008>

Recommended Citation

Otterbacher, Jahna, "Searching for Product Experience Attributes in Online Information Sources" (2008). *ICIS 2008 Proceedings*. 207.
<http://aisel.aisnet.org/icis2008/207>

This material is brought to you by the International Conference on Information Systems (ICIS) at AIS Electronic Library (AISeL). It has been accepted for inclusion in ICIS 2008 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.

SEARCHING FOR PRODUCT EXPERIENCE ATTRIBUTES IN ONLINE INFORMATION SOURCES

*Rechercher les attributs d'expérience d'un produit
dans des sources d'information en ligne*

Completed Research Paper

Jahna Otterbacher

Department of Public and Business Administration

University of Cyprus

P.O. Box 20537

CY-1678 Nicosia, CYPRUS

jahna@umich.edu

Abstract

Using the Web, consumers not only find product characteristics from manufacturers and sellers; they can also exchange opinions with other third parties. Learning about such “experience attributes” builds confidence in purchasing decisions and establishes trust between parties in transactions. However, little is known about the search process for these experience attributes. In the current study, 65 participants researched a product, reporting its characteristics as well as salient experience attributes. By analyzing their search diaries and questionnaire responses, patterns for finding product characteristics versus experience attributes were compared. Precision on task was the same, however, product characteristics searches were likely to originate at search engines. Seller-dominated sites were favored over independent sites in searches for product characteristics, while the opposite was true for experience attributes. Finally, searches for experience attributes were not as broad or deep as those for product characteristics, suggesting that consumers focus their attention on fewer sources.

Keywords: Pre-purchase information seeking, experience attributes, word-of-mouth

Résumé

Les consommateurs utilisent le Web pour se renseigner non seulement sur les caractéristiques d'un produit mais également ses attributs d'expérience. La présente étude examine le processus de recherche de tels attributs. En analysant les historiques de leur recherche et les réponses au questionnaire, des différences saillantes entre le processus de recherche des caractéristiques du produit et celui des attributs d'expérience ont été identifiées.

Introduction

When conducting pre-purchasing research on a product of interest, consumers often explicitly seek out third-party information that is independent of the product's manufacturer or seller (Dellarocas 2003). For example, product review forums, wikis and discussion boards are often seen by consumers as being relatively unbiased, since the content is produced by other consumers or independent experts who do not stand to gain from a potential sale of the product. In addition, sources of such information on the Web have become numerous and varied in recent years, as more firms continue to establish sites where consumers are invited to actively participate in the exchange of product-related information, in order to create a customer-focused image (Wagner and Majchrzak 2007) and to establish and better support relationships with customers (McWilliams 2000).

An important and novel aspect of these Web sites is that they provide access to "experience information" (Nelson 1974) that previously could not be determined or verified until after the purchase of the product (Rieh and Danielson 2007). In other words, while product manufacturers and retailers typically provide descriptions of product characteristics and specifications, "word-of-mouth" on the Web, or consumer-to-consumer communication, can help potential buyers learn about others' opinions of and experience with the product (Schindler and Bickart 2005).

A growing body of literature documents the importance of the availability and use of product experience information, in supporting online transactions. For instance, the consumer's access to the opinions and experiences of others, as in product reviews, has been shown to help establish trust in the product and its vendor (Ba and Pavlou 2002; Resnick and Zeckhauser 2002). Indeed, the prices of goods sold in online transactions are significantly affected by the virtual reputations of both products and firms (Senecal and Nantel 2004; Chevalier and Mayzlin 2006). Other research has shown that consumers who have access to word-of-mouth experience information about a product are more excited and interested in it as compared to consumers who gather information only from corporate marketing Web sites (Bickart and Schindler 2001).

Given the influence of consumer access to information about a product's experience attributes, it is important to better understand the consumer *pre-purchase information seeking process*. Little is known about how consumers seek out a product's experience attributes, in the context of a Web-based search for product-related information. In fact, in general, the behavioral aspects of Internet information retrieval in e-commerce contexts are often overlooked in favor of addressing the more technical issues (Kumar et al., 2005). Therefore, the current paper seeks to contribute to an understanding of how consumers use the Web to learn about the experience attributes of products that interest them. Through an exploratory, task-based study, the differences between pre-purchase information seeking for product characteristics versus product experience attributes will be examined.

There are many reasons suggesting that the information seeking process for experience attributes differs from a search for product characteristics. As alluded to previously, much of the available information about products' experience attributes is obtained from consumer interactions in virtual communities, in which they exchange opinions and experiences about products. However, evaluating the quality and trustworthiness of this information is an issue (Rieh 2002). In particular, since these communities are typically not centrally moderated, they are likely to contain a good number of fraudulent or misleading postings (Mayzlin 2006; David and Pinch 2006). Large communities have been shown to suffer from problems of excessive noise, having many low quality postings (Gu et al., 2007) as well as simply having too much information, such that users have difficulty identifying and attending to the most important messages (Butler 2001; Jones et al., 2004). Therefore, identifying salient product experience attributes from such sources is expected to be challenging.

The paper proceeds as follows. In the next section, the research framework will be presented as well as the questions that the paper will address. Following that, the research design of the task-based study will be detailed. The next section will then present the analysis of the data in order to address the research questions put forward.

Finally, in the conclusion, the findings of the study will be discussed as well as their implications. In addition, the limitations of the present work will be explained along with directions for future work.

Research Framework

Terminology and Research Questions

An exploratory study was conducted in which participants were asked to create a report about a product of their choice, using only Web-based information sources. In the report, the participants were to highlight the most important *product characteristics*, as well as the most salient *experience attributes* of the product¹. For clarification, it should be noted that product characteristics as examined in this study are also known in the marketing literature as the “search qualities” of a product (Nelson 1970). These characteristics are qualities of the product that can be evaluated prior to the consumer’s purchase of the product. Some examples include the physical dimensions and color of an Apple iPod. To contrast, experience attributes, which are also known as “experience qualities,” are those properties of the product that can only be evaluated after its purchase and consumption. For instance, some experience attributes of the Apple iPod are its sound quality and its ease of use.

The participants in the study kept diaries of their Web search activities and evaluated the success of their search for product-related information. The focus of the present study is on analyzing the participants’ search process in collecting pre-purchase information. While general Web search patterns have been studied from an information science perspective (e.g., Choo et al., 2000), the current goal is to examine and characterize the participants’ search behavior with respect to several important characteristics that have been noted in the management literature. Using the framework that will be described below, the following research questions will be addressed:

- How can consumer Web search for *product characteristics* be described?
- How can consumer Web search for product *experience attributes* be characterized?
- What are the similarities and differences between these two search processes?

Characteristics of Consumer Information Search

The consumer information search (CIS) process involves gathering and integrating relevant information across multiple sources in order to support decision making (Schmit and Spreng 1996). In CIS research, it is assumed that a consumer engages in search up until the point that its marginal benefit is equal to its cost (Stigler 1961; Diamond 1989). According to Klein and Ford (2003), in the Internet age, where a large volume of information sources are readily available, these costs are not so much in terms of the consumer’s time, but rather, they relate to the cognitive burden of “assimilating and integrating vast amounts of information and appropriately weighting the value of alternative information sources” (p. 30). Therefore, several aspects of search that relate to the effort involved will be examined in this study. Patterns of search will be considered, including the types of information sources used, as well as how a search on the Web originates. Finally, two measures of search outcome will be examined – self-reported precision and trust in the information found. Here, these characteristics as well as how they were operationalized in the current study will be briefly explained.

Depth and Breadth of Search

Both the breadth and the depth of a search have been used as measures of the consumer’s effort on a task. There is some evidence, in the context of general information searches on the Web, that users tend to limit their efforts to a handful of well-known sites (Adamic and Huberman 2001). Indeed, in a study of search in the context of online shopping, Johnson and colleagues (2001) also found evidence of this behavior.

The search processes of the participants will be compared with respect to both breadth and depth. These concepts are operationalized in the following way:

¹ The study’s design is explained in detail in the next section of the paper.

- Breadth 1: the number of unique Web sites used during the search.
- Breadth 2: the number of unique types of Web sites used during the search.
- Depth: the number of Web pages considered during the search (i.e., the number of total entries in the participant's search diary).

As an example, if a participant collected information from two online computer retailers as well as from two virtual product review communities (e.g., Epinions.com), the entry for Breadth 1 would be "4," while Breadth 2 would be recorded as "2." The entry for Depth would be the number of entries recorded in his or her search diary (i.e., the number of URLs used during the search), which in this example would be at least four.

Search Origin

How a search for information originates is an important factor. For example, a consumer may have the tendency to begin at a search engine, either because he or she does not know where to find information about the product of interest, or simply because he or she does not know or remember the URL of the desired Web page (Adar et al., 2008). The origin of a search may also have implications for how accurate or efficient the search for product-related information will be. For instance, previous research compared the performance of search engines specific to e-commerce (e.g., Froogle) versus generic search engines (e.g., Yahoo!) for retrieving shopping-related links (Jansen and Molina 2006). It was found that the e-commerce engines retrieve significantly better links than their generic purpose counterparts. In the present study, the two modes of searching (product characteristics versus experience attributes) will be compared with respect to their search origin.

Information Sources

According to Ratchford and colleagues (2001), different sources of information on the Web are perceived as being more valuable for gathering information concerning certain product qualities. Therefore, one would expect to observe that the profile of information sources used during a search for product characteristics varies from the profile of sources considered during a search for experience attributes. This is an important aspect of the information search process since consumers must judge the perceived benefits of each source of information, and allocate their efforts accordingly.

Following Klein and Ford (2003), the Web site information sources used by the participants have been classified into four categories, which describe two important aspects – who controls the content on the site and the mode of communication used. As mentioned previously, consumers often seek out word-of-mouth information on the Web since they view it as being less biased as compared to that obtained directly from a product's manufacturer or seller. Therefore, who controls Web-based content is likely to be an important factor that consumers take into consideration when gathering information. Likewise, the mode of communication may affect the extent to which the information is easy to find and use, and is seen as being trustworthy and of a good quality. Therefore, as shown in Figure 1, the analysis of the participants' searching activity considered whether the mode of communication of a particular information source used is impersonal (i.e., as in an expert review describing a camera's performance in a magazine article) versus interpersonal (i.e., as in a group of consumers posting messages in a product discussion forum). Examples of each of the four categories are given in Figure 1. As can be seen, an interesting feature of Web-based information is that one can find the same style of content falling into more than one of the categories. For example, a consumer might find textual product reviews at both a seller-dominated site (e.g., Amazon.com) as well as at a community site (e.g., Epinions.com) from where the product is not for sale.

In classifying the Web sites used during a consumer's information search, the following criteria were used:

- Control of content: If the product is available for purchase directly at the Web site, the content is considered to be seller-dominated. Otherwise, the site is classified as independent.
- Communication mode: If the consumer is able to participate in the creation of content on the site in any form (e.g., comments, reviews, discussion), the site is considered to be interpersonal. If the consumer is not able to post any content to the site, it is considered impersonal.

For instance, the Amazon.com review forum would be classified as being seller-dominated and interpersonal while the Epinions.com forum would be considered independent and interpersonal. In essence, the difference is that Amazon is a retailer while Epinions is an information broker, since while at Epinions a consumer can compare prices of the given product and be redirected to sites selling the product, the consumer may purchase the product directly at Amazon. As another example, a personal Web site on which the owner describes or evaluates her experience with a product but does not allow others to comment would be classified as being independent and impersonal, while a personal blog on which visitors are invited to comment or converse with the author would be independent and interpersonal.

		Control of content	
		Independent	Seller-dominated
Communication mode	Interpersonal	Interactive blogs, communities of interest	Product review forums, Wikis, product discussion boards at retailer site (e.g. Amazon.com)
	Impersonal	Expert reviews, non-interactive blogs, material from content provider (e.g. Consumer Reports)	Expert reviews, manufacturer's product description

Figure 1: Classification Scheme for Web-based Information Sources.

Finally, the first source of information considered by the participants was also examined. Since consumers often search information sources in decreasing order of expected marginal benefit (Hauser and Urban 1993), it is implied that the first source accessed may be that which is perceived to be the most valuable during a search for product information (Klein and Ford 2003). Finally, the post-study questionnaire data will be considered, in which the participants were explicitly asked to cite their most useful source of information during each search.

Search Outcomes

In characterizing and comparing the consumer search for product characteristics and experience attributes, two measures of the participants' search outcomes will be considered. The first measure is that of self-reported search accuracy or precision, which is an important indication of the consumer's search performance (Kumar et al., 2005). The reported level of trust in the information found during the search will also be examined.

- Search precision: This is found by dividing the number of entries in the search diary in which the participant indicated that he or she found the desired information, by the total number of entries. In other words, following the information retrieval literature, this is the proportion of information sources visited that were relevant or useful to the participant in his or her search for information (Manning et al., 2008).
- Trust in information: In the post-study questionnaire, the participants were asked to indicate their level of agreement with the following statements (on 5-point Likert items): "I trust the information that I found concerning the characteristics of the product" and "I trust the information that I found concerning the experiences of others with this product."

Methodology

Research Design

The participants of the study were undergraduate students completing an introductory MIS course at the University of Cyprus (UCY). More specifically, the students could voluntarily participate in the study as an extra credit assignment in the context of the course. 96 (out of 140) students participated. An appropriate subset of the collected data was used in the current study, as will be explained in the next subsection.

It should be noted that while the majority of the students at UCY have Greek as their native language, fluency in English is required for admission to the business administration program, as English language instructional materials are extensively used. Since the majority of textual documents found on the Web are written in English, this might be an important factor. Therefore, as will be detailed in Table 1, the participants were asked about their confidence in reading and writing in English in the pre-study questionnaire.

In order to study the characteristics of consumer search for product characteristics and experience attributes on the Web, a task-based approach was adopted. This approach is often used in studies of information search and retrieval (e.g., (Morris et al., 1992; Borlund and Ingwersen 1997)). Using this technique, a realistic task is administered to participants in order to study their information searching behavior and their interaction with search technology. The participants were asked to choose a product that interested them. The requirements were that it be something that they were realistically considering for purchase in the near future but about which they felt that they did not have much information prior to participation in the study. Using only information found on the Web, they were asked to prepare a report about the product that consisted of the following components:

- A description of the product of interest and its intended use.
- An analysis of the key characteristics of the product and a comparison of the available models that interested them (if more than one).
- An analysis of the product's experience attributes that explains "what others are saying about this product."

According to Payne (1982) and Payne and colleagues (1988), consumers use a two-stage process when considering products of interest. In the first step, they identify the relevant set of products that meet their needs. Next, they evaluate a small set of items in greater detail, in gathering information to support a decision process. This is because in a complex information environment, consumers cannot evaluate all possible choices in depth (Beach 1993). The current search task was designed with these findings in mind.

The participants were given electronic templates for each component of the report (i.e., Microsoft Word files with tables) to ensure that the structure of the reports was similar between participants. They completed the tasks independently and were told that the completeness and accuracy of the report would be the key factors taken into consideration when grading their assignments. As a guideline, they were told to spend no longer than 4 hours on task, and that they should stop once they felt "sufficiently informed" about the product of interest. It is expected that the participants' levels of search experience and product knowledge will affect the amount of time they required to complete the search task (Kumar et al., 2005). However, since the current goal is to investigate search as a process, rather than trying to objectively measure the participants' performance on task, time taken to completion is not an outcome variable in this study.

In addition to the product report, the participants kept detailed Search Activities Diaries (e.g., (Rieh 2004)). Specifically, for the second and third parts of the task (information gathering of the key product characteristics and experience attributes, respectively), they recorded in a table each URL visited, their intentions ("For what were you searching?") and whether or not they found the desired information. In the directions, it was stressed to them that each unique URL required a separate entry in the search diary.

Finally, two short questionnaires were administered – one before and one after the participants completed the task. The pre-task questionnaire was designed to collect demographic and Internet usage information from the participants. In the post-task questionnaire, they were asked to state the best source of information that they found during the two stages of the task, as well as how much they trusted the information that they collected during the task.

As previously noted (e.g., (Kumar et al., 2005)), studies of information searching behavior have used a multitude of research methodologies, each having its respective advantages and disadvantages. For example, while laboratory experiments allow researchers to better control the environment in which the participants search, they are less likely to give insight as to how people behave in real search environments and on tasks that arise during the course of a normal day. In the current study, since the participants chose their own product to research and completed their task outside of the lab, one can gain a better understanding of their search behavior in a more natural setting. Nonetheless, it should be noted that a known limitation of self-reports such as search diaries, is that participants may not report their behavior entirely accurately (Newman 1977). While observational studies involving the analysis of clickstream data (e.g., Johnson et al., 2004) can help get around this problem, this method introduces other potential problems, including the fact that other activities that may not be related to the participants' searching tasks are also captured. In the present research, since the main concern is to examine the information sources from which users gather product characteristics versus experience attributes, the research design that is more naturalistic was chosen.

Data Selection

Once the reports, search diaries and questionnaires were collected from the participants, they were screened for inclusion in the current analysis. In particular, if any part of the task was incomplete, all components of the respective participant's data were removed from the study. It can be noted that data from only five participants was removed for this reason. On further inspection of this data, it was clear that in four cases the participants did not follow the directions properly while the fifth participant was not able to complete the tasks because he discovered that there were no products on the market that met his needs.

Likewise, the reports were examined for authenticity, in order to make sure that they were unique and were not simply copied from Internet sources. In addition, the first part of the reports, in which the participants described the product of interest, was screened. If a participant described a particular brand and model of product, the report was removed. This is because the search behaviors of someone gathering information about one specific model are likely to differ significantly from those of someone interested in searching a type of product (i.e., "Canon PowerShot SD850" versus "digital camera with at least 8 MP") (Choo et al., 2000).

This filtering process resulted in 84 remaining reports, of which 65 involved electronics products and 19 involved cars. It has been previously noted that different types of goods vary with respect to how easy it is for consumers to evaluate them (Zeithaml 1981). This is because certain goods, such as automobiles, might have more experience attributes than product characteristics (or search qualities), as compared to a simpler product such as a shirt. In addition, consumers might be more motivated to search for information related to more expensive items as compared to less expensive products. For these reasons, the present analysis focuses on one category of products, namely electronic products, which included digital cameras, mobile phones, computers and peripherals, electronic dictionaries, memory cards, and video games. Currently, the search diaries of the participants as well as their responses to the two questionnaires were analyzed. In future work, a content analysis of the participants' reports is planned, in order to gauge the quality of the information that they obtained from the various information sources.

Analysis

Participant Demographics

Of the 65 participants whose search processes were analyzed, 36 were women and 29 were men. They were all between the ages of 18 and 22 and all but two reported having Internet access from their homes. The participants overall are avid Internet users, with the mean weekly number of hours of use reported being 13.5 (approximately normally distributed with a median of 12 hours). Also, it can be noted that all of the participants had completed an introductory course in computer science. The total average time the participants spent on the search task was 3.7 hours (with a median of 3 hours), which indicates that overall, they followed the guidelines set for time on task.

Table 1 displays the mean responses to three items on the pre-study questionnaire given to the participants. These items concern the participants' confidence in their ability to search the Web for information, in using search engine technology as well as in communicating in English. In particular, they were asked to rate their agreement with the statements shown on a 5-point scale, with 1 indicating a response of "no / not at all" and 5 indicating an agreement of "very much so." As can be seen, overall, the participants were confident in their Web searching and English

language abilities. Because slightly more women than men participated in the study, it was also verified that there were no significant differences between the genders.

	Women	Men	All ²
It is easy for me to find information that I need on the Web.	4.3	4.3	4.3 (0.85)
It is easy for me to use search engines on the Web.	4.8	4.6	4.7 (0.65)
It is easy for me to read and write in English.	4.1	4.3	4.2 (0.89)

Search Breadth and Depth

Table 2 compares the search for product characteristics to the search for experience attributes in terms of three measures that have been considered in other research studies, as explained previously. As can be seen, the participants considered significantly fewer sources on a search for experience attributes as compared to product characteristics, fewer types of sources, as well as fewer Web pages overall. One way to interpret this finding is that when searching for experience attributes from third parties, consumers may have to invest more effort in evaluating the quality of each source considered (Rieh 2002). Therefore, they cannot consider as many sources. In addition, in contrast to product characteristics, which are often displayed conveniently in tables or lists for easy comparison-shopping, experience attributes are characteristically found in the form of text (e.g., reviews, discussions). It is known that tasks requiring the interpretation and understanding of textual information are complex, and are often susceptible to problems such as information overload (Hiltz and Turoff 1985). Therefore, when researching experience attributes, consumers may have to focus their attention and efforts on relatively fewer sources of information. Finally, another possible explanation is that consumers do not feel a need to consider as many Web sites when seeking product experience attributes since they can find reviews for a given product posted by multiple reviewers at a community site such as Epinions.com.

	Product Characteristics	Experience Attributes	p-value for difference (paired t-test)
Number of unique sources (sites)	11.60	7.88	< 0.001
Number of unique source types	3.48	2.38	< 0.001
Number of diary entries (URLs)	12.71	9.06	< 0.001

First Source of Information

Table 3 describes the types of sources of information used first by the participants during the information gathering tasks. As previously explained, the first site visited by a participant is inferred to be that which she perceives to be of the highest marginal benefit. This information was obtained from the search diaries. The first source of information was indicated by the first site from which someone sought information, excluding search engines. In other words, if a participant began a search at Google.com, obtained a list of relevant links and then followed one of them to a retailer's Web site, the retailer's site was considered to be the first source of information considered during the information gathering process.

First, it can be seen that the distribution of the use of the four types of sites significantly differs between the two searches. In order to confirm this more formally, a chi-square Goodness of Fit Test for a multinomial population was conducted (Anderson et al., 1994). The null hypothesis for this test is that the distribution of site types used

² The standard deviation among all participants is given in parentheses.

does not differ by type of search. As shown in Table 3, the p-value for the test is less than 0.005, suggesting that the types of sites used first during searches for product characteristics differs as compared to a search for experience attributes. On closer examination, one important tendency is revealed. During a search for product characteristics, a seller-dominated site is significantly more likely to be the first one visited as compared to independent sites. However, the mode of communication does not seem to be important when choosing the site to visit first, as both interpersonal and impersonal sites were visited equally often. Finally, an independent site is more likely to be used as the first source of information for experience attributes, as compared to seller-dominated sites. Interestingly, during the search for experience attributes, the mode of communication is also not an important factor in choosing which site to visit first.

Table 3: First Source of Information by Type (Proportion of Searches).		
Type of Site	Product Characteristics	Experience Attributes
Independent / Interpersonal	0.18	0.16
Independent / Impersonal	0.16	0.40
Seller-dominated / Interpersonal	0.33	0.34
Seller-dominated / Impersonal	0.33	0.10
p-value for chi-square Goodness of Fit test	< 0.005	
Independent	0.34	0.56
Seller-dominated	0.66	0.44
p-value for difference (z-test for population proportion)	< 0.001	<0.05
Interpersonal	0.51	0.50
Impersonal	0.49	0.50

Best Source of Information

In addition to examining the first source of information used, the participants were explicitly asked, in the post-study questionnaire, to state the best source of information that they found during their searches. Their responses are summarized in Table 4. Here, a clear pattern emerges. In terms of who controls the available information, seller-dominated information was the seen as the best source during searches for product characteristics while independent sources of information were preferred when finding experience attributes. In terms of the mode of communication on product information sites, interpersonal sites are clearly viewed as being better than impersonal sites such as non-interactive expert reviews. This finding was valid for both types of search.

Table 4: Best Source of Information by Type (Proportion of Respondents).		
Type of Site	Product Characteristics	Experience Attributes
Independent / Interpersonal	0.30	0.52
Independent / Impersonal	0.03	0.10

Seller-dominated / Interpersonal	0.25	0.32
Seller-dominated / Impersonal	0.42	0.06
p-value for chi-square Goodness of Fit test	< 0.005	
Independent	0.33	0.62
Seller-dominated	0.67	0.38
p-value for difference (z-test for population proportion)	< 0.001	< 0.001
Interpersonal	0.55	0.84
Impersonal	0.45	0.16
p-value for difference	< 0.05	< 0.001

Origin of Search

While searching for product characteristics, 71% of the participants began at a search engine, while 29% of them proceeded directly to a Web site. For experience attribute searching, less than half of the participants began at a search engine. This difference in search engine use to begin a search (71% versus 42%) is highly significant (p -value < 0.001). This difference might be explained in one of two ways. For example, it may be the case that many searchers proceed directly to one of the well-known consumer community sites (e.g., Epinions.com). Another search tactic might be to revisit known retail sites, as many of them now offer forums for customer reviews (e.g., BestBuy.com). In fact, an examination of the search diaries revealed that 23% of the participants went directly to a consumer community without the use of a search engine. Similarly, 22% proceeded directly to the site of a product's manufacturer or retailer.

For both types of searches, when a search engine was used, Google was clearly the engine of choice, with only a few participants using Yahoo! For example, for product characteristics searches, of the participants who began their searches with a search engine, 93% of them used Google. Interestingly, none of the participants used an e-commerce search engine, despite previous findings suggesting their superiority over general-purpose engines.

	Product Characteristics	Experience Attributes
Search engine	0.71	0.42
Google	0.93	0.89
Yahoo!	0.07	0.11
Other site	0.29	0.58

Search Outcomes

According to the participants' search diaries, they were no less successful searching for experience attributes as compared to product characteristics, having a self-reported precision a bit above 80% in both cases, as shown in Table 6. In other words, around 80% of the Web sites visited contained the information for which the participants were searching. However, they did not trust the experience attribute information that they found as much as they trusted the product characteristics information. Table 7 shows their mean responses to the respective items in the post-study questionnaire, and that the difference in the level of trust is significant.

Table 6: Mean Self-reported Search Precision.			
	Product Characteristics	Experience Attributes	p-value for difference (paired t-test)
Precision	0.831 (0.161)	0.818 (0.232)	0.350

Table 7: Level of Trust in Information.			
	Mean response	Standard deviation	p-value for difference (paired t-test)
I trust the information that I found concerning the characteristics of the product.	4.28	0.80	< 0.001
I trust the information that I found concerning the experiences of others with this product.	3.62	0.95	

Conclusion

In recent years, a variety of information sources has become available on the Web that can help consumers learn about products of interest. An important trend is the growing number of sites from which users can exchange product information with one another, in learning about their “experience attributes.” For example, following the retail leader Amazon.com, online retailers such as BestBuy.com and JCPenney.com are now sponsoring forums where customers can exchange product reviews and ratings with one another (Rindova et al., 2007).

Despite the fact that such information is now freely and readily available, it takes significant effort for users to find, organize and interpret this information in order to support decision-making. As noted by Klein and Ford (2003), in the age of the Internet, much of this effort is in terms of consumers’ cognitive burden rather than in terms of time. Because a major source of experience attribute information is found in virtual communities, and more specifically, because it is characteristically expressed through text, it was proposed that the search for experience attributes on the Web is likely to differ from a search for product characteristics.

The current study is the first attempt at characterizing the consumer information search for these more complex, product experience attributes. Its focus is to describe CIS in terms of several search attributes proposed in previous research. Specifically, the breadth and depth of the search was considered, and the types of sources used were compared. More specifically, sources of information were classified according to who controls the information (seller-dominated or independent) and the mode of communication (i.e., interactive versus impersonal sites).

The main findings from the present work can be summarized as follows:

- Among the participants, searches for experience attributes were narrower in terms of the number of information sources used and the types of sites used, as compared to searches for product characteristics. Likewise, these searches were shallower (i.e., participants visited fewer Web sites overall). Indeed, previous research has suggested a general tendency of consumers to visit a surprisingly limited number of sites when collecting pre-purchase information (Johnson et al., 2004). This behavior has alternative explanations. For example, the difference may have to do with the increased burden of interpreting textual information. Another important factor is the effort required to evaluate the quality of the experience attribute information. Finally, because of the large quantity of reviews available from multiple reviewers at the popular consumer communities, consumers may not feel the need to seek out a great number of Web sources. These factors warrant further investigation.
- While the participants frequently began their searches at a search engine, they did not take advantage of e-commerce engines. In fact, among the 65 participants, only two general-purpose search engines were used

at all – Google and Yahoo! Search engines were more likely to be used in a search for product characteristics. This may be because when searching for experience attributes, consumers head directly to known communities or forums, while when looking for product characteristics, they try to find the sites of all manufacturers and retailers offering a type of product that fits their needs. It would be useful to investigate the circumstances under which consumers do or do not use search engines and also if they are aware of the availability of e-commerce search engines.

- For both types of searches, the best sources of information cited by the participants were interpersonal rather than impersonal. This is in agreement with previous research indicating that making corporate Web sites more interactive, using technologies such as wikis and recommendations, can improve consumers' impressions and evaluations of the site (Kumar and Benbasat 2006). In a search for product characteristics, seller-dominated information sources are typically seen as best, and sites of this type are often visited early on in the search. To contrast, in seeking out experience attributes, independent sources of information are seen as the best type, and are sought out first.
- The participants were not significantly less precise at finding sources of product experience attributes as compared to characteristics. However, they trusted this information less. This finding seems to support the first bullet point above in that the participants may have had to expend more effort in interpreting and evaluating the experience information found, and therefore, restricted themselves to a narrower search.

Limitations

The current study is exploratory in nature and contributes to what is known about the consumer search for experience attributes on the Web. Here, some known limitations of this work are explained. First, as already mentioned in the research framework, there are both advantages and disadvantages to the research design employed. In order to ensure that the task assigned was of genuine interest to the participants, they were free to choose the product to be researched. Thus, few variables were controlled. For example, there may be factors that affected their level of motivation and how much they searched, such as the speed of their Internet connection or their level of knowledge about the product before the search for information.

Another important point is that the participants' search precision was self-assessed. It would be interesting to know which types of Web sites enable consumers to collect accurate information most effectively, however, currently there is no objective measure of how accurate the participants were in their searches. Particularly in the case of a search for product experience attributes, it may be difficult for someone to know a priori what kind of information he or she seeks, in order to then evaluate the search's success afterwards. In future work, however, a means to analyze the content of the product reports will be developed, in order to gauge the quality of the information that the participants found.

Finally, it should be noted that there are likely to be many types of product experience attributes available from Web-based information sources. Currently, in the directions to the participants, experience attributes were defined as being information that describes "what others are saying about this product." It was not suggested to the participants that the "others" in this definition should or could be other consumers, independent experts or novices. Therefore, it is probably the case that the participants found a variety of experience attributes of the products researched, and in this study, these were not differentiated.

Directions for Future Research

The current work has raised many questions for further exploration. To start, there are many other analyses that can be undertaken with the data collected in the present study. Here, several questions of interest are noted:

- What kinds of experience attributes are available by type of source on the Web? How helpful are these types of attributes to the consumer in supporting decision-making? To address these questions, a content analysis of the product reports, cross-analyzed with the search diaries, is planned.
- Furthering that, a taxonomy of experience attributes could be developed, in order to facilitate an examination of the influence of different experience attributes on consumer attitudes or perceptions toward a given product. For example, some possible classes of experience attributes are the following: overall satisfaction with product, various uses of the product, ease of use, troubleshooting use of the product.

In conclusion, product experience attributes have become an important aspect of the consumer information search. Further examining and characterizing this search process will benefit both consumers and firms, by aiding in the development of sites that are truly beneficial to both.

Acknowledgements

The author would like to thank the anonymous reviewers and associate editors for their very thorough and helpful feedback on this work, which truly helped in improving both its content and readability. She is also grateful to the students who participated in the current study.

References

- Adamic, L.A. and Huberman, B.A. "The Web's Hidden Order," *Communications of the Association for Computing Machinery*, 44(9), 2001, pp. 55-59.
- Adar, E., Teevan, J. and Dumais, S.T. "Large Scale Analysis of Web Revisitation Patterns" in *Proceedings of the ACM Conference on Computer-Human Interaction (CHI 2008)*, April 2008, Florence, Italy.
- Anderson, D.R., Sweeney, D.J. and Williams, T.A. *Introduction to Statistics*, West Publishing Company, Minneapolis, 1994.
- Ba, S. and Pavlou, P. "Evidence of the Effect of Trust Building Technology in Electronic Markets: Price Premiums and Buyer Behavior," *MIS Quarterly* 26(3), September 2002, pp. 243-268.
- Beach, L.R. "Broadening the Definition of Decision Making: The Role of Prechoice Screening of Options," *Psychological Science*, 4(4), 1993, pp. 215-220.
- Bickart, B. and Schindler, R.M. "Internet Forums as Influential Sources of Consumer Information," *Journal of Interactive Marketing*, 15, 2001, pp. 31-40.
- Borlund, P. and Ingwersen, P. "The Development of a Method for the Evaluation of Interactive Information Retrieval Systems," *Journal of Documentation*, 53(3), 1997, pp. 225-250.
- Butler, B.S. "Membership Size, Communication Activity, and Sustainability: A Resource-Based Model of Online Social Structures," *Information Systems Research*, 12(4), 2001, pp. 346-362.
- Chevalier, J.A. and Mayzlin, D. "The Effect of Word of Mouth on Sales: Online Book Reviews," *Journal of Marketing Research*, 43(3), 2006, pp. 345-354.
- Choo, C.W., Detlor, B. and Turnbull, D. "Information Seeking on the Web: An Integrated Model of Browsing and Searching," *First Monday* 5(2), 2000.
- David, S. and Pinch, T. "Six Degrees of Reputation: The Use and Abuse of Online Review and Recommendation Systems," *First Monday* 11(3), 2006.
- Dellarocas, C. "The Digitization of Word of Mouth: Promise and Challenges of Online Feedback Mechanisms," *Management Science* 49(10), 2003, pp. 1407-1424.
- Diamond, P.A. "Search Theory," in *The New Palgrave: Allocation, Information, and Markets*, Eatwell, J., Milgate, M., and Newman, P. (Eds.), Norton, 1989, New York.
- Gu, B., Konana, P., Rajagopalan, B., and Chen, H.M. "Competition among Virtual Communities and User Valuation," *Information Systems Research*, 18(1), 2007, pp. 68-85.
- Hauser, J.R. and Urban, G.L. "How Consumers Allocate their Time when Searching for Information," *Journal of Marketing Research*, 30, 1993, pp. 452-466.
- Hiltz, S.R. and Turoff, M. "Structuring Computer-Mediated Communication Systems to Avoid Information Overload," *Communications of the Association for Computing Machinery*, 28(7), 1985, pp. 680-685.
- Jansen, B.J. and Molina, P.R. "The Effectiveness of Web Search Engines at Retrieving Relevant Ecommerce Links," *Information Processing and Management* 42, 2006, pp. 1075-1098.
- Johnson, E.J., Moe, W.W., Fader, P.S. Bellman, S. and Lohse, G.L. "On the Depth and Dynamics of Online Search Behaviour," *Management Science*, 50(3), March 2004, pp. 299-308.
- Jones, Q., Ravid, G. and Rafaeli, S. "Information Overload and the Message Dynamics of Online Interaction Spaces: A Theoretical Model and Empirical Exploration," *Information Systems Research*, 15(2), 2004, pp. 194-210.
- Klein, L.R. and Ford, G.T. "Consumer Search for Information in the Digital Age: An Empirical Study of Prepurchase Search for Automobiles," *Journal of Interactive Marketing*, 17(3), Summer 2003, pp. 29-49.

- Kumar, N. and Benbasat, I. "The Influence of Recommendations and Consumer Reviews on Evaluations of Websites," *Information Systems Research*, 17(4), December 2006, pp. 425-439.
- Kumar, N., Lang, K.R., and Peng, Q. "Consumer Search Behavior in Online Shopping Environments," *e-Service Journal* 4(1), 2005, pp. 87-102.
- Manning, C. D., Raghavan, P. and Schutze, H. *Introduction to Information Retrieval*. Cambridge University Press, 2008.
- Mayzlin, D. "Promotional Chat on the Internet," *Marketing Science*, 25(2), 2006, pp. 155-163.
- McWilliams, G. "Building Stronger Brands through Online Communities," *Sloan Management Review* 41(3), 2000, pp. 43-54.
- Morris A.H., Kasper, G.M., and Adams, D.A. "The Effects and Limitations of Automatic Text Condensing on Reading Comprehension Performance," *Information Systems Research*, 3(1), 1992, pp. 17-35.
- Nelson, P. "Advertising as Information," *Journal of Political Economy*, 82, 1974, pp. 729-754.
- Nelson, P. "Information and Consumer Behavior," *Journal of Political Economy*, 78, 1970, pp. 311-329.
- Newman, J.R. "Consumer External Search: Amount and Determinants," in *Consumer and Industrial Buying Behavior*. Woodside, A., Sheth, J. and Bennet, P. (Eds.), North-Holland, 1977, New York.
- Payne, J.W. "Contingent Decision Behavior," *Psychological Bulletin*, 92, 1982, pp. 382-402.
- Payne, J.W., Bettman, J.R. and Johnson, E.J. "Adaptive Strategy Selection in Decision Making," *Journal of Experimental Psychology: Learning, Memory and Cognition*, 14, 1988, pp. 534-552.
- Ratchford, B.T., Lee, M.S. and Talukdar, D. "A Model of Consumer Choice of the Internet as an Information Source," *International Journal of Electronic Commerce*, 5(3), Spring 2001, pp. 7-21.
- Resnick, P. and Zeckhauser, R. "Trust Among Strangers in Internet Transactions: Empirical Analysis of eBay's Reputation System," in *The Economics of the Internet and eCommerce*, Baye, M.R. (Ed.), Volume 11 of *Advances in Applied Econometrics*, Elsevier Science, 2002, Amsterdam.
- Rieh, S.Y. "Judgment of Information Quality and Cognitive Authority on the Web," *Journal of American Society for Information Science and Technology*, 53(2), 2002, pp. 145-161.
- Rieh, S.Y. "On the Web at Home: Information Seeking and Web Searching in the Home Environment," *Journal of the American Society for Information Science and Technology* 55(8), 2004, pp. 743-753.
- Rieh, S.Y. and Danielson, D. R. "Credibility: A Multidisciplinary Framework," *Annual Review of Information Science and Technology*, B. Cronin (Ed.), Information Today, 2007, 41, pp. 307-364.
- Rindova, V., Petkova, A.P. and Kotha, S. "Standing Out: How New Firms in Emerging Markets Build Reputation and Knowledge Creation," *Strategic Organization*, 5(31), 2007, pp. 31-70.
- Schindler, R.M. and Bickart, B. "Published Word of Mouth: Referable, Consumer-Generated Information on the Internet," in *Online Consumer Psychology: Understanding and Influencing Behavior in the Virtual World*, Hauvedt, C., Machleit, K. and Yalch, R. (Eds.), Lawrence Erlbaum Associates, 2005, pp. 35-61.
- Schmidt, J.B., and Spreng, R.A. "A Proposed Model of External Consumer Information Search," *Journal of the Academy of Marketing Science*, 24, Summer 1996, pp. 246-256.
- Senecal, S. and Nantel, J. "The Influence of Online Product Recommendations on Consumers' Online Choices," *Journal of Retailing* 80, 2004, 159-169.
- Stigler, G.J. "The Economics of Information," *Journal of Political Economics*, 29, June 1961, pp. 213-225.
- Wagner, C. and Majchrzak, A. "Enabling Customer-Centricity Using Wikis and the Wiki Way," *Journal of Management Information Systems* 23(3), 2007, pp. 17-43.
- Zeithaml, V. "How Consumer Evaluation Processes Differ Between Goods and Services," in *Marketing of Services*, Donnelly, J. H. and George, W. R. (Eds.), American Marketing Association, 1981.