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December 2007

Click-Tracks: Consumers' Online Information Seeking Behaviors and Their Implications for Seller Strategies

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CLICK-TRACKS: CONSUMERS' ONLINE INFORMATION SEEKING BEHAVIORS AND THEIR IMPLICATIONS FOR SELLER STRATEGIES

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Introduction

Recent developments in information and digitization technologies have substantially increased the amount of information about consumers available to sellers. The Internet for instance, allows online sellers to track the search behaviors of consumers at a fine-grained level – information that can potentially be of great value to firms. An in-depth understanding of consumers' online search behaviors can help firms design optimal marketing, segmentation, promotion, pricing, and positioning strategies, among others. While prior research has largely relied on static information such as demographics, and aggregate information such as time spent online, and time spent at various parts of a shopping website (Moe and Fader 2004), greater power is proffered by the analyses of online consumer behavior dynamic clickstream data (Montgomery et al. 2004). In particular, understanding the differences in consumers' search behaviors online, and more importantly understanding their relationships with underlying consumer preferences promises to open up new avenues not only for research, but also for practice. For instance, the ability to infer who their consumers are (*underlying latent preferences and utilities*) from what they do online (*search patterns, alternatives selection strategies, and purchase behaviors*) would be of great interest to retailers. This knowledge would be useful in a) *predicting* consumers' behaviors at various stages of the shopping process, b) *explaining* the effects of website features that lead to (un)favorable outcomes, and c) *optimizing* interactions with customers at their websites through customized promotions/recommendations.

To this end, my dissertation seeks to understand how the differences in consumers' online search behaviors are related to their underlying preferences. More specifically, my dissertation attempts to examine the following research questions**:** How

do different consumers use various online retail/shopping services provided by an online retailer? Can we identify consumer segments based on their search patterns? How do the design and information presentation formats influence consumers' preferences, purchase behavior, and outcomes? How can online retailers leverage this understanding of different "consumer segments" to effectively target their marketing and promotional strategies to them?

Answers to these questions would help online retailers customize buyers' experiences and favorably influence their purchase outcomes. However, before that can be achieved, retailers must establish an important missing link to connect the dots between analyzing observable consumer *search patterns*, learning (or inferring) latent consumer *preferences* and optimizing *offer customization* for segments of similar customers.

Conceptual Research Framework

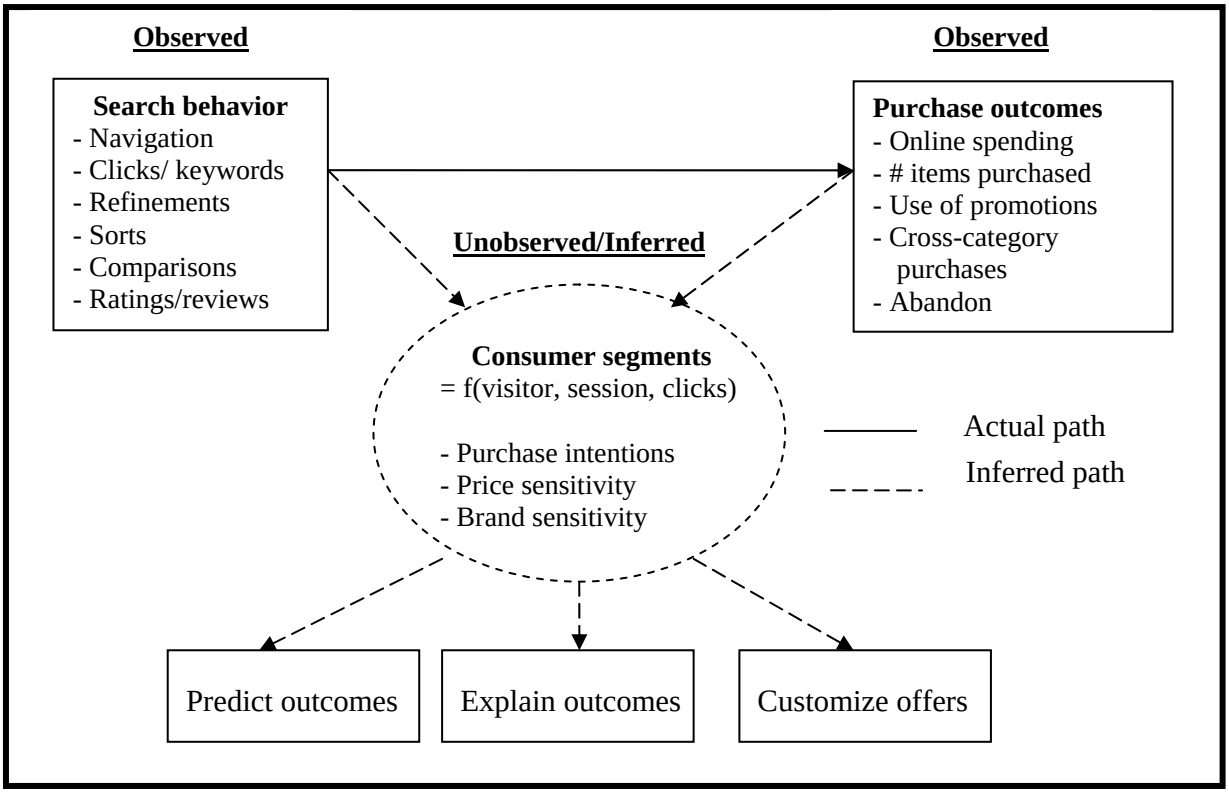

Figure1. A model of consumers' information seeking behavior and outcomes

My dissertation integrates theories of consumer search strategies (i.e., reservation - Schotter and Braunstein 1981; reinforcement learning- Zhang, Feng and Sheng 2006) and consideration set formation (multiple-item choice- Bradlow and Rao 2000; cost-benefit tradeoffs- Hauser and Wernerfelt 1990) to understand consumer choices and their online information search patterns. I also examine how retailers can design more optimal interactions with its customers to improve outcomes in online retail settings (Palmer 2002; Agarwal and Venkatesh 2002).

Research Methodology

Data

To answer our research questions I use a unique and extensive data set consisting of click-stream activities of consumers at a large North American retailer's website. The data consists of detailed consumer click-tracks collected over a period of over 30 days. I augment this dataset with data on consumer consideration sets extracted from the retailer's website using several programming scripts. The dynamics of the purchase process are captured in two important ways. Time dynamics are captured via user sessions (typically defined to last 30 minutes in prior literature) with pre-defined nodes (an example pathway might include: *Enter→browse product categories→select product category→view items within category→view detailed item information→ add to cart→Exit*), each representing a sequential micro-task completion (Sismeiro and Bucklin 2004). State dynamics are made available through consumer search patterns (compensatory vs. non-compensatory strategies for consideration set formation, use of reviews, sorting, comparison and other tools) which I examine to infer their latent state and corresponding underlying utilities. An important underlying assumption is that consumers' needs/preferences change as she progresses through time and state.

Methods

The main methodological focus of my dissertation lies in the use of clickstream data to model the link between consumers' observed online behaviors and their unobserved utilities or preferences, while addressing the dynamic nature of consumer preferences as they evolve *across time* (the length of a session, the order of page (information) access, etc.) and *across consumer states* (browsing, information-seeking, searching, purchasing, etc.). The relationships between consumer segments and various outcomes as described above will be assessed using appropriate econometric techniques in a multi-stage choice modeling framework. Further, information from visitor-level (cookies, past history, demographics) and session-level data (total length, starting & end points, referring sites) are combined with click-level data (navigation, use of sorting and comparison tools, selecting promotional offers, accessing additional information found in reviews/ratings, etc.) to identify underlying segments of similar consumers (Cadez et al. 2000) that may then be linked to interesting outcomes. Finally, while it would be useful to have demographic information of customers who visit their website, most retailers do not have access to such information unless consumer purchases or registers. I also seek to build methods to allow inference/ estimation of their preferences in the absence of these characteristics.

Contribution

Several organizations collect some form of clickstream data, accessible through basic server logs or from specialized site monitoring/tracking software. However, many of them do not fully utilize the potential of clickstream analysis to get a clearer understanding of their customers. A small but growing stream of research in information systems, marketing and computer science is evolving to address questions in this domain. My dissertation will contribute to this stream by examining how the various "search features" available at the retailer's website are used by different "consumer segments" and how they are correlated with different purchase outcomes of interest (conversion rates, cart size and cart value). While the estimation of the link among consumer observed behaviors and their unobserved preferences has ranged from difficult to nearly impossible in traditional retail settings, the emergence of online commerce coupled with advances in technology has made this possible. Further, click-tracks in online stores shed light on the impact and effectiveness of various marketing efforts on consumer behavior. This knowledge is crucial for managers of online retailers and market-makers, and will help them explain and predict consumer behavior at their website, and also how to optimize the dynamic interactions with their consumers by offering customized experiences and targeted promotions.

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