

# Personalized Product Recommendations and Consumer Purchase Decisions

Gerald Häubl  
School of Business  
University of Alberta  
(780) 492-6886

Gerald.haeubl@ualberta.ca

Kyle B. Murray  
Richard Ivey School of Business  
University of Western Ontario  
(519) 661-4210

kmurray@ivey.uwo.ca

## ABSTRACT

We discuss some of the key findings from an ongoing research stream that focuses on the effects of recommendation agents (“RAs”) – electronic decision aids that generate personalized product recommendations – on buyer behavior in online shopping environments. Consumers who rely on agent assistance can drastically reduce their search effort while, at the same time, improving the quality of their purchase decisions. However, when consumers rely on such an agent, they also become susceptible to being influenced by it. Consequently, RAs are “double agents” that act on behalf of the buyer and the seller to both improve and influence buyer decision making. We provide a brief overview of the major findings from this stream of research, and we discuss the implications of this work for building better recommender systems.

## Categories and Subject Descriptors

H.1.2 [Models and Principles]: User/Machine Systems – *human information processing, human factors, software psychology.*

H.4.2 [Information Systems Applications]: Types of Systems – *decision support.*

## General Terms

Algorithms, Management, Performance, Design, Economics, Experimentation, Human Factors, Theory.

## Keywords

Recommendation agents, recommender systems, human-computer interaction, consumer psychology, economics, search, human decision making, influence, consumer behavior, e-commerce.

## 1. INTRODUCTION

Electronic shopping environments on the Internet are capable of providing consumers with a volume of relevant information that poses a severe challenge to the capacity limits of human information processing [1] – whether those limits are in memory, attention, motivation, or elsewhere. Software tools that assist consumers in filtering and organizing information into more

digestible amounts and formats represent a response to this challenge. Many of these tools are altruistic in the sense that they have no vested interest in what the user does with that information; i.e., the tool is an end unto itself. Often these tools exist simply to assist buyers who are trying to make purchase decisions in information-intensive marketplaces.

However, not all such decision aids are necessarily altruistic and, in fact, many of these tools are designed to not only assist buyers, but to also influence the very choices they make. Such tools are *double agents* – in addition to helping the buyer make a better choice, the agent works for the seller to influence the buyer’s purchase decision.

Our research has focused on one important type of electronic decision aids for consumers: recommendation agents (“RAs”) that provide consumers with personalized product recommendations. We conceptualize an RA as a decision aid that (1) attempts to understand a shopper’s subjective preference in terms of multiple product attributes based on an initial preference-elicitation phase, and (2) provides recommendations in the form of a sorted list of products based on its understanding of the consumer’s preference [2].

## 2. MAJOR FINDINGS

The major findings from this stream of research can be summarized as follows. First, there are several potential benefits to a consumer of using RAs, including reduced search costs and improved decision quality. In particular, it has been demonstrated that the use of RAs tends to enable consumers to make better purchase decisions than they would otherwise, and to do so with less effort than would be required when shopping without agent assistance [2].

Second, consumer preferences are susceptible to being influenced by an RA in a systematic manner. Although, a number of different psychological mechanisms may underlie the influence that a recommender system has on shoppers [3], our research has focused on three: (1) associative feature-based priming, (2) effects due to the format of information presentation, and (3) consumer inferences about attribute importance based on conversational logic. These mechanisms range in the level of consciousness at which they operate – from the unaware to conscious information processing.

Third, some of the effects of using an RA persist beyond situations where the agent is available, while others are only evident when the agent is present. The impact of an RA that is selective in which attributes it considers during preference

elicitation on consumer preference can persist into future decision making environments in which the agent is no longer present. On the other hand, our evidence indicates that the benefits of using an RA (i.e., reduced search effort and improved decision quality) do not persist beyond situations in which consumers actually use the agent.

### 3. BUILDING BETTER AGENTS

We argue that electronic RAs can play a dual role by both assisting and influencing consumer decision making. We believe that this perspective leads to a deeper, and more comprehensive, understanding of the interaction between electronic agents and consumers, which in turn can lead to the design of better and more effective RAs. Anecdotal evidence suggests that consumers in the bricks-and-mortar world are willing to accept some degree of influence or bias from human sales agents in exchange for the benefits that come with the latter's advice. There is no reason to believe that consumers are not equally willing to accept the dual role played by an electronic RA if they are able to benefit from their interaction with such a tool.

The consumer-centric double-agent perspective outlined here provides a framework for the design of RAs that focuses on delivering value to consumers by accelerating their decision processes, while at the same time improving the quality of the choices that they make. However, this perspective also takes into account the competitive advantage gained by a seller who delivers the benefits of agent-assisted shopping and improves its own position in the marketplace through its electronic agent's influence on consumer preferences.

It is important to note that, although we have discussed only one type of influence in this article, other types of computer-human influence have also been demonstrated [3]. For example, subtle contextual cues can prime (i.e., predispose) consumers towards some alternatives and away from others [4], an RA's selectivity in terms of the product attributes that it takes into account can affect consumers' choice processes [5], and the degree of match between agent advice and consumers' pre-existing attitudes can determine the extent to which consumers rely on an agent's recommendations [6]. It has also been demonstrated that lowering search costs for quality information can in some cases reduce consumer price sensitivity [7], and in others increase consumer price sensitivity [8].

These types of influence are relatively subtle and do not necessarily cause the consumer to make a poor purchase decision. On the contrary, each of these types of influence is compatible with improved consumer decision making. The electronic agent's influence can simply sway the buyer towards one good product over another. The conclusion for both buyers and sellers is clear: well-designed electronic RAs can, and should, play a more prominent role in improving the overall value of online shopping.

### 4. CONCLUSION

The stream of research reviewed here is based on numerous controlled experiments (conducted both in the lab and via the Internet) aimed at examining the impact of recommendation systems on shopping behavior, as well as the psychological mechanisms that underlie these effects. The following list of

references includes work cited in this brief review, as well as other relevant work (including working papers) by the authors.

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