12-14-2014

Recommendation Agent Acceptance: The Impact of Decision Difficulty in RA Sets of Multidimensional Products

Agapi Thaleia Fytraki
Erasmus University Rotterdam, fytraki@ese.eur.nl

Benedict G.C. Dellaert
Erasmus University Rotterdam, dellaert@ese.eur.nl

Izak Benbasat
Universjity of British Columbia, izak.benbasat@sauder.ubc.ca

Follow this and additional works at: http://aisel.aisnet.org/digit2014

Recommendation Agent Acceptance:
The Impact of Decision Difficulty in RA Sets of Multidimensional Products

Research-in-Progress

Agapi Thaleia Fytraki
Erasmus University Rotterdam
Rotterdam, The Netherlands
fytraki@ese.eur.nl

Benedict G.C. Dellaert
Erasmus University Rotterdam
Rotterdam, The Netherlands
dellaert@ese.eur.nl

Izak Benbasat
University of British Columbia
Vancouver, BC Canada
izak.benbasat@sauder.ubc.ca

Abstract

Recommendation Agents aim at reducing decision effort and improving quality through recommending a set of alternatives which fits users' preferences. The list of the alternatives is typically compiled in a multidimensional way, where the user is called to indicate preferences regarding a number of different product dimensions. Nevertheless, in decision situations where products are characterized by a variety of advantages and disadvantages, consumers may be confronted with conflicting values of product attributes, leading to severe dilemmas and decision paralysis. Based on theories on choice context effects, it is proposed that the relationship between the attributes of the recommended products impact perceptions regarding the quality of the decision process as well as the quality of decision outcomes, including the acceptance of the technology. This study proposes a novel method of determining the presentation of the recommended alternatives and suggests a system design which minimizes decision difficulty and maximizes both user's satisfaction and the agent's use.

Introduction

The rapid evolution of information technology has exponentially increased the amount of information consumers can consult when making a decision. Whereas this impressive boom in information availability has the potential to improve decisions, it is a fact that due to its vast amount, not all available information can be incorporated into one's judgment. It is well known that people are inherently limited in the amount of information they can assimilate and process at one time, (e.g. *Miller, 1956)* a limitation that often leads to information overload.

Major improvements on intelligent technologies have provided solutions to the overload problem by assisting consumer decision making. Nowadays, decision makers have access to a variety of online recommendation sources (advice) from professional critics (e.g., citysearch.com) or laypeople (e.g., Netflix.com, amazon.com) to personalized recommendations through product Recommendation Agents (RA)s (e.g. myproductadvisor.com, skyscanner.com). The pervasiveness of mobile technologies which permit for constant reach and interaction with the user, is adding an extra layer of potential benefits, both for users and for the companies which are trying to reach them.

Recommendation agents offered by sellers or third-parties enable consumers to navigate through huge product assortments, and form, evaluate and re-evaluate their options in the click of a button, benefits that can only be realized if these systems are used. For about the last three decades, RA research has been providing a rich understanding of the factors that influence their acceptance and use; from technology and product characteristics to user and user-RA interaction elements, which conversely shape one's decision processes and outcomes. A seminal paper by Xiao and Benbasat (2007) and its recent update (2012) provide an overview of all these factors and identify a gap in our knowledge concerning user behavior towards the composition of an RA's recommendation list.

The primary goal of an RA is to help consumers in selecting appropriate products that best fit their needs. The recommendations presented by the RAs inherently influence decision making as they comprise a certain representation of reality (Tan & Benbasat, 1990; Vessey, 1991). This study examines the idea that the way the recommended products are arranged on the screen and the similarity of the (top) products may play a role in which recommendation people choose.

Choice modeling and utility theories assume that the insertion of an alternative in a consideration set does not influence the share of other alternatives. However, recent studies in behavioral decision making, economics and marketing show that sometimes the attractiveness of a product does not only depend on the characteristic of the product itself but also on the relation of the product's attribute values with its competitors values. This set of phenomena is called "context effects", (Tversky & Simonson, 1993) and they are used to describe the effects of the composition of the consideration set on decisions.

Although different context effects describe different choice patterns, an underlying commonality exists for all of them. There is a fundamental dependence between the process of evaluation and choice, and the context in which this is executed (Bettman, 1986; Hogarth, 1983; Payne, 1982). Consequently, a choice between alternatives is dependent on the presence or absence of other alternatives and their characteristics.

Based on this dependence (between the decision process, the context and the choice), this study examines how the composition of the recommendation set (list) – as expressed by the products' attribute relationships and their presentation– affects users' evaluation of the decision process. We further suggest how recommendation agent recommendation sets can and should be constructed to increase both the evaluation of the decision process and the evaluation and acceptance of the RA. Does the composition of the recommendation's list influence one's evaluation of decision processes and outcomes?

A meaningful answer to this question can provide valuable guidelines for the –interface- design of product recommendation agents and more generally, of decision support systems. Knowing if and how the items in a recommendation list affect user behavior, we can design systems which maximize both user's satisfaction and the use of the recommendation agents.

Recommendation Agent Output

RA research has provided valuable insights on designing the input of recommendations (e.g. Häubl & Murray, 2003), RA decision strategies (e.g. Tan, Teo & Benbasat 2010; Wang & Benbasat, 2012), and the recommendation process (Bechwati and Xia 2003).

Being interactive technologies, product recommendation agents receive some information input (implicitly or explicitly), they process that information, and they present a number of product alternatives as output. The comprehensive review of the RA literature (Xiao & Benbasat, 2007, 2014) underline that both the recommendation content as well as the recommendation format are key antecedents of the RA's evaluation and acceptance. What is presented to the user at the output stage and how it is presented are questions that have received some scholarly attention.

For example, Wang and Benbasat (2005) Wang (2007) showed that providing an explanation of RA's reasoning logic strengthens users' beliefs regarding the RA's competence and benevolence. In examining the impact of the number of recommended MP3s and greetings cards on decision processes and outcomes Diehl (2005) found that a higher number of recommended alternatives increases the information searched, decreased the quality of the consideration set and led to poor product choices.

Knijnenburg et al. (2012) suggests the sole attempt examining RA set composition effects on choice difficulty and choice satisfaction while making a movie choice. In a controlled lab experiment, they exposed participants to either, the Top-5, Top-20 or the Top-5 recommendations, supplemented with the recommendations with rank 99, 199, 299,…, 1499. They find a positive effect of recommendation quality and a negative effect of choice difficulty on choice satisfaction. The Top-20 set was perceived to be more varied and attractive than the Top-5 but high-variety recommendations increased choice difficulty as well.

RAs and Tradeoffs

Due to the fact that our study proposes effects which are grounded on users' aversion towards tradeoffs, reviewing RA studies which have investigated this decision characteristic is a relevant endeavor.

Initial attention to the role of the decision context in the evaluation of recommendation agents was given by Lee and Benbasat (2011). They manipulated trade-off difficulty, not through manipulating the level of the attribute values in the recommendations, but through manipulating users' reference points (Payne, Bettman, & Johnson, 1993). Participants in the loss group decided how much of each attribute they had to give up, while those in the gain group decided how much of each attribute they could gain. They subsequently examined the effect of tradeoff difficulty on the evaluation of different preference elicitation methods (PEMs) (alternative- vs. attribute-driven), which is a characteristic of the input of the RA. Their findings show that tradeoff difficulty moderates the degree to which PEMs generate trade-off difficulty.

Lastly, Xu, Benbasat, and Cenfetelli (*forthcoming*) also focus on the input side of the recommendation agent by incorporating an interface element which interactively demonstrates trade-offs among product attribute values. Users rated the advantages of the trade-off transparent RA against the traditional RA in terms of product diagnosticity and enjoyment. The results revealed that the relationship between tradeoff transparency and positive beliefs regarding the RA follow an inverse-U shape, as the level of tradeoff transparency increased. RA users are driven away from the RA when tradeoff transparency is low or high. This last finding indicates that RA users are also averse to tradeoff extremeness. In sum these findings provide indirect, yet initial evidence that extremeness aversion -the principle driving context effects - plays a role in RA evaluation.

Taken together, the literature evidence provides valuable insights to our understanding regarding RA acceptance. Yet, the composition of the recommended alternatives is, to the best of our knowledge, still an uncharted territory (see also Xiao & Benbasat, 2007). Along these lines, we show that, what the users see as output of the recommendation process is as important as the input received and the process followed by the agent, and is requiring more scrutiny than the one currently paid by researchers.

Theoretical Background- Choice Context Effects

The notion that a choice between two alternatives may be influenced by the consideration of a third alternative is highly consequential for the determination of product assortments (Huber, Payne & Puto, 1982) and as such, has received considerable attention from scholars in economics, psychology and marketing.

The theory of rational choice – a dominant paradigm in economics- is based on the fundamental premise that individuals make choices that have the highest value (value maximization). Preferences are well-articulated, stable, and the assumption is that the relative preference between two alternatives does not depend on the presence of any other alternative (Tversky and Simonson 1993). If in one context, product A is preferred to product B, then product B cannot be preferred to A even if a third product appears in the choice set. Whereas rational choice is an important part of being a consumer (Bettman, Luce, & Payne, 1998), studies have challenged this assumption (Payne, Bettman, & Johnson, 1992).

Context effects "refer to the phenomenon that consumer choice behavior is influenced by the composition of the choice set in a manner inconsistent with the theory of rational choice" (Rooderkerk et al. 2011). Three important context effects are: the *compromise effect*, the *attraction effect* and the *similarity effect.*

To further understand these effects, consider a simple example (Figure 1). Someone wants to buy a tablet computer and two models are available in the market; one is inexpensive but has a small screen, whereas the other is bigger but expensive. In this case, none of the alternatives are dominated, that is, both alternatives are better than the other on at least on characteristic. Consequently, it is not clear whether tablet A or B will be favored by decision makers.
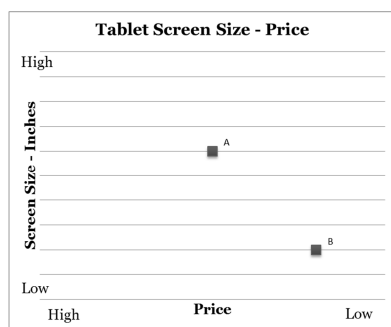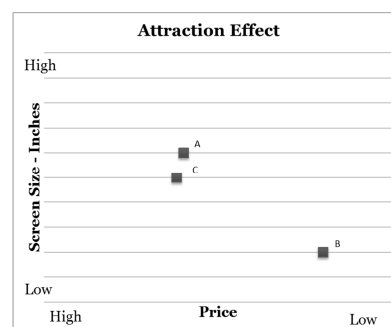

Figure 1 – Choice between 2 tablets   Figure 2 – Adding C improves preference for A relative to B

In this case, a "context effect" occurs when a third tablet is added to the choice set, resulting in the decision-maker changing his or her choice between the two original options.

The Attraction Effect
The attraction effect (Huber, Payne, and Puto 1982; Huber and Puto 1983) refers to the phenomenon that an item increases the favorable perceptions of similar, but superior, items in the choice set. In the tablets example, the attraction effect is triggered by the consideration of a third tablet, C, which is worse on all attribute dimensions (i.e. dominated) in comparison to one of the other options (tablet A), but it is not totally dominated (i.e. is better on one of the two attributes) by the other alternative (tablet B). As it is illustrated on Figure 2, tablet C may be similar to tablet A, but it is inferior on all attributes. The attraction effect predicts that when alternative C is present in the decision set, the choice share of the similar, tablet A (called the *target* option) can go up and the choice share of tablet B will go down. In a way, if alternative C (called *the decoy* option) is absent, the decision between tablet A and B is a difficult one, as it is not clear which tablet has the best price-quality ratio. The presence of a decoy option draws one's attention to the contrast between option A and C. It is expected that Tablet C will not be chosen, yet it influences the choice share of the other alternatives in the set.

The Similarity Effect

The similarity or substitution, effect, refers to the phenomenon that an item hurts similar alternatives more than dissimilar alternatives (Tversky 1972). In this case, the two similar products are seen as competitors so given that consumer choices reflect their preferences, the introduction of a new alternative with similar characteristics, will be able to fulfill the same needs, as the similar item which was already present in the choice set. Back to our tablet example, the addition of tablet C in the A-B choice set (Figure 3) decreases the relative choice share of tablet B more than the share of tablet A. Note that the attraction effect requires the decoy option (inserted alternative) to be inferior to the similar option, whereas the similarity effect has no such requirement.
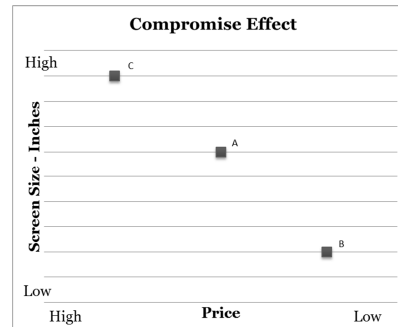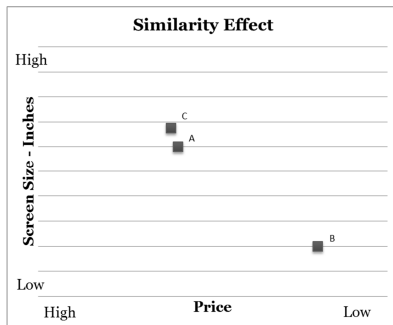

Figure 3– C steals more share from A than from B   **Figure 4 –A becomes more attractive when C in present**

The Compromise Effect

Another well-supported context effect is the compromise effect (Simonson, 1989). This effect arises when the likelihood that one product will be chosen over its alternative is increased by the introduction of a third product, which makes the first product to appear as the middle option. Suppose that tablet C which has the highest quality and lowest price is added to the choice set in Figure 4. In this situation, tablet A becomes the middle option. Even though tablet C provides the highest price-screen size ratio, evidence indicates an increase in the choice share of tablet A (e.g. Nowlis & Simonson, 2000; Pettibone & Wedell, 2000; Dhar & Simonson, 2003).

Framework

Although evidence for the three effects are robust, no research that we are aware of, is suggesting the presence or the consequences of these effects in a RA-supported decision environment. Given that a consumer uses a recommendation agent to make a certain product decision, the output of the RA or the "recommendation set", constitutes the choice set available to the user at a given time. Consequently, it is our belief that context effects which occur in an un-aided environment, can occur in the RA decision environment as well.

We assess the effect of the RA set's composition on user performance using the framework proposed by Lilien, Rangaswamy, & Van Bruggen (2004) and utilized by Tan, Teo, & Benbasat (2010) in previous RA work. As our research framework depicts (Figure 5), our goal is to assess the impact of the different RA sets, within which the three different context effects occur, on characteristics of the decision process and decision outcomes.
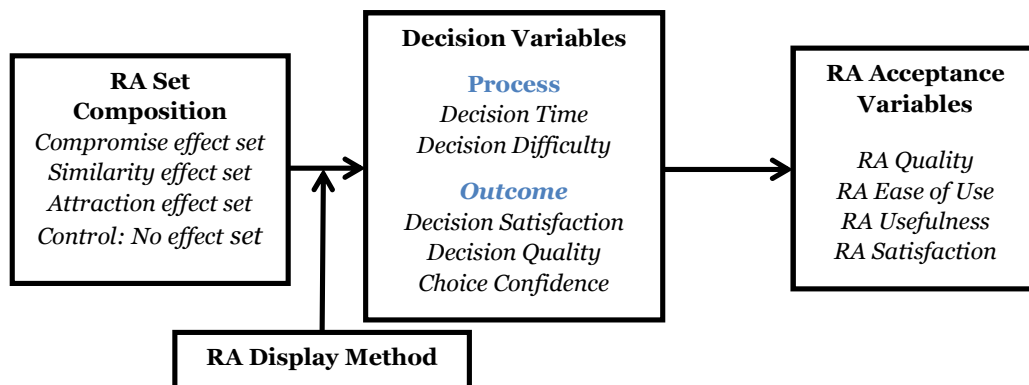
FIGURE 5- Research Framework

The *decision process* is characterized by the evaluation of the decision process itself and the perceptions users hold about the facilitating role of the agent in taking a certain decision. *Decision time* is an objective indicator of the amount of effort exerted to process information before a decision is made (Roberts and Lattin 1997). Some research advocates that personalized recommendations, can lower decision satisfaction even though they improve objective decision quality (Häubl, Dellaert, & Usta 2010). Consequently, subjective measures are particularly useful in assessing consumer evaluations of the decision process. *Perceived RA quality* reflects the degree to which the consumer perceives the RA to be capable of assisting in reaching a decision (DeLone and McLean 1992). Two other indicators tied to the user's perceived performance given the use of an RA are, perceived usefulness, "the user's perceptions of the utility of the RA or the RA's recommendations" and ease of use, a user's perceptions of the effort necessary to operate the RA (Xiao & Benbasat, 2007). Lastly, the decision making process is also fundamentally characterized by the perception of *decision difficulty*.

Logically, the use of an RA is also bearing certain *decision outcomes*. As context effects are errors in judgment, they influence how people think about their decision-making capabilities. *Choice confidence* (Häubl & Trifts, 2000) and *RA decision quality*, which is a subjective evaluation of how a decision maker perceives his decision to be accurate, correct, precise, and reliable (Mennecke & Valacich 1998).

At the same time, both decision outcomes and processes are influenced by other environmental variables (Lilien, Rangaswamy, & Van Bruggen 2004) such as the display order of the recommended alternatives. This research problem becomes more important when it comes to mobile agent acceptance. Especially in a mobile application environment, providing a (long) list of alternatives that is unsorted or shorted on a specific attribute (e.g. price) may put an excessive burden on the user.

The following sections provide theoretical support to the proposed relationships in Figure 5. Since this research is ongoing, the last sections present our plans along with possible implications for research and practice.

Context Effects' Influence on Decision Variables

Conflicting values of product attributes, tradeoffs are present in many purchase choices (Bettman et al. 1998, Häubl & Murray 2003), and when they are present, the decisional conflict experienced by consumers is a major source of decision difficulty (Payne, Bettman & Johnson, 1993). Research has shown that a choice task is considered easier in the presence of a superior alternative (under the influence of the *attraction effect*, for example) (Hedgcock & Rao 2009; Tversky & Shafir 1992). Klein and Yadav (1989), for instance, found that the number of inferior alternatives in a choice set influenced the time required to make a decision and its accuracy: The fewer inferior alternatives present in the set, the less accurate and the more time demanding the decision. Conversely, difficult decisions undermine one's confidence that the best option will be selected (Dhar, Nowlis, and Sherman 1999).

> **Hypothesis 1:** A product chosen from a recommendation set where the attraction effect takes place, leads to lower decision difficulty and time, higher decision satisfaction, confidence, and quality than a recommendation set were the attraction effects is absent.

Decision making entails not just choosing a favored option but also rejecting its alternatives, and rejecting alternatives often prompts anticipated regret and decision avoidance. When the product not chosen is similar to the one that is chosen, people may anticipate less regret and experience less difficulty because the alternative outcomes are not very different from the actual outcome of the chosen product (Sagi & Friedland, 2007). On the basis of this link between choice difficulty and similarity, Kim et al. (2013) attest that introducing a small difference on an otherwise identical attribute reduced choice difficulty by increasing the perceived similarity of the available options. As a result, decision makers exhibit higher willingness to choose when considering a choice set where a very similar, but not identical alternative is present. Similarly, Medin et al. (1993) showed that when people compare objects, features that do not vary across those objects may not be considered. This may be especially true in a choice context, because common features provide no basis for choosing (Dhar & Sherman, 1996).

> **Hypothesis 2:** A product chosen from a recommendation list where the similarity effect takes place leads to lower decision difficulty and time, higher decision satisfaction, decision confidence and decision quality than a recommendation list where the similarity effects is absent.

As far as the Compromise Effect is concerned, the no-choice option competes most heavily with the compromise option (Dhar & Simonson, 2003). This study argues that choosing the no-choice or the compromise option are both mechanisms that help consumers resolve difficult choices. In the eyes of the individual, the compromise option provides a "good enough", easily justifiable option. People are reluctant to make trade-offs among valued attributes, and as a result, this reluctance is associated with increase in decision difficulty (Dhar 1997; Kivetz, Netzer, & Srinivasan 2004; Simonson 1989; Tversky & Shafir 1992). A middle option protects consumers from any potential loss due to the extremeness of the attributes and prevents them from having to give up any favorable attributes of the other products (Drolet, Luce, & Simonson, 2009; Chang et al., 2012).

> **Hypothesis 3:** A product chosen from a recommendation set where the compromise effect takes place leads to lower decision difficulty and time, higher decision satisfaction, confidence and quality than a recommendation list were the compromise effect is absent.

Linking Perceptions about the Decision to RA Evaluation

Researchers have noted that the Internet comprises an ideal medium in which to exploit the effects of context (Peterson, Balasubramanian, & Bronnenberg 1997). Unlike interactions with human agents, for which cues relating to process and motivation exist, the algorithms by which electronic agents make their recommendations are not obvious to the consumer. Consequently, consumers may evaluate electronic agents primarily on salient contextual cues-the recommended alternatives (Xiao & Benbasat, 2007).

In their Theory of Goal Systems, Kruglanski et al. (2002) show that the evaluations held for the attainment of a goal, can spill over to the evaluation of the means used to reach that goal. In a setting of decisions supported by information technology, the goal of the user is to take a certain decision, whereas the "means" is the technology itself. Based on this theory, we can thus posit that beliefs held regarding the decision process, like decision difficulty and quality can be transferred to the evaluation of the outcome, that is, the recommendation agent.

RA users have as their expectation that these decision support tools will make the decision easy for them (Häubl and Trifts, 2000), they will conserve them effort (Benbasat and Todd, 1996; Todd & Benbasat, 1992) and will put more effort in the decision than themselves (Bechwati & Xia, 2003; Li & Tsekouras, 2012). An RA that introduces rather than resolves decision conflict through the composition of the recommended alternatives may as well be regarded as the scapegoat of the conflict itself (Moon & Naas, 1998; Moon, 2003). Such an RA does not do a great job in fulfilling the activated goal of making an easy but on the same time, high quality decision. We can thus expect:

> **Hypothesis 4a,b:** Decision quality and satisfaction have a positive effect on RA quality & RA satisfaction.

> **Hypothesis 4c,d:** Decision difficulty and decision time have a negative effect on RA ease of use.

"Decision variables" mediate the influence of RA set composition on RA variables in such a way that:

Hypothesis 5: An RA offering a recommendation list where the compromise effect takes place leads to the perception of higher RA satisfaction, RA quality and lower ease of use than for a RA where the compromise effect is absent.

Hypothesis 6: An RA offering a recommendation list where the attraction effect takes place leads to the perception of higher RA satisfaction, RA quality and lower ease of use than for a RA where the attraction effect is absent.

Hypothesis 7: An RA offering a recommendation list where the similarity effect takes place leads to the perception of higher RA satisfaction, RA quality and lower ease of use than for a RA where the similarity effect is absent.

Context effects & Information Display Method

The organization of information display plays a major role in what consumers choose (Russo, 1977). According to the "concreteness" principle (Slovic, 1972) decision makers tend to use only the information that is explicitly displayed and will use them in the form they are displayed.

Support was provided by Bettman and Kakkar (1977) who found that individuals indeed acquired information in a manner consistent with the display format (by attribute or by brand) , and Jarvenpaa (1989) extended these results to the case of graphical displays. Based on these findings Bettman, Luce and Payne (1998) propose that the relationships among choice options will be more difficult to assess if the choice set is displayed in such a way that these relationships are less transparent. Examining the interaction between the compromise effect and options' display format, Chang and Liu (2008) found that the position of the middle option influences its relative attractiveness; study participants were more likely to choose the compromise option when it was presented in the middle of a product list.

RA research on recommendation formats has shown that in comparison to unsorted recommendations sets, sorted recommendations increased consumers' tendency to engage in local utility comparison when evaluating alternatives (Dellaert & Haubl, 2012) and improved objective decision quality (Aksoy & Bloom 2011).

Given these findings and because all the context effects stem from the relational properties of the alternatives in the recommendation set, we can expect that:

Proposition 1: The way the recommended alternatives are displayed (e.g. sorted vs. unsorted) moderates the influence of context effects on decision processes and outcomes.

Methodology

Our next step will be to design (1) an agent that can simulate the proposed context effects at the output stage of the recommendation experience and, (2) an experimental study followed by a survey where we can observe and document users' interaction and beliefs regarding the recommendation agent. A full factorial, between subjects 4 (RA set composition: control, attraction, compromise, similarity) x 2(RA set display method: sorted vs. unsorted) experimental design will be employed. Each participant will be asked to purchase a product using the recommendation agent. Individuals will be able to specify their preferences for a number of attributes using the RA while in the back end of the RA, recommendation options that can according to the theory, represent the attraction, similarity and compromise effects will be specified[1]. The RA will then present a list that, based on the theory, represents one of the three context effects. The occurrence of the context effects on users' recommendation sets will be manipulated by placing on the first output page, or on the top of the list, alternatives representing each of the context effects. Note that all the alternatives will fit users' elicited preferences. Compared to a "no context effect" set, only the location of the products will vary. Lastly, in order to increase involvement in the decision task, participants will be asked to justify their choice in the follow-up survey.

---

[1] By calculating the distances between the values of each product and for each attribute.

Discussion

The results of this study have the potential to draw the attention of both practitioners and researchers to the importance of the relationships between the (top) recommended items in a recommendation list. Firstly, we are uniquely providing empirical evidence on the occurrence of three different context effects in a RA set environment. Secondly, following an experimental design will allows us to explore the effects of these context effects on users' decision processes. More importantly, providing a link between the composition of the RA list, the decision process and the evaluation of the technology itself, we put forward that RA designers should be cautious about the presentation of alternatives of any recommendation set. By introducing a list of recommendations where a context effect takes place, the agent can reduce decisional conflict and improve the evaluation of the recommendation agent, which will ultimately lead to higher acceptance of the technology.

The findings are generalizable to other decision domains, apart from that of consumer product choice. If context effects impact decision processes and outcomes the way we propose, it is possible that these effects occur in other technology supported decisions, like healthcare decision making. This is a highly uncertain and consequential environment were the composition of the recommended options may relief or burden decision makers. The presence of significant context effects can call into question many current practices of recommendations presentation which have largely ignored the presence of other products and their relative position in the list provided by the agent and may lead to the design of more intelligent recommendation technologies.

References

Aksoy, L., Cooil, B., and Lurie, N. H. 2011. Decision quality measures in recommendation agents research. *Journal of Interactive Marketing*, *25*(2), pp. 110-122.

Bechwati, N. N., & Xia, L. 2003. Do computers sweat? The impact of perceived effort of online decision aids on consumers' satisfaction with the decision process. *Journal of Consumer Psychology*, 13(1), pp. 139-148.

Benbasat, I., and Todd, P. 1996. The effects of decision support and task contingencies on model formulation: A cognitive perspective. *Decision Support Systems*, *17*(4), pp. 241-252.

Bettman, J. R., Luce, M. F., and Payne, J. W. 1998. Constructive consumer choice processes. *Journal of Consumer Research*, *25*(3), pp. 187-217.

Bettman, J. R., and Kakkar, P. 1977. Effects of information presentation format on consumer information acquisition strategies. *Journal of Consumer Research*, *3*(4), p. 233.

Chang, C. C., Chuang, S. C., Cheng, Y. H., and Huang, T. Y. 2012. The compromise effect in choosing for others. *Journal of Behavioral Decision Making*, *25*(2), pp. 109-122.

Chang, C. C., and Liu, H. H. 2008. Information format-option characteristics compatibility and the compromise effect. *Psychology and Marketing*, *25*(9), pp. 881-900.

Dellaert, B.G.C. and G. Häubl, 2012, Searching in choice mode: Consumer decision processes in product search with recommendations. *Journal of Marketing Research*, 49 (2), pp. 277–288.

Dhar, R., and Simonson, I. 2003. The effect of forced choice on choice. *Journal of Marketing Research*, *40*(2), pp. 146-160.

Dhar, R., Nowlis, S. M., and Sherman, S. J. 1999. Comparison effects on preference construction. *Journal of Consumer Research*, *26*(3), pp. 293-306.

Dhar, R. 1997. Consumer preference for a no-choice option. *Journal of Consumer Research*, *24*(2), 215-231.

Dhar, R., and Sherman, S. J. 1996. The effect of common and unique features in consumer choice. *Journal of Consumer Research*, pp. 193-203.

Diehl, K. 2005. When two rights make a wrong: Searching too much in ordered environments. *Journal of Marketing Research*, *42*(3), pp. 313-322.

Drolet, A., Luce, M. F., and Simonson, I. 2009. When does choice reveal preference? Moderators of heuristic versus goal-based choice. *Journal of Consumer Research*, *36*(1), pp. 137-147.

Häubl G., Dellaert B.G.C., Usta M. 2010. Ironic Effects of Personalized Product Recommendations on Subjective Decision Outcomes. *Proceedings of the Society for Consumer Psychology Winter Conference*, p. 68.

Häubl, G., and Murray, K. B. 2003. Preference construction and persistence in digital marketplaces: The role of electronic recommendation agents. *Journal of Consumer Psychology*, *13*(1), pp. 75-91.

Häubl, G., and Trifts, V. 2000. Consumer decision making in online shopping environments: The effects of interactive decision aids. *Marketing Science*,*19*(1), pp. 4-21.

Hedgcock, W., and Rao, A. R. 2009. Trade-off aversion as an explanation for the attraction effect: A functional magnetic resonance imaging study. *Journal of Marketing Research*, *46*(1), pp. 1-13.

Huber, J., and Puto, C. 1983. Market boundaries and product choice: Illustrating attraction and substitution effects. *Journal of Consumer Research*, pp. 31-44.

Huber, J., Payne, J.W., and, Puto, C. 1982, Adding Asymmetrically Dominated Alternatives: Violations of Regularity and the Similarity Hypothesis. *Journal of Consumer Research*, Vol. 9, No.1, pp. 90 - 98.

Jarvenpaa, S. L. 1989. The effect of task demands and graphical format on information processing strategies. *Management Science*, *35*(3), pp. 285-303.

Kim, J., Novemsky, N., and Dhar, R. 2013. Adding small differences can increase similarity and choice. *Psychological science*, *24*(2), pp. 225-229.

Kivetz, R., Netzer, O., and Srinivasan, V. 2004. Alternative models for capturing the compromise effect. *Journal of Marketing Research*, *41*(3), pp. 237-257.

Klein, N. M., and Yadav, M. S. 1989. Context effects on effort and accuracy in choice: An enquiry into adaptive decision making. *Journal of Consumer Research*, pp. 411-421.

Knijnenburg, B. P., Willemsen, M. C., Gantner, Z., Soncu, H., and Newell, C. 2012. Explaining the user experience of recommender systems. *User Modeling and User-Adapted Interaction*, *22*(4-5), pp. 441-504.

Kruglanski, A. W., Shah, J. Y., Fishbach, A., Friedman, R., & Chun, W. Y. (2002). A theory of goal systems. In *In MP Zanna (Ed.), Advances in Experimental Social Psychology*.

Lee, Y. E., and Benbasat, I. 2011. Research Note-The Influence of Trade-off Difficulty Caused by Preference Elicitation Methods on User Acceptance of Recommendation Agents Across Loss and Gain Conditions. *Information Systems Research*, *22*(4), pp. 867-884.

Li, T., and Tsekouras, D. 2012. Reciprocity in effort to personalize: Examining perceived effort as a signal for quality. In *Proceedings of the 14th Annual International Conference on Electronic Commerce*. pp. 1-8, ACM.

Lilien, G. L., Rangaswamy, A., Van Bruggen, G. H., and Starke, K. 2004. DSS effectiveness in marketing resource allocation decisions: Reality vs. perception. *Information Systems Research*, *15*(3), pp. 216-235.

Moon, Y. 2003. Don't blame the computer: When self-disclosure moderates the self-serving bias. *Journal of Consumer Psychology*, *13*(1), pp. 125-137.

Moon, Y., and Nass, C. 1998. Are computers scapegoats? Attributions of responsibility in human–computer interaction. *International Journal of Human-Computer Studies*, *49*(1), pp. 79-94.

Medin, D. L., Goldstone, R. L., and Gentner, D. 1993. Respects for similarity. *Psychological review*, *100*(2), p. 254.

Nowlis, S. M., and Simonson, I. 2000. Sales promotions and the choice context as competing influences on consumer decision making. *Journal of Consumer Psychology*, 9(1), pp. 1-16.

Payne, J. W., Bettman, J. R., and Johnson, E. J. 1993. *The adaptive decision maker*. Cambridge University Press.

Payne, J. W., Bettman, J. R., and Johnson, E. J. 1992. Behavioral decision research: A constructive processing perspective. *Annual review of psychology*, *43*(1), pp. 87-131.

Peterson, R. A., Balasubramanian, S., and Bronnenberg, B. J. 1997. Exploring the implications of the Internet for consumer marketing. *Journal of the Academy of Marketing Science*, 25(4), pp. 329-346.

Pettibone, J. C., and Wedell, D. H. 2000. Examining models of nondominated decoy effects across judgment and choice. *Organizational behavior and human decision processes*, 81(2), pp. 300-328.

Rooderkerk, R. P., Van Heerde, H. J., and Bijmolt, T. H. 2011. Incorporating context effects into a choice model. *Journal of Marketing Research*, *48*(4), pp. 767-780.

Russo, J. E. 1977. The Value of Unit Price Information. *Journal of Marketing Research (JMR)*, *14*(2).

Simonson, I. 1989. Choice based on reasons: The case of attraction and compromise effects. *Journal of Consumer Research*, 16(2), pp. 158-174.

Sagi, A., and Friedland, N. 2007. The cost of richness: the effect of the size and diversity of decision sets on post-decision regret. *Journal of personality and social psychology*, *93*(4), p. 515.

Shah, J. Y., and Kruglanski, A. W. 2003. When opportunity knocks: bottom-up priming of goals by means and its effects on self-regulation. *Journal of Personality and Social Psychology*, pp. 84(6), 1109.

Slovic, P. 1972. Oregon Research Institute from Shakespeare To Simon: Speculations—And Some Evidence—About Man's Ability To Process Information. *Research Bulletin, 12*(2).

Tan, C. H., Teo, H. H., and Benbasat, I. 2010. Assessing screening and evaluation decision support systems: A resource-matching approach. *Information Systems Research, 21*(2), pp. 305-326.

Tan, J. and I. Benbasat, "Graphics Processing: A Decomposition Taxonomy to Match Tasks and Graphical Presentations," *Information Systems Research*, Vol. 1, No. 4, December 1990, pp. 416-439.

Todd, P., and Benbasat, I. 1992. The Use of Information in Decision Making: An Experimental Investigation of the Impact of Computer-Based Decision Aids. *MIS Quarterly, 16*(3). pp. 73-393

Tversky, A., and Simonson, I. 1993. Context-dependent preferences.*Management Science, 39*(10), pp.1179-1189.

Tversky, A., and Shafir, E. 1992. Choice under conflict: The dynamics of deferred decision. *Psychological science, 3*(6), pp. 358-361.

Tversky, A. 1972. Elimination by aspects: A theory of choice. *Psychological review, 79*(4), p. 281.

Vessey, I. 1991. Cognitive Fit: A Theory-Based Analysis of the Graphs Versus Tables Literature. *Decision Sciences, 22*(2), pp. 219-240.

Wang, W., and Benbasat, I. 2005. Trust in and Adoption of Online Recommendation Agents. *Journal of the Association for Information Systems,6*(3), p72-101.

Wang, W., & Benbasat, I. 2007. Recommendation agents for electronic commerce: Effects of explanation facilities on trusting beliefs. Journal of Management Information Systems, 23(4), pp. 217-246.

Wang, W., and Benbasat, I. 2012. Research Note—A Contingency Approach to Investigating the Effects of User-System Interaction Modes of Online Decision Aids. *Information Systems Research, 24*(3), pp. 861-876**.**

Xiao, B., and Benbasat, I. 2007. E-commerce product recommendation agents: use, characteristics, and impact. *MIS Quarterly, 31*(1), pp. 137-209.

Xiao, B., and Benbasat, I. 2014. Research on the Use, Characteristics, and Impact of e-Commerce Product Recommendation Agents: A Review and Update for 2007–2012. In *Handbook of Strategic e-Business Management*(pp. 403-431). Springer Berlin Heidelberg.

Xu, J., Benbasat, I., and Cenfetelli, R. T. *forthcoming 2014.* Research Note-The Influences of Online Service Technologies and Task Complexity on Efficiency and Personalization. *Information Systems Research*.