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Bo Xiao

University of British Columbia, bo.xiao@sauder.ubc.ca

Chee-Wee Tan

University of British Columbia, chee-wee.tan@sauder.ubc.ca

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Reducing the Perceived Deception of Product Recommendation Agents: The Impact of Perceived Verifiability and Perceived Similarity

Bo Xiao

Management Information Systems Division
Sauder School of Business
University of British Columbia
bo.xiao@sauder.ubc.ca

Chee-Wee Tan

Management Information Systems Division
Sauder School of Business
University of British Columbia
chee-wee.tan@sauder.ubc.ca

ABSTRACT

Product Recommendations Agents (PRAs) are software applications that augment consumers' purchasing decisions by offering product recommendations based on elicited customers' preferences. The underlying premise of PRAs is often grounded on the assumption that PRAs seek to optimize consumers' utility by tailoring product recommendations to meet requisite expectations. Because the majority of commercial PRAs are implemented by parties with partisan interests in product sales, it is highly probable that recommendations are biased in favor of their providers and do not accurately reflect consumers' interests. This in turn may possibly induce perceptions of deception among consumers. This study theorizes that the incorporation of IT-mediated components in PRAs, which induce high levels of perceived verifiability and perceived similarity, could mitigate consumers' perceptions of deception towards product recommendations.

Keywords

Perceived deception, product recommendation agent, perceived verifiability, perceived similarity

INTRODUCTION

Digital marketplaces offer consumers great convenience, immense choices and large amounts of product-related information. However, due to the cognitive constraints imposed by humans' limited information processing capabilities, locating suitable products is challenging for online customers. Many electronic stores have thus provided Product Recommendation Agents (PRAs), which elicit the preferences of individual customers to assist in product search and selection (Xiao and Benbasat, 2006). By offering product recommendations aligned with a customer's expressed preferences and/or behavioral pattern, PRAs have the potential to reduce consumers' information overload and search complexity, while concurrently, improving their decision quality (Haubl and Trifts, 2000).

However, the degree to which PRAs actually empower consumers depends upon the veracity and objectivity of the PRAs (Hill, King, and Cohen, 1996). Since the

majority of PRAs are devised by parties (e.g., retailers, product manufacturers) with vested interests in sales figures, it is probable that the product recommendations presented are biased in favor of their providers. Together with the growing dependence on PRAs for advice on online purchases, consumers may become increasingly vulnerable to intentional manipulation by PRAs serving partisan agendas (Biros, George, and Zmud, 2002).

This paper hence endeavors to explore how consumers' perception of PRAs' deceptiveness may be mitigated by separate notions of *perceived verifiability* and *perceived similarity*. Subsequent sections will introduce various classes of PRAs and define the concept of *perceived deception* in the context of product recommendations. At the same time, we delineate the constructs of *perceived verifiability* and *perceived similarity* in advancing testable propositions concerning their impact on consumers' perceived deception towards product recommendations.

PRA, PRA DECEPTION, AND PERCEIVED DECEPTION

PRAs fall into two major categories: 1) collaborative-filtering PRAs, and 2) content-filtering PRAs (Ansari, Essegai, and Kohli, 2000). Collaborative-filtering PRAs mimic "word-of-mouth" recommendations and capitalize on the close proximity among opinions of like-minded people in offering product recommendations (Xiao and Benbasat, 2006). Such PRAs typically compare ratings, which are derived from an individual's response to a predetermined list of items or her prior shopping history and/or browsing behavior, in order to isolate a set of "nearest neighbors" (i.e., other individuals with similar ratings). Collaborative-filtering PRAs then recommend items that have been rated highly by the individual's neighbors but have not been rated by the individual.

Conversely, content-filtering PRAs assume that people tend to revisit products that they preferred before (Zhang, 2002). These PRAs generate recommendations based on consumers' preferences, which are obtained explicitly (by analyzing consumers' responses to a set of preference-elicitation questions) and/or collected implicitly (by analyzing consumers' shopping history and/or browsing behavior). Content-filtering PRAs that are explicit in

nature can be further classified into feature-based and needs-based PRAs (Stolze and Nart, 2004). Whereas a feature-based PRA allows a consumer to specify preferred product features (e.g., desired effective pixel for digital cameras), needs-based PRA profiles a customer according to his/her attributes and expected usage of the requested product (e.g., image quality needs) before translating this information into appropriate product specifications.

PRA Deception and Perceived Deception

Common definitions of deception, as proposed by deception researchers, are listed below:

- “a communicator’s deliberate attempt to foster in others a belief or understanding which the communicator considers to be untrue” (DePaulo and DePaulo, 1989, p. 1553)
- “a deliberate act perpetrated by a sender to engender in a receiver beliefs contrary to what the sender believes is true to put the receiver at a disadvantage” (Burgoon and Buller, 1994, p. 157)
- “a cognitive interaction between two parties in conflict of interest: a deceiver and a target. The deceiver manipulates the environment of the target in order to induce an incorrect cognitive representation and, as a result, a desired behavior” (Johnson, Grazioli, and Jamal, 1993)

From the above definitions, certain characteristics of deception appear to be homogeneous:

1. Deception occurs between two parties involved in a social exchange, namely the *deceiver* and the *target* of the deception;
2. Deception is an intentional or deliberate act;
3. Deception is accomplished by manipulating the environment of the social exchange (with information being part of this environment);
4. Deception has an instrumental end purpose, i.e. to induce certain perceptual and/or behavioral changes in the target that would not otherwise have been feasible, and;
5. Deception is not a means in itself (Masip, Garrido, and Herrero, 2004).

Taking into account the aforementioned characteristics, we define *PRA deception* as a deliberate attempt by the PRA (or its provider) to manipulate the interactional environment between the consumer and the PRA so as to induce perceptual and/or behavioral changes in the consumer as desired by the PRA (or its provider).

The consumer’s counterpart to PRA deception is *perceived deception*: the consumer’s belief, held without sufficient evidence to warrant certainty, that the PRA is being deceptive (Buller and Burgoon, 1996). It is often triggered by negative-valenced violation of preconceived expectations or the recognition of situational cues suggesting deception.

This study focuses on the notion of *perceived deception* because perceptions have been consistently found to be stronger predictors in determining individuals’ attitude

and behavior. Varying types of PRAs exhibit differential likelihood to trigger consumers’ perception of deception. For instance, while a major advantage of collaborative-filtering PRAs resides in their ability to generate novel recommendations, the abruptness and unfamiliarity of such recommendations may lead to an opposite effect by inducing negative consumer attitude, which in turn gives rise to perceptions of PRA deception. The negative effect is even more pronounced in cross-product-category recommendations (e.g., when a PRA recommends a video camera when the consumer is searching for a tripod), whereby a PRA’s recommendations are often incongruent with the immediate purchasing decision. Moreover, a PRA (collaborative-filtering or content-filtering) that collects consumers’ preferences implicitly before making a recommendation proactively (i.e., without an explicit preference elicitation process) is also likely to generate negativity and trigger perceptions of deception.

IMPACT OF PERCEIVED VERIFIABILITY AND PERCEIVED SIMILARITY

Perceived deception falls along a truth-falsity judgment continuum (Buller and Burgoon, 1996). Since a customer whose perception of deception has been triggered usually exists in a state of uncertainty as to the honesty of the PRA, she is likely to solicit extra evidence or proof in order to arrive at a firm conviction about the PRA’s truthfulness. We argue that the verifiability of a PRA’s recommendations as well as the similarity between the PRA and a consumer present the needed evidence for the consumer to defray her perception of deception towards the PRA’s recommendations.

Perceived Verifiability

Communication researchers have established a positive relationship between the *verifiability* of a message and the likelihood of individuals relying on such information when making decisions (Rosenthal, 1971). They posited that perceptions of verifiability will foster more favorable attitudes towards a given message (Calfee and Ford, 1988).

When consumers’ perception of deception has been triggered, the ease for them to verify a PRA’s recommendations is likely to move their perception towards the “truth” end of the truth-falsity judgment continuum. Therefore, the *perceived verifiability* of a PRA’s recommendations—the extent to which consumers perceive that the appropriateness of a PRA’s product recommendations can be determined—will diminish perceptions of deceptiveness towards the PRA and subsequently, reduce customers’ resistance to its recommendations. We thus propose:

Proposition 1: The *perceived verifiability* of a PRA’s product recommendations reduces the *perceived deception* of the PRA.

There are two means by which consumers can verify the PRA’s recommendation: *internally* via the explanations

provided by the PRA and *externally* via their own subjective assessment, comparison, or reference.

Internal Verifiability

The internal verification mechanism provided by a PRA lies in its explanation facilities. Research on explanation in knowledge based systems (KBSs) has demonstrated that explanations and transparency alleviate the information asymmetry existing between the KBSs and their intended users (Gregor and Benbasat, 1999). Prior PRA research has also examined the effects of explanations on consumers' positive attitude toward a PRA's (content-filtering or collaborative-filtering) recommendations. Wang and Benbasat (2004a) demonstrated the trust-enhancing effects of three types of explanations (i.e. *how* explanations, *why* explanations, and *guidance*) on consumers' trusting beliefs in a content-filtering PRA context. Wang (2005) also observed that PRAs providing these three types of explanations were deemed more transparent and consequently, more trustworthy by consumers.

The only comprehensive study of explanation facilities in collaborative-filtering PRAs was conducted by Herlocker, Konstan, and Riedl (2000), who appropriately characterized most collaborative-filtering systems as black boxes that dish out unquestionable advice (Herlocker et al., 2000). This lack of transparency prevents the widespread acceptance of such systems.

Despite the *trust* focus in these studies, the same reasoning is amenable to our research context. For instance, when a consumer's perception of deception is triggered by unexpected PRA recommendations (e.g. when a PRA recommends a product without first eliciting the consumer's preferences, or when it suggests an unusual product), explanations concerning how the consumer's profile (i.e., browsing behavior, shopping history, explicated preferences and requirements) is translated into criteria for generating recommendations should increase consumers' perceived verifiability of the PRA's recommendations and alleviate their wariness towards unanticipated recommendations. These IT-mediated verifiability mechanisms can be provided internally by the PRA.

Proposition 2: *Internal verifiability*, the extent to which the recommendations of a PRA can be internally verifiable via explanations, positively influences the *perceived verifiability* of the PRA's recommendations.

According to Rosenthal (1971), the degree to which a message is perceived as verifiable is also a function of its specificity (i.e., the quality of being specific and precise). In the context of product recommendations, the perceived verifiability of a PRA is influenced by the specificity of the explanation (if available) provided by the PRA. Overly general explanations may be perceived as offering little informational value, thereby resulting in low perceived verifiability of the PRA:

Proposition 3: The *specificity* of a PRA's explanations moderates the effect of *internal verifiability* on the *perceived verifiability* of the PRA's recommendations to the extent to which a PRA providing specific explanations is perceived to be more verifiable than one providing general explanations.

External Verifiability

Churchman (1971) argues that a system can not serve as its own guarantor. Rosenthal (1971) notes that a message can be considered verifiable if it can be confirmed empirically by means independent of its source and available to the audience. Prior PRA research (Wang and Benbasat, 2004b) has confirmed that when consumers have some suspicions regarding a PRA, the absence of effective means to verify the PRA's recommendations with a trusted third party led to trust deterioration:

Proposition 4: *External verifiability*, the extent to which the recommendations of a PRA can be externally verifiable, positively influences the *perceived verifiability* of the PRA's recommendations.

The simplest, external means of verifying a PRA's recommendation is for consumers to evaluate their own preferences for the recommended items. Insofar as PRAs are intended to provide advice that accurately reflects customers' needs and requirements, both content-filtering PRAs and collaborative-filtering PRAs can be readily verified in this manner.

A more objective means of external verification for consumers consists of comparing recommendations against certain external criteria. Consumers can either compare features of recommended products with their expressed preferences on those attributes or compare recommended products with one another.

PRA users can also verify the validity of the PRA's recommendations by referencing additional information sources (e.g. expert views, other customers' reviews). In reality, this is exactly the situation across e-commerce vendors whereby customers access multiple websites to verify product quality and price information. The caveat of this strategy however, is that consumers will not be able to uncover deceptive PRAs that recommend highly popular products (i.e., products highly recommended by experts and/or other customers) that do not necessarily satisfy more unique customer preferences.

Perceived Similarity

Past research in psychology, sociolinguistics, communication, business, and related fields purported that the greater degree of similarity between two parties (e.g. in behavior, communication style, attitude, personality, physical appearance), the greater the attraction will be (Byrne and Griffitt, 1969).

In the context of PRAs, similarities between consumers and PRAs will reduce consumers' perceptions of uncertainty inherent in their interaction with the PRAs

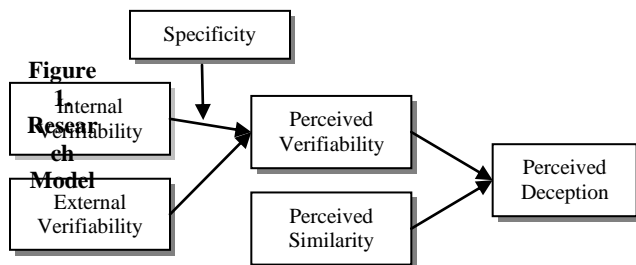
and promote group membership, both of which contribute to reduced negativity toward the PRAs' recommendations and diminished perception of PRA deceptiveness. This paper focuses on *perceived similarity* rather than *actual similarity* since the former has been demonstrated as more crucial in predicting individuals' evaluative responses than the latter, especially in the formation stage of a relationship (Al-Natour and Benbasat, 2006).

Aksoy and Bloom (2001) demonstrated that similarities in the significance vested in certain attributes by PRAs and the significance that would be given to those attributes by consumers can have a profound impact on influencing consumer perceptions of the recommendations generated by the PRA. Gershoff, Mukherjee, and Mukhopadhyay (2003) also observed that when evaluating an PRA, consumers pay greater attention to past instances when they have agreed with the PRA's opinions and ratings (an indication of similarity in tastes or preferences). Higher rates of agreement lead to greater confidence in and greater likelihood of accepting a PRA's advice.

Proposition 5: *Perceived similarity* between a PRA and consumers reduces the *perceived deception* of the PRA.

RESEARCH PLAN

To test the propositions advanced in this paper, a laboratory experiment will be conducted. The experiment will employ a 2 (Internal Verifiability: high vs. low) x 2 (External Verifiability: high vs. low) x 2 (Similarity: high vs. low) between-subject factorial design (see Figure 1).



Measurement instruments for *perceived verifiability*, *perceived similarity*, *specificity*, and *perceived deception* will be developed based on similar prior measures in the literature. Multiple items will be used for each construct, following standard psychometric scale development and validation procedures (Moore and Benbasat, 1991). The instruments will be pre-tested for reliability (by calculating Cronbach's alpha) and validity (by conducting confirmatory factor analysis). Partial Least Squares (PLS) will be used to assess both the measurement model and the structural model.

CONCLUSION AND DISCUSSION

With the research model depicted above, this paper aims to investigate the negative effects of perceived verifiability of a PRA and perceived similarity between the PRA and its users on consumers' perception of the PRA's deceptiveness. It proposes that:

- Both perceived verifiability (internal or external) and perceived similarity mitigate perceived deception, and;
- The specificity of a PRA's explanations (i.e. the internal verification mechanism) moderates the effects of internal verifiability on perceived verifiability.

Different types of PRAs may generate differing levels of verifiability and similarity perceptions. First of all, although both content-filtering and collaborative-filtering PRAs can enhance *internal verifiability* via providing explanations, they manifest differential *external verifiability*. Whereas the attribute-based nature of content-filtering PRAs makes it easy for consumers to compare features of recommended products with their expressed preferences for product features, recommendations generated by collaborative-filtering PRAs, which are based on user proximity, are more difficult to verify by such means.

In addition, consumers' perceptions of their similarity with PRAs may differ depending on whether content-filtering PRAs or their collaborative-filtering counterparts are being utilized. Content-filtering PRAs enable users to specify their product related needs or their preferred product features before generating recommendations that reflect expressed preferences. In contrast, collaborative-filtering PRAs request consumers to provide ratings on a pre-specified set of products (some of which may be totally unrelated to the product category currently of interest to the consumer) before presenting recommendations that supposedly capture consumers' interest. Because consumers are more accustomed to the decision making process employed by content-filtering PRAs, they are likely to consider such PRAs as more intuitive, more understandable, and thus more similar to themselves than collaborative-filtering PRAs.

Moreover, perceived similarity may also differ between needs-based PRAs and feature-based PRAs. A PRA that asks about consumers' product-related needs rather than their specification for product features conveys to consumers that it understands the consumers' true needs and internalizes such needs as its own preferences. Internalization signals behavioral similarity.

Furthermore, as argued previously, collaborative-filtering PRAs as well as PRAs (both collaborative-filtering and content-filtering ones) that provide recommendations proactively, will be more likely to be perceived as deceptive by consumers, due to their tendency to recommend novel products or their aggressiveness in recommending. As such, PRA mechanisms that induce consumers to develop perceptions of *verifiability* and *similarity* to defray perception of deception will be stronger for these types of PRAs than for content-filtering PRAs and PRAs that provide recommendation reactively.

Despite considerable research over the years into both PRAs and deception, there has yet to exist an intersection of these two research streams. Marking a timely attempt to investigate deceptive PRAs, this paper represents a

pertinent contribution to theory building in both PRA and deception research.

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