

# Timing and Basis of Online Product Recommendation: The Preference Inconsistency Paradox

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**Abstract.** Online retailers employ recommendation agents (RAs) to provide product recommendations with the objectives of not only to support consumers' decision-making but also to influence their decisions of product choice. However, some empirical studies have found that product recommendations are not always well accepted by consumers. While one cause for the non-acceptance might be the poor personalization of the product recommendations as suggested by prior studies, another plausible cause would be the failure in providing a product recommendation in the wrong way and/or at the wrong time. Building on the theoretical lens of Preference Inconsistency Paradox, this study seeks to investigate how a RA could offer recommendations based on product reviews (i.e., the basis of a recommendation) and at the juncture when consumers are most receptive to (i.e., the timing). A controlled laboratory experiment was subsequently conducted. The results reveal that the basis and time of recommendations could lead to varying impacts on a consumer's decision satisfaction and decision difficulty. Implications for research and practice are discussed.

**Keywords:** product recommendation, preference inconsistency paradox, recommendation timing, recommendation source.

## 1 Introduction

Research on recommendation agent (RA), i.e., a software agent that makes product recommendations to individual consumers, is increasingly abundant due to its potentials of not only to assist a consumer in making shopping decisions but also to influence his/her choice of product [1]. It is increasingly cautioned that an unsuitable recommendation may cause a consumer to ignore that recommendation or in certain cases, result in a behavioral backlash: a consumer intentionally contradicts that recommendation [2]. It is added in the marketing literature that a recommendation or an advertisement at the wrong timing would not only lower its persuasiveness but also lead to negative attitude formation [3-5]. Taken together, we argue that a consumer denying a recommendation could be due to the failure in providing a product recommendation in the wrong way (i.e., the basis of recommendation) and/or at the wrong time (i.e., the timing of recommendation).

In term of the basis of recommendation, we propose the consideration of third-party generated product information, such as product reviews written by product experts (thereafter terms as expert reviews) and those written by end-consumers after consumption of a product (thereafter terms as consumer reviews). It is increasingly suggested by extant literature that product reviews play an important role in influencing a consumer's purchase decision-making behavior [6, 7].

In term of the timing of recommendation, prior studies have predominantly and implicitly focused on one instant of recommendation provision, which is toward the end of a decision-making process (or just before a decision is made). For example, in the work of [2], which focused on examining the provision of recommendations after preferences are defined. It is not clear what if recommendation comes in the earlier stage of decision process would be well received.

To form theoretical predictions on how a RA could provide recommendation (i.e., the basis) and the instant of providing it (i.e., the timing), we anchor on the theoretical lens of Preference Inconsistency Paradox (PIP). PIP posits that when a consumer is formulating the consideration set, he/she has a tendency to increase more product alternatives to form a large consideration set [8, 9] with the prospective of not missing any good product options; however, when he/she is prompted to make an explicit purchase decision, he/she tends to be troubled not only by a large rather than a small consideration set and also the need to have an easy-to-justify choice [10-12]. A controlled laboratory experiment was subsequently conducted. This research contributes to the extant literature by explicitly examine the issue of how a RA could provide recommendations that could reduce a consumer's decision difficulty and at the same time increase his decision satisfaction.

## **2 Theoretical Background and Research Model**

### **2.1 Preference Inconsistency Paradox**

PIP is based on the view of consumer behavior in a two-stage product decision process. The two stages are (1) forming a consideration set and, subsequently, (2) selecting a product alternative from that consideration set [8, 13, 14]. PIP suggests that there is a discrepancy in a consumer's preferences during the two stages [11, 14].

When a consumer is forming the consideration set, he/she has the preference for having more product alternatives, leading to a large consideration set [8]. For instance, consumers prefer larger assortment rather than smaller assortment when choosing among assortments [11, 15], because people like to have a wider choice selection [16, 17].

Preference inconsistency emerges when a consumer progresses to the stage of making a final product choice. In this stage, a consumer is not interested in increasing the size of consideration set and due to the large consideration set, he/she is troubled by the considerable number of product alternatives. The reason is that a large consideration set increases the demand for cognitive resources to evaluate the product alternatives. Additional effort is required to evaluate alternatives in the larger

consideration set, which could result in a cognitive overload [18-20]. Suggested by the need-for-justification paradigm, a consumer needs to focus on finding a good justification/reason for selecting a product alternative among all the options in the consideration set [21].

## 2.2 Research Framework and Hypothesis Development

The research framework is depicted in Figure 1. As depicted, we seek to assess the impacts of recommendation timing (before search vs. after choice) and basis of recommendation (consumer review vs. expert review) on a consumer's decision satisfaction and decision difficulty in the context of an online shopping website. At the "before search" timing point, which is in the consideration-set-formation stage, a recommendation is presented when a consumer first accesses the online shopping website. At the "after choice" timing point, a recommendation is presented after a consumer has considered some alternatives and made a preliminary choice but before final confirmation of the decision.

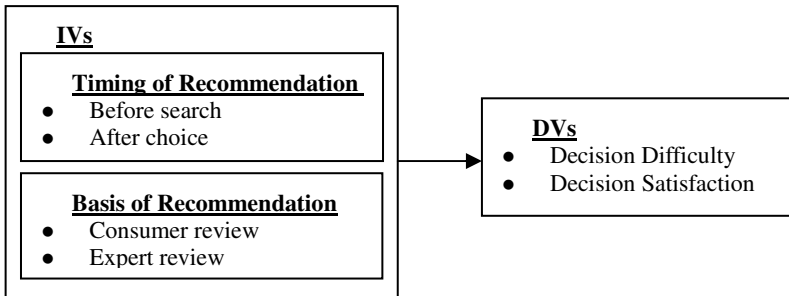


Fig. 1. Research Framework

Decision difficulty refers to the complexities encountered by a consumer during the decision-making process [22, 23]. Decision difficulty comes from various sources at different decision-making stages [24]. At the consideration-set-formation stage, knowledge uncertainty and preference uncertainty are major sources of decision difficulty [25]. A recommendation would be perceived to be helpful at this stage because it could provide product knowledge and aid a consumer's preference construction. Thus, it is less likely that the recommendation would increase a consumer's decision difficulty.

However, at the stage of final choice making, choice conflict and need-for-justification are the main sources of decision difficulty. PIP suggests that when a consumer is making the final choice, it would be more difficult to choose from a large consideration set than from a small one. If a product recommendation is presented "after choice", more cognitive effort is required to solve the choice conflict between the recommended product and a consumer's preliminary choice. The recommendation would compel that consumer to re-evaluate alternatives and re-justify his choice,

which increases the demand on consumers' cognitive resources. As a result, a higher decision difficulty is associated with the recommendation presented after search. Therefore, we posit:

*H1: Consumers who receive a recommendation presented "after choice" will have higher decision difficulty compared to those who receive a recommendation presented "before search."*

Decision satisfaction measures the extent that a consumer perceives a decision to be acceptable [26, 27]. Decision satisfaction is viewed as an antecedent of repeated purchase, loyalty and system usage [26, 28]. Therefore, enhancing a consumer's decision satisfaction is of great importance. We propose that a consumer who receives the recommendation based on expert review would be more satisfied with the decision than an individual who receives the recommendation based on consumer review. Decision satisfaction is not only based on the decision outcome but also on how consumers justify the decision [29]. Compared with consumer review, which is mainly individual consumer's product opinion based on personal usage, expert review, focusing on product attribute information (such as performance, features and reliability) that is easier to quantify and measure, is more objective to be relied on [30]. If a recommended product is accepted by a consumer, expert review serves as a good reason for the consumer to justify comparing to consumer review which is more subjective [31]. It is found that a consumer's satisfaction with expert-made choices relative to their own varies even when the outcomes are the same [32]. Even if a consumer refuses the recommendation, expert review provides a good support for that consumer to explain the final choice, which would result in higher decision satisfaction. As a result, we suggest:

*H2: Consumers who receive the recommendation based on expert review will have higher decision satisfaction compared to those who receive the recommendation based on consumer review.*

### **3 Research Methodology**

A 2×2 controlled laboratory experiment was conducted in this study. The operationalization of decision satisfaction and decision difficulty was adopted from prior studies [33, 34]. 88 students from a public university in China participated in the experiment. The participants' average age was between 21 and 23 years old; 27 (30.7%) were male and 61 (69.3%) were female. They were randomly assigned to one of the four treatments to minimize the effects of individual differences on the results and there were 22 participants per treatment group. Participants were told to make purchase choices from four product categories (i.e., cell phone, digital camera, laptop and Mp3 player). They were paid about \$6 U.S. for each hour of the experiment task.

The experiment was conducted in a computer lab with PCs in groups of 6-12 participants. Participants were required to make a choice from each product category store. Real product data was used in the experiment. When performing the purchase task of a product category, a participant began with a pre-questionnaire regarding his/her knowledge about the product category. Then he/she entered the search page of

the online store. He/she could add one or more options into the consideration set by clicking “add into shopping cart.” Finally, he/she needed to make a choice by clicking the “buy” button in the shopping cart, and then to click “confirm” for confirmation of final choice. After a post-questionnaire, he/she moved on to making decision for the next product category.

Recommendation timing was manipulated at two timing points: before search and after choice. For the “before search” treatment, a recommendation was presented in a pop-up window when a participant began to search products at the screening page. For the “after choice” treatment, a recommendation was presented when a participant clicked the “buy” button in the shopping cart and before confirmation. These two timing points are chosen to make sure that the presentation of recommendation could be well manipulated at different stages of decision-making.

For the manipulation of basis of recommendation, the recommendation based on consumer review consisted of a title of “Other consumers recommend this product to you,” attribute information of the recommended product and several positive consumer reviews. The recommendation based on expert review page included a title of “expert recommends this product to you,” attribute information of the recommended product and expert review.

The sequence of the purchase tasks in the four product categories was controlled by randomly assigning task sequences to participants. Recommended product was controlled by randomly recommending a product. Other control variables included perceived knowledge of the product category and perceived task involvement.

## 4 Data Analysis

Participants’ individual characteristics, such as age, gender, computer experience and online shopping experience, were controlled by randomization. Further checks indicated that there is no significant differences among participants in all four treatments in terms of age ( $F=1.083$ ,  $p>0.1$ ), computer experience ( $F=0.78$ ,  $p>0.1$ ), and online shopping experience ( $F=2.17$ ,  $p>0.05$ ). There was no significant difference across the treatment groups in terms of gender ratio, based on the Kruskal-Wallis test ( $\chi^2=0.648$ ,  $p>0.1$ ).

Manipulation checks were conducted to ensure that our manipulation was successful. Recommendation timing manipulation was verified by asking the participants to rate on a seven-point Likert scale regarding when they saw the pop-up recommendation (1 means at the beginning of the task and 7 means after making a preliminary decision). Comparing the mean ratings obtained from participants of before search condition and participants of after choice condition (i.e., 1.00 and 6.59 respectively) yielded a highly significant result ( $t=45.45$ ,  $p<0.001$ ). Recommendation source manipulation was checked by asking the participants to rate on a seven-point Likert scale whether they thought the recommendation was mainly based on personal usage experience. Comparing the mean ratings obtained for the consumer recommendation and expert recommendation conditions (i.e., 5.41 and 3.86 respectively) yielded a highly significant result ( $t=7.65$ ,  $p<0.001$ ). As a result, our manipulation of the two independent variables was successful.

Because each participant had four purchase tasks (i.e., cell phone, digital camera, laptop and Mp3 player), our data have a two-level structure with purchase tasks at level 1 and subjects at level 2. In order to control the subjects' variation in the two-level structure data, multi-level linear regression analyses are conducted. Data were analyzed by using the multi-level xtreg module in Stata (release 10.0).

The results are depicted in Table 1. Full models were tested and there was no interaction effect. The results suggested that the timing of recommendation significantly influenced the consumers' decision difficulty and basis of recommendation significantly influenced the consumers' decision satisfaction. It is shown that consumers had significantly lower decision difficulty if the recommendation came at the stage of forming the consideration set than if the recommendation comes at the stage of making the final choice; and they reported significantly higher decision satisfaction if the recommendation was based on expert review than the one based on consumer review. Therefore, H1 and H2 are both supported.

**Table 1.** Data Analysis Results

	Decision Difficulty (DV)			Decision Satisfaction (DV)		
	Coefficient	Std. Error	Z	Coefficient	Std. Error	Z
<b>Manipulated Independent Variables</b>						
Recommendation Source (0-expert; 1-consumer)	-0.08	0.30	-0.26	-0.56	0.20	-2.82**
Recommendation Timing (0- after choice; 1-before search)	-0.97	0.30	-3.24***	0.10	0.20	0.48
Recommendation Source * Recommendation Timing	0.26	0.42	0.62	0.36	0.28	1.29
<b>Control Variables</b>						
Product_cellphone	0.12	0.15	0.82	-0.12	0.12	-0.98
Product_digital camera	-0.07	0.15	-0.46	-0.21	0.13	--1.85
Product_laptop	-0.09	0.16	0.55	-0.22	0.13	-1.73
Knowledge	-0.03	0.05	-0.53	0.08	0.04	2.20*
Involvement	0.03	0.04	0.69	0.10	0.04	2.65**
Recommendation Quality	0.003	0.09	0.03	0.03	0.07	0.41
Intercept	2.88	0.34	8.56***	5.04	0.25	20.12***
Log likelihood	-517.47			-418.27		

\*p<.05; \*\*p<.01;\*\*\*p<.001

## 5 Discussion and Conclusion

This study investigates how a RA could provide recommendations based on product reviews and at the right timing to yield higher decision satisfaction and lower decision difficulty. The results suggest that a product recommendation presented after choice would result in a consumer experiencing greater decision difficulty than the one presented before search. As suggested by PIP, at the stage of making final choice from the consideration set, a consumer has the inclination to minimize decision complexity and reach an easy-to-justify decision, the recommendation at this stage would bring choice conflict between the recommended product and his/her preliminary choice, which increases the demand on that consumer's cognitive effort and causes higher decision difficulty.

It is also found that the basis of recommendation significantly influences a consumer's second-stage decision: making the final choice. Higher decision satisfaction is associated with recommendation based on expert review than recommendation based on consumer review. While the justification for a choice is seen as an important factor in understanding consumer choice and decision satisfaction [21, 35], the recommendation based on expert review assist a consumer to have better reasons for his decision.

Like any other studies, this research suffers from several limitations that readers should take into account when interpreting the findings. First, while the nature of the products would affect consumer decision-making process and the effectiveness of product recommendation, further studies could be conducted to investigate the impact in other product categories, such as experience products/service (e.g., hotels, restaurants). Second, the cultural context of this study may limit the external validity. Without considering the impact of cultural characteristics, this study was conducted in a university of a collectivistic country. The findings might be influenced by cultural factors, such as consumers' preference for expert review. Future research could investigate the impact of recommendation basis and timing in different cultural contexts.

This study contributes to several schools of literature. First, it contributes to the RA literature by examining the impact of product review as basis of recommendation. Although RA is important in online retailing, the truth is that many are not making the most of the opportunities. As the rejection of recommendation might be a result of insufficient evidences of product superiority and not persuasive enough to be relied on [4], we compared the impact of recommendations based on expert review and consumer review. The understanding of employing third-party product review provides valuable implications in RA and electronic commerce literature. Second, this study contributes to recommendation timing literature by considering a consumer's preference inconsistency at two stages of decision-making: preferring larger consideration set when forming the consideration set and, making an easy-to-justify choice from the formed consideration set. While prior studies have mainly focused on one instant of recommendation provision, we compared two timing points and found that recommendation at the second stage of decision-making would bring higher decision difficulty to consumers. Third, while previous consumer research validated the existence of PIP, this study moves forward by drawing from the paradox to study RAs. It contributes to the PIP literature by indicating that consumers' preference inconsistency could be leveraged in understanding consumer behavior, such as the acceptance of online product recommendation.

Our study also provides practical implications for online merchants. First, in order to increase online shoppers' decision satisfaction, online merchants should provide good reasons for them to justify. Recommendations with expert review could be a better solution, compared to consumer review. Second, practitioners should avoid providing late recommendation when consumers are making final choice from a set of considered options. Recommendation at the choice-making stage may increase consumers' decision difficulty, which would have negative impacts on consumers' online shopping, such as reactance and a behavioral backlash that would result in consumers' purchase abandonment.

## References

1. Häubl, G., Murray, K.B.: Double agents. *MIT Sloan Management Review* 47, 8–12 (2006)
2. Fitzsimons, G.J., Lehmann, D.R.: Reactance to Recommendations: When Unsolicited Advice Yields Contrary Responses. *Market Sci.* 23, 82–94 (2004)
3. Ha, L.: Observations: Advertising clutter in consumer magazines: Dimensions and effects. *J. Advertising Res.* 36, 76–84 (1996)
4. Chan, J.C.F., Jiang, Z.H., Tan, B.C.Y.: Understanding Online Interruption-Based Advertising: Impacts of Exposure Timing, Advertising Intent, and Brand Image. *IEEE T. Eng. Manage* 57, 365–379 (2010)
5. Ho, S.Y., Bodoff, D., Tam, K.Y.: Timing of Adaptive Web Personalization and Its Effects on Online Consumer Behavior. *Inform Syst. Res.* 22, 660–679 (2011)
6. Chen, Y., Xie, J.: Third-Party Product Review and Firm Marketing Strategy. *Market Sci.* 24, 218–240 (2005)
7. Chen, Y.B., Xie, J.H.: Online consumer review: Word-of-mouth as a news element of marketing communication mix. *Manage Sci.* 54, 477–491 (2008)
8. Kahn, B.E., Lehmann, D.R.: Modeling Choice among Assortments. *J. Retailing* 67, 274–299 (1991)
9. Broniarczyk, S.M., Hoyer, W.D., McAlister, L.: Consumers' perceptions of the assortment offered in a grocery category: The impact of item reduction. *J. Marketing Res.* 35, 166–176 (1998)
10. Iyengar, S.S., Lepper, M.R.: When choice is demotivating: Can one desire too much of a good thing? *Journal of Personality and Social Psychology* 79, 995–1006 (2000)
11. Chernev, A.: Decision focus and consumer choice among assortments. *J. Consum Res.* 33, 50–59 (2006)
12. Chernev, A.: Product assortment and individual decision processes. *Journal of Personality and Social Psychology* 85, 151–162 (2003b)
13. Gensch, D.H., Javalgi, R.G.: The Influence of Involvement on Disaggregate Attribute Choice Models. *J. Consum Res.* 14, 71–82 (1987)
14. Moe, W.W.: An empirical two-stage choice model with varying decision rules applied to Internet clickstream data. *J. Marketing Res.* 43, 680–692 (2006)
15. Bulbul, C.: When consumers choose to restrict their options: Influence of concrete and abstract regret on choice set size preference. Graduate School of Business Administration, vol. Ph. D, p. 86. New York University, New York (2007)
16. Botti, S., Iyengar, S.S.: The Psychological Pleasure and Pain of Choosing: When People Prefer Choosing at the Cost of Subsequent Outcome Satisfaction. *Journal of Personality and Social Psychology* 87, 312–326 (2004)
17. Bown, N.J., Read, D., Summers, B.: The lure of choice. *Journal of Behavioral Decision Making* 16, 297–308 (2003)
18. Huffman, C., Kahn, B.E.: Variety for Sale: Mass customization or mass confusion? *J. Retailing* 74, 491–513 (1998)
19. Jacoby, J., Speller, D.E., Berning, C.K.: Brand Choice Behavior as a Function of Information Load: Replication and Extension. *The Journal of Consumer Research* 1, 33–42 (1974)
20. Malhotra, N.K.: Information Load and Consumer Decision Making. *The Journal of Consumer Research* 8, 419–430 (1982)
21. Simonson, I.: Choice Based on Reasons: The Case of Attraction and Compromise Effects. *The Journal of Consumer Research* 16, 158–174 (1989)
22. Dhar, R.: Consumer preference for a no-choice option. *J. Consum Res.* 24, 215–231 (1997)



23. Greenleaf, E.A., Lehmann, D.R.: Reasons for Substantial Delay in Consumer Decision Making. *The Journal of Consumer Research* 22, 186–199 (1995)
24. Luce, M.F., Payne, J.W., Bettman, J.R.: Emotional Trade-off Difficulty and Choice. *JMR, Journal of Marketing Research* 36, 143 (1999)
25. Bettman, J.R., Luce, M.F., Payne, J.W.: Constructive consumer choice processes. *The Journal of Consumer Research* 25, 187–217 (1998)
26. Meuter, M.L., Ostrom, A.L., Roundtree, R.I., Bitner, M.J.: Self-service technologies: understanding customer satisfaction with technology-based service encounters. *The Journal of Marketing* 64, 50–64 (2000)
27. Devaraj, S., Fan, M., Kohli, R.: Antecedents of B2C Channel Satisfaction and Preference: Validating e-Commerce Metrics. *Inform Syst. Res.* 13, 316–333 (2002)
28. Hoyer, W.D.: An Examination of Consumer Decision Making for a Common Repeat Purchase Product. *The Journal of Consumer Research* 11, 822–829 (1984)
29. Hsee, C.K.: Elastic Justification: How Tempting but Task-Irrelevant Factors Influence Decisions. *Organizational Behavior and Human Decision Processes* 62, 330–337 (1995)
30. Bickart, B., Schindler, R.M.: Internet forums as influential sources of consumer information. *J. Interact Mark* 15, 31–40 (2001)
31. Sela, A., Berger, J.: Justification and Choice. *Advances in Consumer Research* 36, 27–27 (2009)
32. Burson, K.A., Botti, S.: Choice Satisfaction Can Be the Luck of the Draw. *Advances in Consumer Research* 36 (2009)
33. Bottomley, P.A., Doyle, J.R., Green, R.H.: Testing the reliability of weight elicitation methods: Direct rating versus point allocation. *JMR, Journal of Marketing Research* 37, 508 (2000)
34. Steenkamp, J.-B., Van Trijp, H.: Attribute Elicitation in Marketing Research: A Comparison of Three Procedures. *Marketing Letters* 8, 153–165 (1997)
35. Kivetz, R., Zheng, Y.H.: Determinants of justification and self-control. *J. Exp. Psychol. Gen* 135, 572–587 (2006)