Do I Know How Much to Search? Effect of Extent of Search, Subjective Knowledge, and Involvement on Returns to Search in Ordered and Unordered Environments

Satish Maheswarappa, Assistant Professor, Indian Institute of Management Lucknow, India
Sivakumaran Bharadhwaj, Professor, Great Lakes Institute of Management, Chennai, India

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ABSTRACT
There is conflicting evidence on the effect of extent of online information search on returns to search. We provide some answers by investigating effect of subjective knowledge and involvement on returns to search in ordered and unordered environments. An online simulated experiment was conducted and results were discussed.

EXTENDED ABSTRACT
Introduction and Motivation for the study
Pre-purchase information search behaviour has been researched for long (for e.g., Copeland 1917) and with the evolution of the Internet it continues to attract considerable interest till date (e.g., Nordgren and Dijksterhuis 2009). “Returns to search” is explained as the incremental quality or lower price obtained by a consumer as a result of his/her search.

Internet is a “revolution” that “has altered everything” (Hoffman 2000) resulting in increased information availability. This has led to the development of recommendation agents (RAs) to facilitate information processing and choice. Past works on the effectiveness of RAs is focused on the influence of design of product lists (Cai and Xu 2008), order in which the product is listed (Xu and Kim 2008), and presentation mode or format (Hong et al. 2004b). More importantly, extant literature on the influence of these recommendation agents on decision making is inconclusive. Initial studies (for e.g., Diehl et al. 2003) showed that decision aids enabled consumers to make better decisions while expending substantially less effort. However, later studies (for e.g., Diehl 2005) showed that under certain circumstances increased search results in lower quality of consideration sets and ultimately lower choice.

We intend to provide some explanation for this conflict by investigating the influence of individual variables on returns to online search in ordered and unordered environments. It is known that the benefits of gathering information on the Internet differ by consumer type (Zettelmeyer et al. 2006). Moreover, consumer behavior is typically the result of interplay between personality and situational variables (Russell and Mehrabian 1976). Hence we study,

How much should consumers search to optimize decision quality in ordered and unordered environments?

How individual differences in extent of search, subjective knowledge, and involvement influence return on search in ordered and unordered environments?

Do decision satisfaction and decision confidence increase with the quality of option chosen? Or do they increase with search time?

Conceptual Framework and Hypothesis
Ordered environments are those where RAs evaluate all available options on behalf of the consumer and order options in decreasing expected utility. In unordered environments, options are listed in random order of utility.

The conceptual framework for the hypotheses in the subsequent section is derived from essentially two broad theoretical perspectives: (1) theory of information processing and (2) elaboration likelihood model (ELM). According to Beatty and Smith (1987) and Schmidt and Sprang (1996), ability and motivation of the individual will affect extent of information search. Correspondingly we chose to investigate the effect of subjective knowledge and involvement on returns to search.

Consumers’ primary motive for prepurchase search is to enhance the quality of the purchase outcome (Punj and Staelin 1993). However, according to the information processing theory of consumer choice (Bettman 1979), consumers have limited cognitive processing ability. If information is provided beyond this point, the performance of the individual will rapidly decline (Chewning and Harrell 1990) because they might get confused and consider irrelevant information. Consumers who search the least will have too little information and those that search the most too much, and those that search moderately, “just right” information. Hence,

H1A: In unordered environments, compared with
low and high level of information search, medium level of search should result in better decision quality. Paradoxically, while high amounts of information lead to poorer choices, they often increase confidence and satisfaction in judgments - even though accuracy of judgments is lowered (Stewart et al. 1992).

**H1B:** In unordered environments, increase in the extent of information search leads to (i) higher decision satisfaction, and (ii) higher decision confidence.

In ordered environments, RAs conserve consumers’ effort and also decrease the benefits of deeper search as later alternatives are lower in quality (Diehl 2005). Hence,

**H1C:** In ordered environments, low levels of information search should result in (i) better decision quality, (ii) lower decision satisfaction, and (iii) lower decision confidence.

It is generally accepted that subjective knowledge has an inverted U-shaped relationship with extent of search. Consumers with low subjective knowledge find the task of evaluating alternatives to be difficult and frustrating (Park and Lessig 1981) because they exhibit broad perceptual category breadth. On the other hand, consumers with high subjective knowledge have a narrower category breadth as a result they are more capable of elaborate information processing. But because of high self-confidence, an illusion of knowledge prompts them to search to a lesser extent (Hall et al. 2007). Consumers with a moderate level of subjective knowledge have narrower category breadth. This allows them to process greater amounts of, and more complex information. Hence,

**H2A:** In unordered environments, compared with low and high levels of subjective knowledge, medium levels of subjective knowledge lead to (i) better decision quality, and (ii) higher search time.

**H2B:** In unordered environments, higher levels of subjective knowledge lead to (i) higher decision satisfaction, and (ii) higher decision confidence.

**H2C:** In ordered environments, compared with low and high levels of subjective knowledge, medium levels of subjective knowledge lead to (i) lower decision quality, and (ii) higher search time.

**H2D:** In ordered environments, compared with high and medium levels of subjective knowledge, lower levels of subjective knowledge lead to (i) lower decision satisfaction, and (ii) lower decision confidence.

Purchase decision involvement has been defined as the extent of interest and concern that a consumer brings to bear upon a purchase decision task (Mittal 1989). A person with a high need or interest will be more motivated to exert processing capacity. High involvement leads to greater searching (Brucks 1985). Hence we argue for a linear, as opposed to an inverted U-shaped relationship.

**H3A:** In unordered environments, compared with low and medium levels of involvement, high levels of involvement lead to (i) better decision quality, and (ii) higher search time.

**H3B:** In unordered environments, compared with low and medium levels of involvement, consumers with high levels of involvement will have (i) higher decision satisfaction, and (ii) higher decision confidence.

**H3C:** In ordered environments, higher levels of involvement lead to (i) lower decision quality, (ii) higher decision satisfaction, (iii) higher decision confidence, and (iv) higher search time.

**METHODOLOGY**

We employed two between subjects’ factorial experimental designs. We developed a simulated online digital camera store. The experimental scenario closely matched that of Diehl (2005). The subjects were given the task of selecting a digital camera for someone other than themselves (the principal) using the principal’s predetermined criteria. This was communicated right at the beginning to the subjects. A set of 200 hypothetical Digital Cameras was created with five attributes; optical zoom, resolution, LCD screen size, compactness, and memory. Ordered and unordered environments were manipulated to observe the behaviour. We used pre-validated scales to measure subjective knowledge (Cowley and Mitchell 2003), involvement (Mittal 1989), decision satisfaction, and decision confidence (Lee and Lee 2004). Utility of the selected model was considered for quality of choice and utility of the consideration set for quality of the consideration set.

**RESULT**

All scales exhibited acceptable to high reliabilities. We tested the data using one-way ANOVA and quadratic trend analysis to test for curvilinear relationship. The results are shown in table 1.
Table 1: Results of One-way ANOVA between extent of information search and returns to search (Means and standard error in parentheses)

<table>
<thead>
<tr>
<th>Extent of Information Search</th>
<th>Ordered Environment</th>
<th>Unordered Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Participants</td>
<td>74</td>
<td>72</td>
</tr>
<tr>
<td>Means</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality of the chosen option</td>
<td>100.43 (1.84) a</td>
<td>93.08 (2.05) a</td>
</tr>
<tr>
<td>Decision confidence</td>
<td>5.08 (0.15) a</td>
<td>5.86 (0.11) a</td>
</tr>
<tr>
<td>Decision satisfaction</td>
<td>5.07 (0.14) a</td>
<td>5.97 (0.11) a</td>
</tr>
</tbody>
</table>

* p < 0.01; b p < 0.05; c p < 0.1; d p is not significant. Similarly the data was analysed to study the effect of subjective knowledge and involvement on returns to search. The results tests of all the hypotheses are provided in the table 2.

Table 2: Results of the Experiment

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Independent Variable</th>
<th>Unordered</th>
<th>Ordered</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality of the choice</td>
<td>Extent of Search</td>
<td>Ç</td>
<td>-</td>
<td>Supported</td>
</tr>
<tr>
<td></td>
<td>SK</td>
<td>Ç</td>
<td>E</td>
<td>Supported</td>
</tr>
<tr>
<td></td>
<td>Involvement</td>
<td>+</td>
<td>-</td>
<td>Supported</td>
</tr>
<tr>
<td>Search Time</td>
<td>SK</td>
<td>Ç</td>
<td>Ç</td>
<td>Supported / NS*</td>
</tr>
<tr>
<td></td>
<td>Involvement</td>
<td>+</td>
<td>+</td>
<td>Supported / NS*</td>
</tr>
<tr>
<td>Decision Satisfaction</td>
<td>Extent of Search</td>
<td>+</td>
<td>+</td>
<td>Supported</td>
</tr>
<tr>
<td></td>
<td>SK</td>
<td>+</td>
<td>+</td>
<td>Supported / NS</td>
</tr>
<tr>
<td></td>
<td>Involvement</td>
<td>+</td>
<td>+</td>
<td>NS</td>
</tr>
<tr>
<td>Decision Confidence</td>
<td>Extent of Search</td>
<td>+</td>
<td>+</td>
<td>NS** / Supported</td>
</tr>
<tr>
<td></td>
<td>SK</td>
<td>+</td>
<td>+</td>
<td>Supported</td>
</tr>
<tr>
<td></td>
<td>Involvement</td>
<td>+</td>
<td>+</td>
<td>Supported</td>
</tr>
</tbody>
</table>

* - Hypothesis supported for in unordered environments, but not supported in ordered environments
** - Hypothesis not supported in unordered environments but supported in ordered environments.

GENERAL DISCUSSION

We found strong support for most of the hypotheses (Table 2). Overall in unordered environments, medium level of search resulted in maximum returns to search. Neither too much nor too little the “golden mean” seems to be ideal, as with most things in life! Consumers with medium levels of subjective knowledge had higher returns to search, while consumers with high levels of involvement had higher returns to search. In ordered environments, however, low level of search resulted in maximum returns to search.

However, a few hypotheses concerned with decision satisfaction and decision confidence were partially supported. The reasoning could be because though increased effort should result in higher...
decision confidence and decision satisfaction, for consumers it was probably difficult to gauge decision confidence and satisfaction from the final choice (Hoch and Deighton 1989). Our results are consistent with previous findings (Wilson and Schooler 1991). Our research has a number of contributions to make. We extended the work (for e.g., Diehl 2005) by answering how much a consumer should search in ordered and unordered internet environments. This has got significant impact from the consumer’s viewpoint. Managerially our study provides e-targeting strategies to enhance website revisit. While our research has significant contributions, we also recognize that it has its share of limitations. There is a need to develop a comprehensive model for better understanding of returns to search. Given that there are differences between services and products; would returns to search be different in services? Would there be some nuances and subtle differences? Future research can investigate these and related issues.

REFERENCES


