RECOGNITION PRIMED DECISION MAKING IN E-COMMERCE

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Recognition-primed decision making has been used to describe the behavior of experts in naturalistic environments. A significant body of research has led to the conclusion that RPD models describe decision making in environments characterized by time pressure, competing and/or changing goals and uncertainty. This paper compares the results of several new studies that investigated decision making in the e-commerce environment to what would have been predicted by the RPD model. These environments share some of the characteristics with traditional RPD application areas, but have more variability in terms of the expertise of the decision maker. Results show that RPD models can be used to explain e-commerce behavior, but further research is necessary to draw confident conclusions.

INTRODUCTION

Recognition Primed Decision Making

Models of human decision making have evolved greatly over the past decade. Originally, it was believed that models based on Bayesian probability computations described both actual and ideal decision making (Wickens, 1984). Deviation from this model was called a decision making bias. However, research conducted outside of the laboratory has discovered that decision making in natural environments that are categorized by time-pressure, vague goals, extreme consequences, and uncertainty does not follow normative models, and perhaps should not. Identifying optimal solutions can be extremely time consuming in a situation with many variables and can tax the limits of human information processing capabilities. Selecting a satisfactory solution that is not the optimal may be a better approach when time is short.

Klein (2000) provides a great review of an alternative model that better describes the decision making process that is observed in naturalistic environments. First, he redefines decision making as a choice point where there are several options that could be selected, whether or not these alternatives are consciously considered. This leads to a model based on a recognitional process, thus the term Recognition Primed Decision Making (RPD). Rather than consciously comparing options based on individual diagnostic characteristics, the decision maker recognizes the situation based on salient characteristics that experience has shown to be diagnostic in an unconscious, fuzzy process. When time is available and not enough information is immediately present to

confirm an initial hypothesis, the decision maker can engage in a search for additional evidence. However, this is not done to contrast options but rather to confirm the initial hypothesis. If no other evidence is available, mental simulation is used to extrapolate missing data or to predict possible outcomes of a proposed solution.

Only when the decision maker has insufficient experience and knowledge to recognize a situation are options consciously evaluated. This is the reverse of older theories which presumed that experts could evaluate alternatives whereas novices would consider only one option.

Schemata are abstract cognitive structures that represent situations to be later recognized (Lipshitz and Shaul, 1997). They develop based on the fractionation of experiences (Dreyfus and Dreyfus, 1986). A domain novice stores experiences episodically with stronger connections to the most salient characteristics. After several experiences within a domain, the decision maker develops a set of schemata that have critical characteristics in common. Using Klein's (2000) fireground commander example, schemata (categories) may include search and rescue, interior attack, and exterior attack because each of these is combated in different ways, which for a fireground commander is the most critical characteristic. Only characteristics that are diagnostic in recognizing into which schemata a situation falls become part of the schema. Special cases are stored episodically and connected to the schema for later consideration. The transformation from novice to expert is a gradual evolution from episodic to context-free associations of a schema and its associated characteristics.

E-commerce

E-commerce is becoming a large part of the world economy. Estimates vary considerably, but it is likely that ecommerce reached $40 billion in the U.S. in 2000. However, estimates of future growth recently have been reduced and Webmergers.com reported that over 200 e-commerce focused companies went bankrupt in 2000. Explanations for this disruption include poor customer service, inconsistent fulfillment, concern for privacy, and poor business models. Most of these reasons involve an evaluation by the consumer of a company based on salient features of the web site and/or aggregation of past experience with this vendor and others. There are competing goals in that consumers want low prices, good service, privacy protection and customer service. There are vagaries in the purchase process and uncertainty as to whether fulfillment and service will be present when needed. These similarities to other applications of naturalistic decision making suggest that the RPD model may be useful in understanding the behavior of on-line consumers. It is difficult to define expertise in this domain because consumers may have a great deal of domain expertise with shopping or with books and music, but not much system expertise with the Internet or e-commerce processes. The varying degrees of domain and system expertise suggest that consumers may display many of the characteristics of recognition primed decision making. However, it is unclear whether the RPD model describes actual e-commerce behavior.

RESEARCH

The following studies were conducted to better understand the breakdown of many current e-commerce support systems in the support of on-line shopping. The objectives were both to enhance the effectiveness of e-commerce support systems and to study the behavior of Internet users to determine whether a schema-based model can be used to describe their behavior. An examination of the aggregate results suggests many similarities with those of RPD research.

On-line searching

Searching for information on the Internet is a problem solving situation that has many of the characteristics of naturalistic decision making.

Searchers generally have a context in which they are searching. The decision is not an end in itself, but rather a means to achieve a broader goal (Orasanu and Conolly, 1993). Searchers must select from a set of alternatives the option that best matches their schema of the problem (Balasubramanian, Nochur, Henderson, and Kwan, 1999). However, search engine designers do not take advantage of this in the design of search engine output formats. Generally, all output fields are of equal salience. Sometimes, advanced features such as keyword count are highlighted, but ironically, these are the fields that users are least likely to use (Lergier, 2001). Output fields are equally likely to be present regardless of the needs or expectations of the searcher. A better understanding of human decision making processes when searching can lead to the development of improved search engine input and output interfaces.

Lergier and Resnick (2001a) was a detailed investigation of on-line searching behavior. The study compared participants' searching behavior with predictions based on a schema model in which task schema would determine how each search result was considered and either selected or discarded. The purpose of this study was to identify how the most common fields used by search engines to display results affect users' decision-making processes, confidence and expectations. Search tasks were designed to simulate the way that actual searches are conducted, particularly the presence of realistic task objectives.

Participants performed four different search tasks using a simulated search engine designed for the study. The results support the use of a schema model to describe user behavior. Task critical characteristics led to enhanced pre-click confidence and were specifically requested by participants when they were absent. Participants generally did not notice characteristics that were not important for that task. Task description was universally important for all tasks. Verbal protocols indicated that selection of a search result was a qualitative pattern matching process rather than a computational aggregate of attributes.

Lergier and Resnick (2001b) investigated how searchers develop strategies when searching for information on the Internet. The study required participants to conduct several kinds of searches, where targets varied in their specificity and whether field-specific characteristics were part of the search objective. The purpose of the study was to investigate whether exhaustive and self-terminating search strategies could be induced by varying the type of

search task. A search was considered self-terminating when the participant selected a link immediately after reading it. An exhaustive search was one where the participant selected a link after considering all search results. RPD decision making follows the self-terminating strategy whereas multi-attribute averaging requires an exhaustive search.

The study found that when the search task required specific information, ninety-four percent of searches were self-terminating. This was true even when the best matching result was at the first result position. In other words, even when the participant had only considered one search result, if it was the correct match they selected it without considering other options. And their confidence in that selection was not lower than when the best match was at the fifth or tenth position. Interestingly, participants' accuracy was higher when the best match was at the first position. So when they considered more options, they were more likely to make a mistake. These results match those reported in Klein (2000) for RPD decision making for expert decision makers.

A third study (Resnick et al, 2001) investigated the use of alternate output structures for search engine results. Results were formatted to highlight each field so that searchers could consider only those that were relevant to their search task. The results show that with this support, participants were more able to disregard those fields that were not part of their search schema. In half of the cases, participants did not consider more than one field. They were clearly not using a weighted average of attribute values to identify the best match. They were also more likely to use a self-terminating strategy.

The results of these studies provide consistent evidence that when searching for information on the Internet, users do not use a multi-attribute weighted average strategy. Participants observed in these studies seem to follow a RPD strategy, particularly in tasks where there are specific right and wrong answers.

Selecting a web retailer

Shopping on the Internet is a much more vague task compared to searching for information. Selecting a retailer involves a combination of ill-defined characteristics such as vendor reliability, perceptions of customer service, and trust. These interact with more quantitative variables such as price and delivery time. Research in customer relationship management (CRM) has shown that favorable customer service history (E-

marketer, 2000), trust (Gefen, 2000), and reliability (Selnes and Gonhaug, 2000) lead to increased satisfaction and a greater likelihood of returning to a web store. But whether web retailer selection is accomplished using a RPD pattern matching strategy or a computational multi-attribute strategy has not been tested.

Montania and Resnick (2001a) investigated how visible links to customer support, reputation management, and privacy policy features on the web site of unknown Internet retailers affected which retailer consumers would select to make an important purchase. This original objective did not consider whether the strategy was qualitative or quantitative. However, the results provide some evidence for the RPD strategy.

A scenario was created in which participants had searched for companies that offered same day delivery of a floral bouquet to a local hospital. Web storefronts for several nonexistent web retailers were created with controlled sets of products so that delivery time, product quality and price would not be a significant factor in participants' comparisons. With product selection controlled, the more subjective factors of perceived store reliability, customer service and trustworthiness were expected to dominate store choice. Participants' perceptions of these factors for each store were measured to determine their relationship with store selection.

The presence of prominent links to customer service, privacy policies and reputation managers led to increased intentions to purchase products from that store. While the study did not test the recognition process directly, it appeared that the selection of a web store was not a conscious aggregation of quantitative attribute ratings but was a qualitative matching process between the participant's schema of an acceptable store with the evidence available on the site. In fact, the relationship between the subsequent quantitative reports of perceived quality, privacy and customer service with retailer selection was hard to determine. Some participants claimed to use these factors in store selection but their choice was not the one that they rated the highest. Furthermore, participants claimed to use some factors that did not differ among site designs. There was no evidence for a multi-attribute quantitative decision making style.

A follow-up study (Montania and Resnick, 2001b) used one hundred and twenty eight different site models to better identify smaller effect sizes in the results. Only half of the participants in this study

reported that they considered privacy, customer service and reputation management in selecting a retailer to make their purchase. However, the results showed that the presence of these parameters significantly affected site selection. If shoppers are not aware of the factors that they use to select a store, it is unlikely that multi-attribute decision making defines their strategy.

Shopping assistance

Selecting a particular product is often a task that requires specific task characteristics to be satisfied. Traditional consumer research has identified tasks in which consumers use an attribute based decision making style (Fishbein and Lancaster, 1967; Matsatsinis and Samaras, 2000). However, there are also product selection decisions that may require a more complicated decision making strategy. Häubl and Trifts (2000) describe a hybrid strategy in which a combination of multi-attribute comparison and satisficing constraints are used. Due to this tradeoff, decision makers often select options that are satisfactory but sub optimal. They report that this strategy is likely to be used when alternatives are numerous and/or difficult to compare. This difficult to compare criterion suggests that RPD models may be able to describe such product selection situations.

Rivadeneira and Resnick (2001a) investigated the effects of shopping decision support systems (DSS) on the selection of an ill-defined product. DSS were developed that supported three decision making strategies, including multi-attribute utility analysis, satisficing, and the lexicographic strategy. A scenario was presented in which participants were instructed to select a gift for Mother's Day. The study was conducted just prior to Mother's Day using participants who needed to purchase a Mother's Day gift.

Participants were able to customize each DSS so that it used only the product characteristics that he or she felt were important in selecting a Mother's Day gift and allowed them to rate the importance of each characteristic. Gift suggestions were presented in the order in which they matched the user's preferences. The output format of each DSS presented the information necessary to use one of the three decision making strategies. The model that matched the actual decision making process of the consumer was expected to be the most effective in supporting product selection and therefore preferred by participants.

Statistical analysis of satisfaction and preference data indicated that the satisficing strategy was the superior model. The multi-attribute strategy was neither preferred nor did it satisfy the perceived needs of the user. The RPD model suggests that the aggregation of diagnostic characteristics is not a conscious quantitative process but rather is a fuzzy unconscious recognition process. These results suggest that the product selection task studied here seems to follow the same type of model.

In a follow up study, Rivadeneira and Resnick (2001b) studied both the input and output mechanisms of shopping assistant support systems to investigate the use of the weighted adding and satisficing strategies. There were four conditions tested, corresponding to a factorial matching of two input formats and two output formats. The same Mother's Day scenario was used as in the previous study. Participants preferred to input their constraints using the weighted adding strategy. No difference was found for output style. These results do not suggest that participants used one strategy over the other. However, they do suggest that a DSS that provides users with data they would be unlikely to consider without the system may support improved decision making.

CONCLUSIONS

The initial objectives of these research studies were not focused on evaluation of the Recognition-Primed Decision model as a descriptor of e-commerce behavior, thus it is not simple to declare that e-commerce behavior follows the RPD process. However, many of the results indicated that these decisions were a qualitative and unconscious matching between the participant's expectations based on a task schema and the evidence available at the web site. In no cases was a quantitative attribute-specific aggregation process observed. This suggests that these processes are at least similar to those of RPD decisions. Future studies will use methods focused on testing predictions based on the RPD model specifically so that more accurate conclusions can be drawn.

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