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Predicting online consumer information needs using heuristics

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Abstract

This paper proposes a new approach to online behaviour modelling based on heuristic patterns of behaviour. Such patterns of behaviour reflect the consumer's needs and limited information processing capabilities enabling more effective serving of information relevant to the consumer's needs in real time. Using website interactivity or data exchange with consumers through a purchase process offers previously untapped opportunities for value co-creation. The paper concludes with an outline of the requisite research to implement a real-time, needs-based information serving system and the theoretical advances that are likely to be gained from such research.

Keywords: Internet, consumer behaviour, modelling, interaction data

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Introduction

The internet has been highly successful in marketing semantically simple products such as books, music and computers as evidenced by Amazon.com and Dell computers. Semantically complex hedonic products such as resort experiences and vintage wines however have subjectively evaluated and polysemic attributes which present problems for online consumers. This is particularly so when inexperienced consumers deal with costly options, resulting in high levels of perceived risk. Information is a key factor in consumer perceived risk management (Dowling and Staelin, 1994) and while the internet offers major consumer information advantages, there are also substantial constraints for consumers (Grant et al., 2007). These constraints include the sheer volume of options for information sources and formats that result in information overload (Lee and Lee, 2004) and the law of adverse selection (Redmond, 2002). An effective website information service will therefore facilitate consumer engagement leading to an unbroken consumer engagement online. Consistently good results for consumers may even result in cognitive lock-in (Murray and Häubl, 2007) with greater consumer reliance on a website and less recourse to offline contact points.

To achieve this, the website will need to engage in a process of value co-creation based on the consumer's behaviour on the website such as that proposed by Grant et al. (2010a). Such a process requires monitoring website interactivity and recording details on a server database to derive an understanding of the consumer's context and related needs. Current research practices such as clickstream modelling or factor based analysis such as structural equation modelling are inadequate for complex consumer behaviour (Grant et al., 2008) so an alternative is required. The proposed alternative extends the work done by Moe (2003) in using page classification to define online consumer behaviour motivation. However, a far more detailed classification scheme, such as that proposed by Grant et al (2010 b), will be required with a database to record individual behaviour over time. The required classification details web page information content by product types and more detailed information on individual products such as defined attributes sought by a consumer. Further, differences between pages offering objective (performance related or physical dimension) attributes or subjective (styling or experience in use) attributes of products requires specification. With this detail it is proposed that heuristic patterns of behaviour may be reverse engineered by inference from the characteristics of each heuristic strategy. Bettman et al.'s (1998) description of heuristic strategy characteristics are the product of complex consumer context and therefore account for the complexity that other research approaches cannot.

This paper will firstly define the elements of consumer context definition as a basis for discussing how patterns of website behaviour may represent context based on Bettman et al.'s (1991) behavioural typologies. The application of these patterns of behaviour to heuristics is then discussed before a final section discusses information needs and utility relating to each of these characteristics and the heuristic patterns of behaviour which they are part of.

Elements of consumer context definition

The nature of consumer decision making and constructive choice processes has been addressed by Bettman et al. (1991) and Bettman et al. (1998) in terms of contingent decision making. They identify the effects of *task*, *social* and *cognitive context* factors on the strategies

used by consumers to cope with complex decisions given their limited processing ability. These context factors reflect the complexity of individual motivation, traits and states associated with defined consumer strategies and behaviour making choices. Importantly, they point to the adaptive and evolving nature of such strategies as consumers develop knowledge and skills as they move through a process. For example, Bettman, Luce and Payne (1998, p 191) point to the use of different strategies relating to different tasks in the purchase process: “One frequently observed strategy combination is an initial use of EBA (elimination by aspects) to reduce the choice set to two or three options followed by a compensatory strategy such as weighted adding to select from among those remaining.”

This suggests that the strategy in use by a consumer at any given point reflects their task orientation as well as individual social and cognitive factors that determine their choices. Further, if the strategy in use can be identified, different strategies may be associated with preferences for information content, source types and formats. Employing a database of prior information choices offers the possibility of serving information, or links to information, on other websites suited to an individual. This requires researching behavioural characteristics associated with each of the possible strategies. The following section discusses how choice strategies may be identified by the characteristics of an individual’s website behaviour.

Applying heuristic patterns of behaviour to determine context

The characteristics of decision strategies identified by Bettman Luce and Payne (1998) include (a) the volume of information processed; and whether processing is (b) selective or consistent, (c) attribute or alternative based and (d) compensatory or non-compensatory. The strategies identified range from highly rational weighted adding evaluation strategy to more subjective lexicographic or satisficing strategies. The following four subsections review likely behaviours associated with each of the defined characteristics for the choice or decision strategies identified by Bettman, Luce and Payne (1998).

Information volume

Variance in needs for information volume for a given product is a key indicator of the consumer’s level of engagement with the product and hence the time and cognitive costs that they are willing to incur in their search process. A requirement for large amounts of information may however depend on the consumer’s product knowledge and also whether the information search offers a hedonic experience for the consumer. Typically a consumer with low levels of product knowledge will seek understanding of the relative merits of the product options available, perhaps resulting in cursory perusal of a wide range of different options. On the other hand, an experienced consumer seeking hedonic gratification from information regarding a high involvement hedonic product is likely to search in greater depth on fewer preferred options known to them prior to undertaking the search activity. Both consumers are however likely to access a large amount of information in their search process, perhaps over multiple sessions, in the course of their information search. To determine the consumer’s heuristic strategy and resulting information needs, it is necessary to distinguish between such visitors to a website, both of which access large volumes of information.

By tracking the number of website pages accessed by each consumer and time spent on each page, website visitors may be classified according to the volume of information accessed. When combined with a classification system that identifies the information content accessed by individual website visitors the breadth or depth of the consumer’s search may be

determined. For example, a knowledge building consumer may limit their clicks to the introductory website pages of a range of products in a product line, suggesting a broad rather than deep pattern of information search. On the other hand, an indulgent consumer may exhibit deep information search by visits to website pages for a single product option dealing with different attributes or warranty arrangements. Such a person is also more likely to access online chatrooms as a participant rather than a passive observer.

Selective or consistent processing

Different consumers are likely to have different interests for the same product resulting in attention being directed to relevant product attributes. A highly specific focus on one attribute by a consumer is likely to lead to different heuristic strategies to those of a consumer with a broader or more generalised interest. Selective processing is likely to result in greater attention to information regarding a limited range of attributes or alternatives and less attention to other attributes. Consistent processing on the other hand would likely have a consumer giving equal weight or attention to all relevant attributes or alternatives.

To determine this aspect of a consumer's behaviour to define their heuristic strategy, the proposed website page content classification scheme is required to track the consumer's information choices. In this case, the relative volume of time spent by the consumer on website pages dealing with product attributes of interest to them may be analysed for relative focus or generality of interest to the consumer as evidence of selectivity or consistency in their heuristic strategy. This requires the classification scheme to specify website page contents by attribute so that the volume of information accessed for each attribute can be determined. Tracking such behaviour also offers insights into the consumer's salient interests relating to the product, an important basis of customer segmentation by purchase motivation.

Attribute or alternative processing

The third dimension of Bettman et al.'s (1998) consumer heuristic strategies is the tendency to process either by attributes of the product options or alternatively by the alternatives available. Processing by attributes may suggest better levels of product knowledge perhaps based on the consumer's experience with the product giving an understanding of the differential effects of attributes for value in use. Alternative processing on the other hand is typically at the level of brand or holistic product options, possibly because of a consumer's limited knowledge of attributes and/or their effects in use.

A consumer's behaviour on a website may provide evidence of which type of processing is being used based on whether they access information at the level of product options or deeper level searches of the attributes of those products. A person searching for information on a Swiss watch brand for example without knowledge of the workings of such items may select details of options and prices. A more knowledgeable person however may select details of the workings and configuration of options based on their understanding of the effects of such differences. Such differences in behaviour are likely to show clearly in analysis of page classifications accessed by the two consumers indicating whether attribute or alternative processing is being used.

Compensatory or non-compensatory processing

The fourth characteristic of consumer processing, the degree to which consumers make conscious trade-offs between the options available to them, is less obvious and requires exploration by research. In this case the degree to which favourable attributes of one option outweigh unfavourable attributes need to be determined relative to other options under

consideration for a given consumer. A simple example may be the choice of a more expensive option (typically an unfavourable attribute) over a less expensive option because of perceived superior value in use for the consumer. Such superior value may be represented by functional or performance superiority and/or image or prestige depending on the consumer's motivation for purchase. The patterns associated with such behaviour may be similar to those for attribute or alternative processing as discussed in the prior sub section.

A focus on more expensive products in a range of options may suggest either functional or emotional utility that outweighs price for a consumer in alternative processing. Where a consumer engages in attribute processing, the attributes considered (based on website pages visited by a consumer) indicate which product dimensions deliver the value sought. One consumer may focus on a particular performance attribute and another on physical attributes such as size, weight and perhaps aesthetic elements such as styling. Similarly, a specific brand may be preferred regardless of a higher price, perhaps pointing to value associated with alternative rather than attribute processing for a consumer. Either way, the consumer's focus may point to the factors which are considered as compensatory for the higher price in the consumer's processing. While the favourable and unfavourable attributes may differ between product types (high price may be favourable in a prestige product), the possible relationship between alternative and attribute processing, and possibly selective and consistent processing and compensatory or non-compensatory processing is of interest. Bettman et al. (1991) and Bettman et al. (1998) do not consider interactions between characteristics of consumer heuristic strategies but this is an important research question.

Identifying the consumer's behavioural strategy does not however offer direct links to information utility and the research also needs to identify the utility arising from the context identified. The relationship between information utility and a consumer's heuristic patterns of behaviour are discussed in the following section.

Tying consumer information needs to specified heuristics

Once the research has determined the consumer's operational strategy for dealing with information, the preferred information options associated with each heuristic should be identified. Information source type (commercial, public or private) and format (words, images, audio or audio visual) may however have an element of subjective utility associated with them. Subjective utilities for each strategy may realistically result in a switch to offline information search when offline contact is preferred (Grant et al 2007). The consumer's subjective utility for information on the website may be evident from a database of their selected page options as reflected by the website's page classification system.

To minimise frustration which may lead a consumer to turn to offline information sources, probably frustrating efforts to achieve cognitive lock-in, online vendors need to embrace consumer needs for information beyond their site. This is likely to be particularly relevant when consumers seek independent information to validate their opinions about a product or service of interest. To offer consumer utility therefore the vendor needs to offer appropriate links to third party information providers, requiring a database record of navigation to external websites by a given consumer over time. For example the server log may record a particular consumer's exit from the website to a third party "independent expert" website by bookmark or other inter-website navigation method. Tracking such third party website use may further offer insights into preference for alternative processing based on brand, if the

consumer is navigating to competitor websites, with possible implications for compensatory or non compensatory consumer processing.

Conclusion

To implement such a system, research will be required to validate the logical assumptions made in this paper. To do this effectively will require as naturalistic as possible a study observing the choices made by consumers in the course of a complex purchase process. To best understand the heuristic strategy represented by the sequence of consumer website page selections an elicitation process such as the *thinking-out-loud* methods advocated by Ericson and Simons (1997) is required. Notably Ericson and Simons argue extremely persuasively that if their conditions for data gathering are met, such qualitative data can be analysed quantitatively using *protocol analysis*. An understanding of the information source and format types associated with various heuristics offers the basis for a program to serve selected information in real-time to consumers based on their individual needs. As well as observing the research subject's sequence and methods of information selection, the vocalisation of motivation for and satisfaction with activities offers important insights.

In addition to the value co-created from identifying and responding to a consumer's needs in real time on a website, it is possible that such a research program may offer further advances in theory. Grant et al's (2010 c) paper identifies the evidence showing that our understanding of consumer online purchase point needs is severely lacking. Such a detailed study would also serve to define the complex needs that individuals have at an online purchase point at a greater level of resolution than previously available. This theoretical advance will enable online retailers to better serve the needs of customers by understanding the consumer's convenience, process and perceived risk management needs in a purchase process. Such a solid theoretical grounding will further facilitate the development of a system to serve information that addresses such needs in real time.

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