When Two Is Better Than One – Product Recommendation with Dual Information Processing Strategies

Wee-Kek Tan[1], Chuan-Hoo Tan[2], and Hock-Hai Teo[1]

[1] Dept. of Information Systems, National University of Singapore, Computing 1, 13 Computing Drive, Singapore 117417, Singapore
{tanwk,teohh}@comp.nus.edu.sg
[2] Dept. of Information Systems, City University of Hong Kong, 83 Tat Chee Avenue, Kowloon Tong, Hong Kong
ch.tan@cityu.edu.hk

Abstract. Extant literature on product recommendation decision aids mainly focus on the use of individual aids in isolation. However, consumers typically shop using a two-step decision making process that necessitates the provision of both detailed attributes information and overall utility value of an item. Drawing on the information processing strategy switching paradigm as the theoretical lens, this paper posits that consumers who are provided with an attribute(alternative)-based screening aid in conjunction with an alternative(attribute)-based explanation-supported evaluation aid would expend less decision effort. That is, one aid should provide either attribute-based or alternative-based information while the other aid should provide a different type of information. In this manner, consumers benefit from both types of information and enjoy a more efficient decision process.

Keywords: Product recommendation, online decision aid, information processing strategy, decision effort.

1 Introduction

Online shopping websites are known to provide multiple decision aids, rather than a single decision aid, to help increasingly sophisticated consumers find their products. For instance, Nextag (http://www.nextag.com) recommends products to consumers using decision aids such as product attributes filtering and relevance ranking tools. However, our review of the extant literature suggests that the bulk of the current understanding on product recommendation decision aids has predominantly been built on empirical investigations appreciating the impact of individual decision aids on consumer decision making behavior and performance [1, 2]. There exists a dearth of studies that examine how decision aids could be used jointly to affect consumer decision making process.

Two complementary streams of consumer research provide hints of how multiple decision aids could be used jointly to support purchase decision making. First, scholars

F.F.-H. Nah (Ed.): HCIB/HCII 2014, LNCS 8527, pp. 775–786, 2014.

have suggested that consumers require access to two types of product information when faced with product choices [3]. Specifically, consumers need detailed information regarding each and every property of a product (i.e., attribute-based information such as Nextag's product attributes filtering) and aggregated information on the overall utility of the product concerning all its properties (i.e., alternative-based information such as Nextag's relevance ranking) [3]. However, most extant decision aids typically provide either attribute-based or alternative-based information, but aids including both types of information are rare [4-6]. Thus, providing multiple decision aids would be expedient if the combination of decision aids collectively provides the desired dual product informational perspective.

Second, researchers have identified two key interrelated consumer decision tools that are often used together, i.e., the screening aid and explanation-supported evaluation aid, to make purchase decisions [1, 7, 8]. The screening aid supports the decision making process by assisting a consumer to filter out inferior alternatives that one would not even consider employing. The remaining screened alternatives are then assessed carefully as choices are made, and this process is known as evaluation [7, 8]. An explanation-supported evaluation aid offers explanations on why the individual alternatives are shortlisted with respect to consumer's elicited preferences [9]. Screening decision aids differ, depending on whether the filtering of product alternatives is based on specific product attributes like price range (i.e., is attribute-based) or whether the attractiveness of each alternative is based, for example, on its overall weighted score value (i.e., is alternative-based). Likewise, explanation-supported evaluation aids span across a spectrum highlighting pertinent attractive attributes such as the cheapest price (i.e., attribute-based) or alternative values such as computed quality value of each presented option (i.e., alternative-based).

Does a mixture of information processing strategies (i.e., with each decision aid supporting a different strategy) indeed yield a better decision performance? In this study, we draw on the information processing strategy switching paradigm [5, 10, 11] to posit that decision process is enhanced when there is a combination of screening and evaluation aids that facilitate both attribute-based and alternative-based information processing, without focusing solely on one form of information processing.

2 Theoretical Background

Our review of the extant decision aiding literature has generally shown that using decision support tools, consumers can benefit from lower search effort [2, 12, 13] and lower search time [14].

2.1 Information Processing Strategy Switching Paradigm

Of these, the work by Todd and Benbasat [15, 16], which relates decision aids to performance through the employment of an information processing strategy is particularly noteworthy. Todd and Benbasat [15, 16] perceived that if a decision aid exists which enables a consumer to employ a traditionally more cognitively demanding information processing strategy (e.g., alternative-based processing) that is as easy to

perform as a simpler but less accurate one (e.g., attribute-based processing), the use of that decision aid will induce the adoption of the alternative-based processing strategy, thus leading to an improved decision outcome. Moreover, the use of that decision aid would result in an improvement in the decision process (i.e., improvement in decision efficiency through reduction in decision effort). This line of thought perceives that the influence of a decision aid on decision outcome and process depends on the information processing strategy that is induced.

However, many of the extant studies have examined the impact of decision aids on decision process by conceptually simplifying the situations in which a consumer would adopt a single form of information processing strategy [2, 15, 16]. In reality, a consumer is not solely committed to adopting a single information processing strategy or dependent on one single decision aid throughout a decision making process [17]. More often than not, that consumer would utilize multiple information processing strategies (manifested by attribute-based processing and alternative-based processing) to make purchase decision, and this phenomenon is commonly known as the information processing strategy-switching paradigm [10].

This paradigm is rooted in the adaptive decision making principle advocated by Payne et al. [5], which proposes that a decision making process is dynamic and results in the adoption of the information processing strategies. Several factors are cited for prompting a switch in the adoption of an information processing strategy, including variations in product complexity, the size of the choice set, information presentation format, and time constraints [5, 11]. These factors are subsumed in the theory that a consumer engages in a dynamic yet responsive cognitive analysis of the decision environment by trading off positive and negative aspects of the adopted (or one being considered for adoption) information processing strategy. The outcomes of such analysis could trigger a change in the information processing strategy that is adopted [18].

A consumer often needs to make explicit choices (or switches) among the information processing strategies in order to process the product information and make an informed decision. Alternative-based processing, which allows more desirable attributes to compensate for less desirable attributes, is typically more cognitively demanding but generally leads a consumer into making a better choice [1]. On the contrary, attribute-based processing requires less cognitive effort but may not necessarily result in a consumer making a better decision [5, 7]. The switching between information processing strategies enables a consumer to leverage on the positive features of a strategy (e.g., attribute-based screening) and use another strategy (e.g., alternative-based evaluation) to compensate for the shortcomings of the previously adopted strategy. Overall, the decision making process should thus become more efficient in term of expending lower cognitive effort.

2.2 Screening and Evaluation Aids

Commercial implementations of decision aids mainly manifest as screening aids and explanation-supported evaluation aids [1, 8]. A screening aid is an automated implementation of a specific information processing strategy to support the decision-making

process [2]. This is done by presenting a list of product alternatives according to a consumer's elicited preferences. An explanation-supported evaluation aid has an additional function of offering explanations on why the individual alternatives are presented with respect to a consumer's elicited preferences [9]. These two types of decision aids are often used together since they support a consumer in different but sequential stages of purchase decision making [1, 2]. They are also able to reduce consumer's decision effort [2, 12, 14].

Screening aids differ depending on whether they support attribute-based processing (e.g., elimination-by-aspects strategy) or alternative-based processing (e.g., weighted additive strategy). An attribute-based screening aid helps consumer to delineate the currently most important product attribute and its minimum threshold value before eliminating undesirable alternatives based on this threshold value [5, 19]. An alternative-based screening works differently by considering the values of each alternative on all the relevant attributes [5]. The aid first prompts consumer to delineate the importance of each product attribute to derive an overall weighted additive score. It then calculates the weighted additive score of each product attribute and screens off those whose score is below the consumer's preference to reduce the consumer cognitive processing load.

An explanation-supported evaluation aid solicits the consumer's preferences and executes a particular information processing strategy to obtain a set of matching recommendations. The evaluation aid then explains how and why it recommends the specific set of alternatives [20]. An alternative-based evaluation aid provides numerical ranking, percentage rating or star rating to summarize the overall quality of the alternatives with respect to all evaluated attributes.

Using screening aids and evaluation aids in conjunction could support a consumer's need to switch between information processing strategies. This is accomplished by facilitating that consumer's use of alternative-based (attribute-based) processing during the first stage of product screening and to attribute-based (alternative-based) processing during the second stage evaluation [10, 11, 21].

3 Research Model and Hypotheses

The thesis of this study is that decision aids could improve decision process by allowing a consumer to utilize multiple information processing strategies, e.g., leveraging on the positive features of one information processing strategy (e.g., attribute-based screening) and use another strategy (e.g., alternative-based evaluation) to compensate for the shortcomings of the first strategy. More specifically, instead of having screening aids and explanation-supported evaluation aids that support a single form of processing (i.e., attribute-based processing or alternative-based processing, but not both), decision aids that enable a consumer to use alternative-based (attribute-based) processing during the first stage of product screening and attribute-based (alternative-based) processing during the second stage evaluation could yield a more efficient decision process. The research model is depicted in Fig. 1 below.

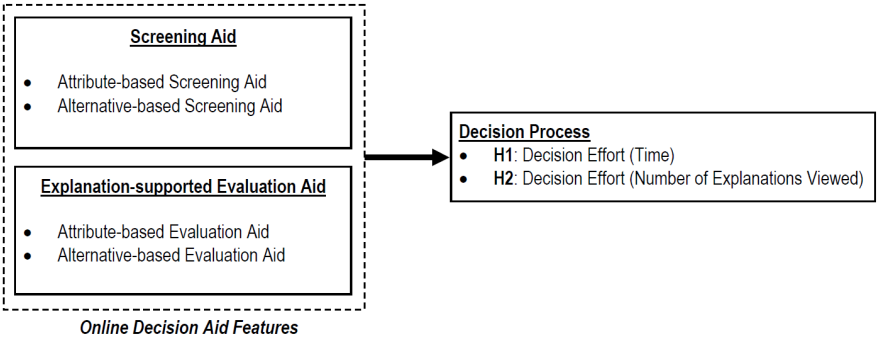

Fig. 1. Research model

Decision process is assessed through decision effort using two objective measures. Decision effort (time) is the mean amount of time expended by the consumers to screen and evaluate the product alternatives, i.e., the result set, recommended by the screening aid. Decision effort (number of explanations viewed) is the number of explanation-supported explanations presented by the decision aids that are viewed by the consumers in order to arrive at their purchase decisions.

3.1 Decision Effort (Time)

Decision makers are known to favor the adaptive use of multiple information processing strategies in order to achieve a high level of accuracy with minimum effort [22]. For instance, in order to reduce decision effort, decision makers tend to use an initial attribute-based processing strategy to eliminate some of the available alternatives before scrutinizing the remaining ones by using an alternative-based processing strategy [23].

Scholars researching on the joint impact of information presentation formats and task demand on information processing have also made similar finding [24, 25]. Specifically, users of the attribute presentation format assigned to perform the task eliciting attribute processing strategy may employ an attribute-based information acquisition strategy initially, but subsequently switch to an alternative-based information evaluation strategy [26]. This is because the attribute presentation format apparently results in a longer decision time compared to an alternative presentation format for attribute tasks. This suggests the plausibility that consumers provided with an attribute-based (alternative-based) screening aid would prefer attribute-based (alternative-based) processing in the first stage but opt for the alternative-based (attribute-based) processing in the second stage, i.e., the alternative-based (attribute-based) evaluation aid, in an attempt to minimize errors and effort related to the product evaluation task.

This line of reasoning is consistent with the overall prediction of the switching paradigm, which posits that consumers could be inclined toward making a compromise between making the right decision and reducing the effort required [11]. Accordingly, we hypothesize that:

H1: *The joint usage of an attribute-based (alternative-based) screening aid and an alternative-based (attribute-based) evaluation aid could lead to lesser decision-making time compared with a combination of a screening aid and an evaluation aid that uses the same type of information processing strategy.*

3.2 Decision Effort (Number of Explanations Viewed)

When the alternatives are presented to a consumer for evaluation, an explanation-supported evaluation aid could serve to reduce the decision-making effort. Explanation-supported online decision aids assist consumers in learning about how the recommended product alternatives match their preferences and thus enable them to make an informed purchase decision [4]. Indeed, consumers are more inclined towards accepting the recommendations made by online decision aids that provide explanations for their recommendations [27]. To the extent that providing screening and evaluation aids that fit induces cognitive resource congruence and enhances the persuasiveness of the online decision aids, consumers should be persuaded to make a purchase decision by simply viewing the few explanations of the selected alternatives. Consequently, the overall number of explanations that the consumer needs to view should be lower in comparison to the use of decision aids that do not fit.

This view is in accordance with the resource-matching theory [28], which explains and predicts the utilization of cognitive resources to process information for a given task. Briefly, the theory states that judgments are affected by the balance between the cognitive resources available to process the information and those required for the task. When there is congruence between the cognitive resources required and those made available, information elaboration and processing are enhanced, thus leading to an increase in persuasion [28, 29]. However, cognitive resource congruence does not always occur. When the message recipient does not possess sufficient resources to elaborate on the message, it is necessary to reduce the resources required for message processing [28].

In fact, within our present context, the consumers inherently possess limited information processing capability [30]. Accordingly, the online decision aid must provide fitting features across the two stages of the consumer decision-making process that facilitates the reduction of the overall decision effort required. In this manner, consumers would then be able to redeploy the conserved cognitive effort towards elaborating the product recommendations and explanations. Leading from this and consistent with the switching paradigm [10, 11], the use of attribute-based processing during either stage one or two can achieve the required cognitive effort reduction. In other words, combining an attribute-based screening aid with an alternative-based evaluation aid or an alternative-based screening aid with an attribute-based evaluation aid should therefore lead to an increase in the perceived persuasiveness of the online decision aid. Accordingly, we hypothesize that:

H2: *The joint usage of an attribute-based (alternative-based) screening aid and an alternative-based (attribute-based) evaluation aid could lead to the viewing of a smaller number of explanations compared with a combination of a screening aid and an evaluation aid that uses the same type of information processing strategy.*

4 Research Methodology

4.1 Research Design

A 2x2 full factorial experimental design was used to investigate the effects of online decision aids on consumer decision making process within the context of a multi-alternative, multi-attribute purchasing context. The hypothesized information processing strategy switching effect was induced by providing two groups of participants with an attribute-based (alternative-based) screening aid and an alternative-based (attribute-based) evaluation aid. The other two groups of participants who were assigned an attribute-based (alternative-based) screening aid and an attribute-based (alternative-based) evaluation aid would only be able to employ either one but not both forms of information processing strategy.

Decision effort (time) was operationalized as the mean amount of time taken by the consumers to screen and evaluate the product alternatives recommended by the screening aid. Decision effort (number of explanations viewed) was measured as the number of instances the participant clicked on the view explanation link of a particular alternative in the result set listing page. Both decision time and number of explanations viewed were calculated for each of the purchase tasks performed by the participant.

4.2 Experimental Controls

The individual differences of the participants such as age, gender and experience, which could potentially affect decision making and its outcomes, were controlled by random assignment of participants to different treatments. The physical environment, i.e. the computer laboratory, workstation and software, were similar for participants across treatments. No other additional online shopping website feature that could aid in the decision making process was provided to avoid any confounding effect.

Prior research study has suggested that there could be a significant interaction between product category knowledge and decision quality [13]. We argue that if a participant's prior category knowledge is extensive; that participant might not give due consideration to the recommendations and explanations provided by the decision aids. Consequently, the amount of time that a participant spent on making the purchase decision might be affected. It is also plausible that an experienced participant might disregard the explanations provided by the decision aid. Thus, it is imperative to control for the participants' prior product knowledge statistically. In our study, prior product knowledge was measured before the administering of each purchase task, by using a four-item seven-point Likert scale adapted from Smith and Park [31].

4.3 Experimental Task and Participants

For the experimental task, each participant was required to complete three purchase tasks, with the assistance of the assigned online decision aid, involving one from each of the following three product categories: 1) thumbdrive, 2) MP3 player and 3) digital camera. The selection of these three product categories was specifically based on the problem size classification, along the two dimensions of alternative size and attribute size that is commonly used in decision making studies [17]. In particular, the

three product categories ranged from simple (i.e. thumbdrive), moderate (i.e. MP3 player) to complex (i.e. digital camera) in terms of problem size as the number of alternatives and/or attributes increased. No time limit was enforced and participants were allowed to complete the purchase tasks at their own pace. The participant's sequence of purchase was balanced within each treatment. Three sequences were used in the experiment with the first sequence being Thumbdrive, MP3 Player and Digital Camera. The remaining two sequences were the left circular shift of the first.

A total of 64 participants (16 per treatment) were recruited through electronic mail. Participants were students from a public university. The participants were paid a small cash amount for their time spent participating in the experiment.

5 Results

5.1 Descriptive Statistics and Instrument Scale Reliability

Among the 64 participants, 30 (46.9%) were male and 34 (53.1%) were female. The ages of the majority of the participants ranged between 20-23 (62.5%) and 24-27 (29.7%). Most of the participants were full-time undergraduates of the university. Individual characteristics such as age, gender and prior product knowledge that could potentially affect online decision making and its outcome were controlled through random assignment of participants to the various treatments. Further control checks indicated no significant difference for participants in all four treatments. The Cronbach's Alpha for prior product knowledge was 0.916.

5.2 Manipulation Check

In order to determine whether an alternative-based screening aid was indeed more cognitively taxing compared to an attribute-based screening aid, the participants were also asked to rate the assigned online design aid on a 7-point scale using the statement: "I find it very easy to define the search criterions ." An independent samples t-test indicates that participants rated the alternative-based screening aid as significantly less easy to use than the attribute-based screening aid (MeanAlternative = 4.438, δ = 1.390, MeanAttribute = 5.594, δ = 1.132, t = -3.649, p = 0.001 **).

However, although the mean number of product alternatives returned by the online design aid with the alternative-based screening aid is larger than the online design aid with the attribute-based screening aid, this difference did not reach statistical significance ($Mean_{Alternative}$ = 142.950, δ = 160.203, $Mean_{Attribute}$ = 123.221, δ = 116.040, t = 1.062, p = 0.290 n.s.). Nonetheless, participants are likely to have switched between information processing strategies as predicted by the switching paradigm [10, 11]. Thus, we may reasonably attribute the results of the hypotheses testing to the predictions of the switching paradigm.

5.3 Hypotheses Testing

All the two hypotheses were tested using univariate analysis of covariance (ANCOVA). Purchase sequence, product categories (two dummy variables for the MP3 player and digital camera) and prior product knowledge were used as covariates.

Prior to conducting the univariate ANCOVA, we first performed multivariate analysis of covariance (MANCOVA) to determine if the dependent variables differed across the four treatments. Bonferroni adjustment was applied to control for overall Type I errors based on six pairwise comparisons for the four different treatments. The baseline significance level for all statistical tests was 0.05. Thus, the MANCOVA was performed at the 0.0083 significance level while Wilks' Lambda for the two-way interaction between the screening aid and the explanation-supported evaluation aid was 0.914 ($p < 0.001$). We further observed that all two dependent variables were statistically different. It was therefore deemed appropriate to proceed with the univariate ANCOVA for each of the two dependent variables.

Significant two-way interactions were detected for all two dependent variables and they were further tested with simple effect analysis using the split samples t-test [32]. The mean and standard deviations of the three dependent variables are shown in Table 2. The dependent variables were measured once for each purchase task. Each participant was asked to complete three purchase tasks. Thus, the sample size was 48 for each treatment or 192 samples altogether.

Table 1. Mean and standard deviations of dependent variables

Screening Aid	Explanation-supported Evaluation Aid	Decision Effort (Time)	Decision Effort (Explanation Viewed)
Attribute-based	Attribute-based	0.414 ($\delta = 0.358$)	3.935 ($\delta = 4.117$)
	Alternative-based	0.309 ($\delta = 0.229$)	1.826 ($\delta = 2.132$)
Alternative-based	Attribute-based	0.475 ($\delta = 0.371$)	2.000 ($\delta = 2.096$)
	Alternative-based	0.771 ($\delta = 0.568$)	5.744 ($\delta = 12.905$)

The two-way interaction between the screening aid and the evaluation aid was significant for decision effort (time) (see Table 3). The results of the simple effect analysis (see Table 4) indicate that in the presence of the alternative-based screening aid, participants using the online design aid with the attribute-based evaluation aid reported a significantly lower decision effort (time) than those using the online design aid with the alternative-based evaluation aid. The reverse prediction did not reach statistical significance. Thus H1 was only partially supported.

Table 2. Univariate ANCOVA results

	Decision Effort (Time)		Decision Effort (Explanations Viewed)	
Factor	*F*	Significance	*F*	Significance
Purchase Sequence	11.240	$p = 0.001$ **	9.872	$p = 0.002$ **
Product Category – MP3 Player	4.738	$p = 0.031$ *	0.346	$p = 0.557$ n.s.
Product Category – Digital Camera	7.047	$p = 0.009$ **	3.205	$p = 0.075$ n.s.
Prior Product Knowledge	0.028	$p = 0.867$ n.s.	1.259	$p = 0.263$ n.s.
Screening Aid	2.959	$p < 0.001$ ***	1.459	$p = 0.229$ n.s.
Explanation-supported Evaluation Aid	0.375	$p = 0.113$ n.s.	0.527	$p = 0.469$ n.s.
Screening Aid × Explanation-supported Evaluation Aid	1.762	$p = 0.001$ **	9.286	$p = 0.003$ **

The two-way interaction between the screening aid and the evaluation aid was significant for decision effort (number of explanations viewed) (see Table 3). The results of the simple effect analysis (see Table 4) indicate that in the presence of the attribute-based screening aid, participants using the online decision aid with the alternative-based evaluation aid reported a significantly lower decision effort (number of explanations viewed) than those using the online decision aid with the attribute-based evaluation aid. The reverse prediction did not reach statistical significance. Thus H2 was only partially supported.

Table 3. Summary of hypotheses testing results (simple effect analysis)

Hypothesis	Data Split by Screening Aid			
	Attribute-based		Alternative-based	
	Hypothesis	Result	Hypothesis	Result
Explanation-supported Evaluation Aid: Attribute-based versus Alternative-based				
H1: Decision Effort (Time)	Alternative-based < Attribute-based	$t = 1.678$, $p = 0.097$ Marginally Supported	Attribute-based < Alternative-based	$t = -2.943$, $p = 0.004$ Supported **
H2: Decision Effort (Number of Explanations Viewed)	Alternative-based < Attribute-based	$t = 3.085$, $p = 0.003$ Supported **	Attribute-based < Alternative-based	$t = -1.962$, $p = 0.053$ Marginally Supported
Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$				

6 Conclusion

In this study, we have identified the screening aid and the explanation-supported evaluation aid as two pertinent features of online decision aids, and we posit that both are capable of supporting consumers across a commonly-adopted two-stage decision making process [21, 22]. Drawing on the information processing strategy switching paradigm [10, 11], we further theorize that an online decision aid with a screening aid that supports a specific information processing strategy and an explanation-supported evaluation aid that supports another strategy can assist consumers in achieving a more efficient decision making process [5, 22]. The results of a carefully designed and executed laboratory experiment largely supported our hypotheses.

This study contributes to the extant literature in two major aspects. First, it is one of the first to examine and predict the interaction effects of two types of decision tools. Second, it utilizes the information processing strategy switching paradigm to formulate a theoretical model for predicting consumer decision making behavior and performance. Although the information processing strategy switching paradigm has been traditionally referenced in multi-alternative and multi-attribute decision making literature, our present study represents possibly the first attempt at applying it in an online consumer-aided decision-making context. Essentially, through applying this theoretical lens to hypothesize the interaction effects of the screening and evaluation supports, we are able to develop a more nuanced understanding of the impact of the usage of multiple decision aids in an online consumer decision-making environment that is characterized by a two-stage consumer decision making process.

References

1. Xiao, B., Benbasat, I.: E-Commerce Product Recommendation Agents: Use, Characteristics and Impact. MIS Quarterly 31(1), 137–209 (2007)
2. Häubl, G., Trifts, V.: Consumer Decision Making in Online Shopping Environments: The Effects of Interactive Decision Aids. Marketing Science 19(1), 4–21 (2000)
3. Howard, J.A., Sheth, J.N.: The Theory of Buyer Behavior. John Wiley, New York (1969)
4. Gregor, S., Benbasat, I.: Explanations from Intelligent Systems: Theoretical Foundations and Implications for Practice. MIS Quarterly 23(4), 497–530 (1999)
5. Payne, J.W., Bettman, J.R., Johnson, E.J.: The Adaptive Decision Maker. Cambridge University Press (1993)
6. Tan, C.H., Teo, H.H., Benbasat, I.: Assessing Screening and Evaluation Decision Support Systems: A Resource-Matching Approach. Information Systems Research 21(2), 305–326 (2010)
7. Edwards, W., Fasolo, B.: Decision Technology. Annual Review of Psychology 52, 581–606 (2001)
8. Alba, J., Lynch, J., Weitz, B., Janiszewski, C., Lutz, R., Sawyer, A., Wood, S.: Interactive Home Shopping: Consumer, Retailer and Manufacturer Incentives to Participate in Electronic Marketplaces. Journal of Marketing 61(3), 38–53 (1997)
9. Slade, S.: Generating Explanations for Goal-Based Decision Making. Decision Sciences 23(6), 1440–1461 (1992)
10. Roe, R.M., Busemeyer, J.R., Townsend, J.T.: Multialternative Decision Field Theory: A Dynamic Connectionist Model of Decision Making. Psychological Review 108(2), 370–392 (2001)
11. Swait, J., Adamowicz, W.: The Influence of Task Complexity on Consumer Choice: A Latent Class Model of Decision Strategy Switching. Journal of Consumer Research 28(1), 135–148 (2001)
12. Häubl, G., Murray, K.B.: Double Agents: Assessing the Role of Electronic Product Recommendation Systems. MIT Sloan Management Review 47(3), 8–12 (2006)
13. Swaminathan, V.: The Impact of Recommendation Agents on Consumer Evaluation and Choice: The Moderating Role of Category Risk, Product Complexity, and Consumer Knowledge. Journal of Consumer Psychology 13(1/2), 93–101 (2003)
14. Vijayasarathy, L.R., Jones, J.M.: Do Internet Shopping Aids Make a Difference? An Empirical Investigation. Electronic Markets 11(1), 75–83 (2001)
15. Todd, P., Benbasat, I.: Evaluating the Impact of DSS, Cognitive Effort and Incentive on Strategy Selection. Information Systems Research 19(4), 356–374 (1999)
16. Todd, P., Benbasat, I.: Inducing Compensatory Information Processing through Decision Aids that Facilitate Effort Reduction: An Experimental Assessment. Journal of Behavioral Decision Making 13, 91–106 (2000)
17. Bettman, J.R., Luce, M.F., Payne, J.W.: Constructive Consumer Choice Processes. Journal of Consumer Research 25(3), 187–217 (1998)
18. Kleinmuntz, D.N., Schkade, D.A.: Information Displays and Decision Processes. Psychological Science 4(4), 221–227 (1993)
19. Tversky, A.: Elimination by Aspects: A Theory of Choice. Psychological Review 79, 281–299 (1972)
20. Chandrasekaran, B., Tanner, M.C., Josephson, J.R.: Explaining Control Strategies in Problem Solving. IEEE Expert: Intelligent Systems and Their Applications 4(1), 19–24 (1989)
21. Payne, J.W.: Contingent Decision Behavior. Psychological Bulletin 92(2), 382–402 (1982)

22. Payne, J.W., Bettman, J.R., Johnson, E.J.: Adaptive Strategy Selection in Decision Making. Journal of Experimental Psychology: Learning, Memory, and Cognition 14(3), 534–552 (1988)
23. Lussier, D.A., Olshavsky, R.W.: Task Complexity and Contingent Processing in Brand Choice. Journal of Consumer Research 6(2), 154–165 (1979)
24. Bettman, J.R., Kakkar, P.: Effects of Information Presentation Format on Consumer Information Acquisition Strategies. Journal of Consumer Research 3, 233–240 (1977)
25. Bettman, J.R., Zins, M.A.: Information Format and Choice Task Effects in Decision Making. Journal of Consumer Research 6, 141–153 (1979)
26. Jarvenpaa, S.L.: The Effect of Task Demands and Graphical Format on Information Processing Strategies. Management Science 35(3), 285–303 (1989)
27. Herlocker, J.L., Konstan, J.A., Riedl, J.T.: Explaining Collaborative Filtering Recommendations. In: 2000 ACM Conference on Computer Supported Cooperative Work, pp. 241–250 (2000)
28. Anand, P., Sternthal, B.: Strategies for Designing Persuasive Messages: Deductions from the Resource Matching Hypothesis. In: Cafferata, P., Tybout, A.M. (eds.) Cognitive and Affective Responses to Advertising, Lexington, MA, pp. 135–159 (1989)
29. Meyers-Levy, J., Peracchio, L.A.: Understanding the Effects of Color: How the Correspondence between Available and Required Resources Affects Attitudes. Journal of Consumer Research 22(2), 121–138 (1995)
30. Simon, H.A.: A Behavioral Model of Rational Choice. Quarterly Journal of Economics 69(1), 99–118 (1955)
31. Smith, D.C., Park, C.W.: The Effects of Brand Extensions on Market Share and Advertising Efficiency. Journal of Marketing Research 29, 296–313 (1992)
32. Keppel, G.: Design and Analysis: A Researcher's Handbook. Prentice Hall, Upper Saddle River (1991)