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2008/33/MKT

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7 May 2008

The authors thank Pierre Chandon and Kyle Murray for their helpful comments on a previous draft; Pallavi Chilappagari, William Fisk, Alpika Mishra, and Ananth Raman for programming assistance; Cécile Adam and Pradeep Kumar Mittal for help with the data collection; and R&D INSEAD for financial support.

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ABSTRACT

When Electronic Recommendation Agents Backfire: Negative Effects on Choice Satisfaction, Attitudes, and Purchase Intentions

The increasing breadth and complexity of information about product features available in the marketplace, especially online, has increased the difficulty of many purchase decisions. In order to assist consumers with these decisions, many websites provide electronic recommendation agents that ask users questions about individual factors and their preferences for product attributes and then rate and rank order the available products on the basis of their responses. In an era in which consumers often feel overwhelmed by the complexity of choice, previous research has hailed electronic recommendation agents as coming to the rescue by offering a quick and efficient means for consumers to form their consideration sets. However, in this article we report the results of an experiment in which use of an electronic recommendation agent negatively impacted participants' choice satisfaction, attitudes, and purchase intentions over a period of between one and two weeks. The data support our hypothesis that use of an electronic recommendation agent leads consumers to overweight utilitarian product attributes and underweight peripheral and trivial hedonic attributes in choice.

Popular online nutrition retailers offer consumers a selection of highly nutritious foods, drinks, and dietary supplements. Often these health and fitness products are comprised of a complex set of functional attributes. For example, nutrition bars, which saw annual sales growth of 12.7% between 2004 and 2007 and are forecast to constitute a $982 million market by 2011 (Winter 2008), vary in terms of calories, fat content, fiber content, glycemic index, protein to carbohydrate ratio, protein quality, and vitamin and mineral content, among others. Furthermore, the combination of attributes that is best for a given consumer depends on a variety of individual factors, such as age, eating patterns, exercise frequency and intensity, gender, and strength and weight goals, among others.

This example illustrates how the increasing amount and complexity of feature information, particularly in online environments, has made selecting the right brand or product increasingly difficult (see Rust, Thompson, and Hamilton 2006; Thompson, Hamilton, and Rust 2005). Since consumers do not want more product information per se, but rather the ability to be fully informed and to make a choice that is optimal for them (Pine, Peppers, and Rogers 2005), it follows that the attractiveness of the increased amount and complexity of information offered by internet retailers depends on the ability of consumers to use it effectively (Alba et al. 1997).

Product recommendation websites (e.g., MyProductAdvisor.com, MyShoppingPal.com) assist consumers in making complex purchase decisions in diverse product categories, such as athletic shoes, automobiles, computers, home appliances, mobile phones, and wine, among others. These websites provide electronic recommendation agents that first ask users questions about their preferences for product attributes and about individual factors, and then rate and rank order available products on the basis of their responses. The goals of these agents include improving decision quality and increasing satisfaction (West et al. 1999).

Although previous research has extensively examined the influence of electronic recommendation agent use on decision quality (e.g., Fitzsimmons and Lehmann 2004; Haubl and Trifts 2000; Swaminathan 2003), far less research has examined effects on satisfaction. Furthermore, those papers that have examined satisfaction have primarily focused on satisfaction with the choice process (Bechwati and Xia 2003; Widing and Talarzyk 1993), rather than on satisfaction with the choice itself, which is a separate construct (Zhang and Fitzsimons 1999). However, choice satisfaction is important to marketers, since it has been shown to influence attitudes and purchase intentions (Oliver 1980).

In this article, we examine how use of an electronic recommendation agent for nutrition bars impacts consumers' choice satisfaction, attitudes, and purchase intentions over a period of one to two weeks, the time frame in which repurchase decisions for nutrition bars are typically made. We hypothesize that use of an electronic recommendation agent leads consumers to overweight functional product attributes and underweight peripheral and perhaps trivial hedonic cues in the choice environment (e.g., package aesthetics), thereby leading to negative outcomes. We report the results of an experiment that support this hypothesis.

ELECTRONIC RECOMMENDATION AGENTS

Agents to the Rescue

Consumers make decisions every time they shop. These decisions are often complex, due to the increasing amount and complexity of feature information available in many categories (Rust et al. 2006; Schwartz 2000; Thompson et al. 2005). Consumers can only effectively utilize a limited amount of information when making decisions (Jacoby, Speller, and Berning 1974; Shugan 1980). Furthermore, due to an inherent trade-off between effort and accuracy in decision making, consumers frequently make choices that are satisfactory yet

suboptimal, especially in the presence of large amounts of information and when the alternatives are difficult to compare (Payne, Bettman, and Johnson 1993). Due to the processing difficulties that consumers encounter in the presence of large amounts of information, it follows that even simple screening mechanisms, such as a list of available products in a category, ordered by the feature of interest, can improve the quality of consumers' purchase decisions (Russo 1977).

The development of Internet retailing has expanded the amount and complexity of feature information available, thereby creating demand for more sophisticated screening mechanisms. Product recommendation websites have satisfied this demand by developing electronic recommendation agents to assist consumers in making complex purchase decisions (West et al. 1999). These recommendation agents may be thought of as "super sales associates" that never get sick, are not moody, learn quickly, and never forget (Alba et al. 1997, p. 42).

Influence on Consumer Choice

In support of the initial praise given to electronic recommendation agents (Alba et al. 1997; West et al. 1999), research suggests that use of such agents can have beneficial effects on consumer choice. For example, Haubl and Trifts (2000) showed that use of an electronic recommendation agent can reduce the effort that consumers expend searching for product information, while simultaneously improving the quality of their choices. Nevertheless, this beneficial influence is not universal, and has been shown to depend on moderators such as the type of recommendation algorithm employed by the agent (Widing and Talarzyk 1993), the level of risk associated with the product category (Swaminathan 2003), the degree to which the agent's recommendations confirm or contradict users' initial product impressions (Fitzsimmons and Lehmann 2004), and the user's focus on either reducing decision making

effort or increasing decision quality (Todd and Benbasat 1991, 1992, 1999). Research has also shown that use of an electronic recommendation agent can increase consumers' satisfaction with the choice process, especially if the agent seems to reduce decision making effort (Bechwati and Xia 2003), recommends only a few products (Widing and Talarzyk 1993), or makes recommendations that confirm consumers' initial impressions (Fitzsimons and Lehmann 2004). Ironically, consumers can be satisfied with the process of using an electronic recommendation agent even when use of the agent reduces the quality of their choices (Fitzsimons and Lehmann 2004; Widing and Talarzyk 1993).

Choice Satisfaction. Although research has examined the impact of recommendation agent use on choice quality and choice process satisfaction, it has all but ignored the potential for electronic recommendation agent use to influence satisfaction with the choice itself, which is a separate construct (Zhang and Fitzsimons 1999). Choice satisfaction, which influences attitudes and purchase intentions (Oliver 1980), is important to marketers. The only paper published to date that has examined the impact of recommendation agent use on choice satisfaction focused on college choice decisions of high school students (Kmett, Arkes, and Jones 1999). The study found that the use of the recommendation agent did not affect the satisfaction of students who already had opinions about which college attributes (e.g., size of student body, location, cost of tuition, public or private status) were most important to them, whereas use of the recommendation agent increased the satisfaction of students who did not have opinions about which college attributes were most important. In this research, we extend the work of Kmett et al. (1999) by examining the impact of recommendation agent use on choice satisfaction when selecting a frequently purchased product, a nutrition bar. Such a choice is fundamentally different from college choice. Choice of colleges has been argued to be cognitive in nature (Kmett et al. 1999; Millar and Tesser 1986, 1989), whereas choice of consumable products such as nutrition bars is likely to be

based on both affective and cognitive cues (Darke, Chattopadhyay and Ashworth 2006). Thus, this research extends our understanding by examining whether use of an electronic recommendation agent that is similar to those available online (e.g., MyProductAdvisor.com, MyShoppingPal.com) affects consumers' satisfaction with a fast moving consumer good that is commonly purchased online. We focus on a choice situation in which a large quantity of product information is provided about each alternative and peripheral brand specific hedonic cues are also present.

HEDONIC AND UTILITARIAN CONSIDERATIONS IN CHOICE

It is well recognized in the marketing literature that consumer choices are driven by both hedonic and utilitarian considerations (e.g., Darke et al. 2006; Dhar and Wertenbroch 2000; Shiv and Fedorikhin 1999; Zajonc and Markus 1982). Characteristics of a choice task can influence the relative weight that consumers place on these two types of criteria. For example, Wilson et al. (1993) had participants either report reasons for choosing a particular poster or not. They found that participants who articulated reasons chose different posters than did those who did not analyze reasons, and were also less satisfied with their choices when contacted several weeks later. Wilson et al. (1993) suggest that these differences in choice and satisfaction stemmed from a tendency of participants to place more weight on the articulated attributes than they normally would when choosing. Furthermore, Wilson and Dunn (1985) provide evidence that articulated reasons are more often utilitarian than hedonic. Related research has shown that including a particular product attribute in an electronic recommendation agent's algorithm leads consumers to place more weight on that attribute when making purchasing decisions (Haubl and Murray 2001, 2003; see also Mandel and Johnson 2002).

Internet retail websites typically provide both functional product information and product related hedonic cues. For example, websites that sell highly nutritious foods such as nutrition bars typically provide detailed functional information about each product (e.g., ingredients, nutrition facts) and also pictures of the product packages and endorsers (typically regular people with good physiques), which can elicit a hedonic response. An examination of a large number of electronic recommendation agents available online suggests that those that base their recommendations on users' expressed preferences for product attributes focus almost exclusively on utilitarian attributes. These agents do not focus on peripheral and trivial hedonic attributes such as product aesthetics, a cue that we manipulate in our experiment. Including such peripheral and trivial attributes in recommendation agent algorithms would likely not be useful, because it is unlikely that consumers would be able to reasonably articulate the role of such cues in their choices. As our pretesting revealed, consumers rate the importance of such elements in choice as insignificant.

The question we ask is: to what extent do peripheral hedonic cues such as pack shots and pictures of everyday (not celebrity) product endorsers influence consumers' product choices and their satisfaction with these products? Furthermore, we examine the extent to which failing to include this information in the algorithms of electronic recommendation agents leads consumers to make choices with which they are later less satisfied. The evidence reviewed above suggests that since electronic recommendation agents do not, or perhaps meaningfully cannot, incorporate such peripheral hedonic cues into their algorithms, these cues would receive less weight when consumers make a choice with the aid of a recommendation agent than without. However, since research shows that peripheral and trivial hedonic cues affect choices (Shiv and Fedorikhin 1999) even under high levels of involvement (Darke et al. 2006), to the degree that use of an electronic recommendation agent leads consumers to underweight such hedonic cues, consumers should make different

choices as a function of whether they use an agent or not, and those who do use an agent should later feel less satisfied as a result.

We also examine how use of an electronic recommendation agent affects consumers' ratings of the taste of these nutrition bars. Sensory experience, including taste, can be ambiguous or open to multiple interpretations (Sabini and Silver 1982). Sensory experiences when consuming nutrition bars are particularly likely to be ambiguous, since consumers may not have strong expectations about how a nutrition bar should taste, smell, or feel. To the degree that this is true, consumers' may evaluate their sensory experiences with nutrition bars by generalizing from broader evaluations such as their overall satisfaction with the bars, much as general product advertising is likely to influence such evaluations when product experience is ambiguous (Deighton 1984; Ha and Hoch 1989; Hoch and Ha 1986).

Furthermore, lower satisfaction should affect consumers' liking of the chosen product and their intentions to purchase it in the future, as observed by Oliver (1980). In turn, lower attitudes and purchase intentions should reduce consumers' willingness to recommend the product to friends, thereby reducing market success, as observed by Moldovan, Goldenberg, and Chattopadhyay (2006). It is noteworthy that the variables that we study are both theoretically and managerially important.

EXPERIMENT

Overview

We chose to conduct the experiment within the nutrition bar product category, since advertising for nutrition bars typically focuses on either functional product attributes (e.g., calories, fat content, protein content) or hedonic cues (e.g., package design, attractiveness of spokespeople who endorse the brand). Furthermore, examination of the nutrition bars available at several local grocery stores and nutrition websites (e.g., NutritionDeals.com)

revealed that relatively utilitarian brands (i.e., those that offer excellent functional attributes but unappealing hedonic cues) and relatively hedonic brands (i.e., those that offer appealing hedonic cues but poor functional attributes) are both quite common.

The experimental design had two between-subjects conditions (recommendation agent vs. control). People recruited from the streets outside a behavioral laboratory near a large, urban university were assigned to one of the conditions and asked to examine descriptions of eight brands of nutrition bars and to select one of these brands to sample at home. At the conclusion of the in-lab portion of the experiment, participants received a package containing five sample bars of the brand that they had selected. One week after the experimental session, participants received an email that contained a link to an online follow-up survey that assessed their overall satisfaction with the brand that they had selected, as well as their taste perceptions, purchase intentions, and willingness to recommend the brand to friends.

Materials

Nutrition Bar Brands. We developed detailed descriptions of eight fictitious brands of nutrition bars. Each description consisted of two relatively trivial hedonic cues (a picture of the brand's package, and pictures of male and female non-celebrity spokespeople who endorse the brand) and a broad range of functional attributes that were described in a nutrition facts table and an ingredients list. We chose these particular hedonic cues and functional attributes, since all of them feature in nutrition bar advertising and in-store product displays. We designed the brands such that four were relatively hedonic and four were relatively utilitarian. Descriptions of each of the hedonic brands (Avalanche, Energy Rush, Extra Set, Jordan Size) were comprised of hedonic cues that had received high ratings in a pretest and functional attributes that had received low ratings. In contrast, descriptions of each of the utilitarian brands (Endurance Pro, Fit Formula, Max Protein, Muscle Equalizer)

were comprised of hedonic cues that had received low ratings in a pretest and functional attributes that had received high ratings (see figures 1 and 2).

We incorporated these descriptions into the computer program that participants used throughout the in-lab portion of the experiment. In both conditions, participants were required to view the descriptions of all eight brands before choosing one of them. We also printed the same descriptions on the packages of sample bars that participants received at the conclusion of the in-lab portion of the experiment.

Real Nutrition Bars: All participants received the same nutrition bars regardless of the brand that they chose to sample. The real nutrition bars were chocolate-flavored, were comprised mostly of soya, contained 117 Calories, and were not sold in local stores. The bars were individually wrapped in plain white packages that were stamped with an expiration date. Thus, the only difference between the brands among which participants chose were those hedonic and utilitarian aspects of their appearance that we manipulated and were printed on the sample packages that they received. Each sample package contained five bars.

Electronic Recommendation Agent Website. Based on a thorough review of the academic nutrition literature, we developed an algorithm to rate and rank order our eight nutrition bar brands, and we incorporated this algorithm into a professionally designed program that simulated a product recommendation website. Since examination of a large number of electronic recommendation agents available online revealed that most are based on users' expressed preferences and generate their recommendations based on a series of questions about individual factors, such as goals and lifestyle characteristics, followed by a series of questions about specific product attributes, we chose to utilize this same format.

The series of questions about individual factors asked participants to enter their gender; their approximate age; the number of minutes per day that they typically spend engaging in light, moderate, and heavy exercise; the number of times per day that they

typically eat; their body weight goal (lose weight, maintain weight, gain weight); their strength goal (maintain strength, gain strength); and their current weight. We selected these particular questions because our review of the nutrition literature indicated that they are all particularly important to consider when selecting highly nutritious foods such as nutrition bars.

The series of questions about product attributes asked participants to indicate the relative importance of seven attributes by distributing 100 points among them, with more points reflecting greater importance. The seven product attributes were calories, fat content, fiber content, glycemic index, protein to carbohydrate ratio, protein quality, and vitamin and mineral content. We selected these product attributes, since our review of the nutrition literature indicated that they are the most important attributes to consider when selecting highly nutritious foods such as nutrition bars. Furthermore, examination of the packages of a large number of nutrition bars available at nutrition websites and local stores indicated that these attributes are all commonly included on nutrition bar packaging and displays.

Participants responded to the questions using a computer program that simulated a website called the Nutrition Zone. A message at the top of the screen reminded participants to think carefully when answering the questions since the electronic recommendation agent would utilize their responses when generating its recommendations.

Once a participant had responded to both series of questions, the computer program used the algorithm that we developed to generate its recommendations. The algorithm used the participant's responses to the questions to determine the appropriateness of each nutrition bar for him or her along each of the seven functional product attributes included in the investigation, and also to determine the relative importance of each of these attributes for the participant. The algorithm was based on guidelines that are well-established in the nutrition literature. For example, in order to determine the number of calories that would be ideal for a

participant, the algorithm utilized the Schofield method, which was first developed in 1919 and continues to be widely used by nutritionists (see Reeves and Capra 2003). Following this method, the algorithm first used a formula to estimate the participant's basal metabolic rate (BMR) based on his or her age, gender, and weight. Then the algorithm used another formula to estimate the participant's exercise energy requirement (EER) based on the number of minutes per day that he or she indicated typically engaging in light, moderate, and heavy exercise. The algorithm then added the participant's BMR and EER to obtain his or her daily energy requirement (DER), the number of calories needed to maintain weight, and subsequently adjusted the participant's DER using a coefficient that was based on his or her goal of losing, maintaining, or gaining weight. Next, the algorithm divided this amount by the number of times that the participant indicated eating per day to determine the number of calories that would be ideal for one meal, and assigned a rating to each bar based on its deviation from this ideal. Finally, the algorithm computed the impact of this rating on the bar's overall rating using a coefficient based on the participant's weight goal. The algorithm used additional methods, similarly grounded in the nutrition literature, to determine the performance of each nutrition bar on each of the other six functional product attributes.

Once the electronic recommendation agent had generated its recommendations using this algorithm, it displayed information about the bars on a screen that was divided into two columns. A narrow column on the left displayed the packages of all eight brands. Clicking on a brand's package made its full description appear in a wide column on the right, which initially contained the Nutrition Zone logo (see figure 3). Each brand's rating on a scale ranging from 1 to 100 appeared next to the brand in the left column. Furthermore, the brands were arranged in rank order based on these ratings. Participants were required to view the full descriptions of all eight brands before choosing one of them. They indicated their choice by

clicking a button labeled ‘click here to choose this bar,’ and then confirming the choice in a pop-up box.

The experimental program recorded participants’ responses to the questions, the number of seconds that they spent looking at the full description of each brand, and the brand that they chose to sample.

Control Website. Participants in the control condition utilized a computer program that was identical to the electronic recommendation agent program, with three exceptions. First, when participants were responding to the questions about individual factors, a message at the top of the screen indicated that they should respond carefully since the responses were important “for our records,” rather than for use by an electronic recommendation agent. Second, control participants did not respond to the product attribute questions. Third, on the screen that displayed the bars, the brands did not receive ratings and appeared in random order.

Follow-Up Survey. Participants received an email with a link to the online follow-up survey exactly one week after they had participated in the in-lab portion of the experiment. The survey website had a professional-looking design that was consistent with that of the experimental program.

The survey asked participants to indicate which brand they had selected during the experimental session and whether or not they had tried the sample bars that they had received. Based on recent research that suggests that single-item measures should be used in favor of multiple-item measures for constructs that consist of a concrete singular object and a concrete singular attribute (Bergkvist and Rossiter 2007; Rossiter 2002), we operationalized choice satisfaction with a single item that asked participants how much they liked or disliked the bars overall (endpoints: -4 [disliked very much,], +4 [liked very much]). Additionally, we included several measures of direct relevance to managers. These included scales of how

good or bad the bars tasted (endpoints: -4 [very bad], +4 [very good]), how likely or unlikely participants would be to purchase the brand that they selected (endpoints: -4 [very unlikely], +4 [very likely]), and how likely or unlikely participants would be to recommend the brand that they had selected to a friend (endpoints: -4 [very unlikely], +4 [very likely]), as well as questions that asked how much they would be willing to pay for a package containing five of the bars and which brand they would choose if they were to participate in the experiment again.

Procedure

Two hundred and three people recruited from the streets near a behavioral laboratory located in a metropolitan city participated in the experiment in exchange for a package of five nutrition bars and a chance to win one of two iPod Shuffles. Seventy-seven participants were male, and 126 were female, with an age range between 18 and 45; three participants did not indicate their age. The experimenter told participants that they would be asked to evaluate a nutrition bar website, and to sample a brand of nutrition bar that they would select using the site. The experimenter explained that we were planning to use the website and nutrition bars in a future experiment, and that the purpose of the current experiment was to measure people's baseline reactions to the site and the bars.

All participants signed an informed consent form, which indicated that the sample nutrition bars that they would receive were prototypes and that their nutritional content might therefore differ somewhat from any information provided during the experiment. The consent form also stated that the sample bars might contain traces of nuts and animal products, and explicitly stated that people who have any food allergies or aversions whatsoever should not participate in the experiment. After participants had signed the consent form, the experimenter randomly assigned each of them to either the recommendation agent or control

condition. Participants were seated in individual rooms, and used the computer program that corresponded to their assigned condition to select one of the eight brands of nutrition bars.

At the conclusion of the in-lab portion of the experiment, the experimenter gave each participant a package containing five bars, ostensibly of the brand that they had chosen. The full description of the brand as it had appeared in the computer program was printed on the front of the package, although the bars inside were always the same, irrespective of brand chosen.

Finally, the experimenter gave participants a form that contained the biographies of the experimenters, but no information about the actual experiment. The form stated that a complete debriefing form would be sent to all participants by email when the entire experiment, including the follow-up survey, was complete.

Exactly one week after completing the in-lab portion of the experiment, participants received an email with a link to the online follow-up survey. We chose to send the link to the follow-up survey one week after the experimental session, since nutrition bars are fast moving consumer goods that are sold in grocery stores and other types of stores that consumers visit on a regular, fixed basis. Given that participants received five bars during the in-lab portion of the experiment, we believed that repurchase decisions would likely be made between one and two weeks after the session. Thus, this was the optimal time to measure participants' satisfaction with the bars, as well as their taste perceptions, purchase intentions, and intentions of recommending the bars to a friend. Non-respondents received a reminder email two days later and a second reminder two days after that. Upon clicking the link, participants were prompted to login to the survey using a username and password provided in the email. The use of these usernames and passwords allowed us to verify the identity of each respondent, and to ensure that each participant responded only once. Two weeks after the last day on which the in-lab portion of the experiment was run, the online survey was closed and

a complete debriefing form was sent to all participants by email. The debriefing form contained a full description of the experiment and its purpose, and the contact information of each experimenter.

Results

Data Exclusions. Three of the 203 participants did not complete the in-lab portion of the experiment. Of the remaining 200 participants, 152 (76%) responded to the online follow-up survey. We excluded the responses of 11 respondents who indicated that they had not tried any of the sample bars that they received at the lab, as it was not appropriate to assess choice satisfaction for these individuals. Thus, our results are based on a final sample size of 141.

Type of Brand Chosen. Based on our hypothesis that use of a recommendation agent leads consumers to overweight functional product attributes and underweight peripheral and trivial hedonic cues in choice, we predicted that participants in the recommendation agent condition would be more likely to choose one of the four utilitarian brands compared to participants in the control condition. Consistent with this, the data revealed that the percentage of participants who chose one of the four utilitarian brands was significantly greater in the recommendation agent condition (58.57%) than in the control condition (42.25%), ($\chi 2$ (1) = 3.75, p = .05).

To rule out the possibility that the participants in the recommendation agent condition just blindly followed the recommendations provided to them, we examined the amount of time that each participant spent deliberating, as a function of the two experimental conditions. The ANOVA indicated that the total amount of time that participants spent examining the brands did not differ significantly between the two conditions (recommendation agent = 152.4 seconds; control = 171.62 seconds; $F(1, 139) = 1.57$, NS), suggesting that participants

in the recommendation agent condition also thought carefully about their choice, and did not blindly follow the agent's recommendations

Satisfaction. Since using a recommendation agent focuses consumers on the elements considered by the agent (Haubl and Murray 2001, 2003), which are typically utilitarian, thereby leading them to be over-weighted in choice at the expense of other elements such as hedonic cues, we argued that participants in the recommendation agent condition would be less satisfied with their choices compared to participants in the control condition. Furthermore, if this reduction in satisfaction resulted from overweighting of functional attributes as we conceptualized, then we would expect that among participants in the recommendation agent condition, satisfaction would be greater among those who chose a hedonic brand than among those who chose a utilitarian brand, whereas among participants in the control condition, satisfaction would not differ between those who chose a hedonic or utilitarian brand. The data supported these predictions.

A 2 (condition: recommendation agent vs. control) × 2 (type of brand chosen: hedonic vs. utilitarian) between-subjects ANOVA indicated that participants in the recommendation agent condition liked the bars significantly less (M = -1.27) than did participants in the control condition (M = .03), ($F(1, 137) = 10.2$, $p < .005$). Furthermore, although the condition × brand type interaction was not significant ($F(1, 137) = 2.05$, NS), comparisons of cell means indicated that among participants in the recommendation agent condition, liking was significantly greater among those who chose a hedonic brand (M = -.38) than among those who chose a utilitarian brand (M = -1.90), ($F(1, 137) = 9.18$, $p < .005$), whereas among participants in the control condition, liking did not differ significantly between participants who chose a hedonic or utilitarian brand (.24 vs. -.27), ($F(1, 137) = 1.05$, NS). The analyses also revealed that overall liking was significantly higher among participants who chose a

hedonic brand (M = -.01) than among those who chose a utilitarian brand (M = -1.21), (F(1, 137) = 8.27, p = .005).

Taste Perception. It is interesting to consider the degree to which the distortion in choice that results from using a recommendation agent can affect people's sensory experiences when using a chosen product. Research on the ambiguity of sensory experience suggests that when people do not have strong expectations about the sensations that a particular product should provide, they base their evaluations on peripheral cues (Deighton 1984; Ha and Hoch 1989; Hoch and Ha 1986). Taste is perhaps the most significant physical perceptual aspect of a nutrition bar. To the degree that using an electronic recommendation agent leads people to make less satisfying choices than they would have otherwise, it is likely that this discrepancy will cloud their perception of the taste of the chosen option. This should particularly be the case for those who used a recommendation agent and chose a utilitarian option.

A 2 (condition: recommendation agent vs. control) × 2 (type of brand chosen: hedonic vs. utilitarian) between-subjects ANOVA indicated that participants in the recommendation agent condition provided significantly lower taste ratings (M = -1.17) than did participants in the control condition (M = .42), (F(1, 137) = 18.35, p < .001). Additionally, participants who chose a utilitarian brand provided significantly lower taste ratings (M = -.85) than did those who chose a hedonic brand (M = .11), (F(1, 137) = 4.44, p < .05). The condition × brand type interaction was marginally significant (F(1, 137) = 2.75, p = .10).

Purchase Intentions and Willingness to Recommend, Since using a recommendation agent leads people to make choices that they are later less satisfied with, it follows that use of a recommendation agent should also reduce their purchase intentions and their willingness to recommend the product to others.

Overall, the data provided support for these predictions. A series of 2 (condition: recommendation agent vs. control) × 2 (type of brand chosen: hedonic vs. utilitarian) between-subjects ANOVAs indicated that participants in the recommendation agent condition provided significantly lower ratings of likelihood of purchasing ($M_{purchasing}$ = -2.53) and recommending ($M_{recommending}$ = -2.14) compared to participants in the control condition ($M_{purchasing}$ = -1.35, $M_{recommending}$ = -.82), ($F_{purchasing}(1, 137) = 7.48$, $p < .01$; $F_{recommending}(1, 137) = 8.62$, $p < .005$). Additionally, the main effect of the type of brand chosen was significant for ratings of likelihood of purchasing ($F(1, 137) = 6.95$, $p < .01$) and recommending ($F(1, 137) = 8.62$, $p < .005$). The condition × brand type interaction, however, was not significant for either of these variables ($F_{purchasing}(1, 137) = .06$; $F_{recommending}(1, 137) = .01$).

GENERAL DISCUSSION

In an era in which consumers are often overwhelmed by the amount and complexity of feature information available, especially online (Rust et al. 2006; Schwartz 2000; Thompson et al. 2005), previous research has hailed electronic recommendation agents as coming to the rescue (Alba et al. 1997; West et al. 1999). Research has demonstrated that use of an electronic recommendation agent can reduce the effort that consumers expend searching for product information, while simultaneously improving the quality of their choices (Haubl and Trifts 2000), and can also increase satisfaction with the choice process (Bechwati and Xia 2003; Widing and Talarzyk 1993). However, previous research has all but ignored the possibility that use of an electronic recommendation agent influences satisfaction with the choice itself (for an exception see Kmett et al. 1999). This possibility is important, since choice satisfaction has been shown to influence consumers' attitudes and purchase intentions (Oliver 1980).

In this article, we have shown that use of a recommendation agent can decrease choice satisfaction over the course of one to two weeks, a time period in which repurchase decisions are likely to be made. Furthermore, we have provided evidence that this reduction in choice satisfaction is due to a tendency of electronic recommendation agents to lead users to overweight functional product attributes and underweight hedonic cues in choice. Finally, we have shown that use of an electronic recommendation agent can also negatively impact variables of direct relevance to marketers, including taste perceptions, purchase intentions, and likelihood of recommending the product to a friend.

Directions for Future Research

Our research provides many directions for future inquiry. First, whereas we have shown that use of an electronic recommendation agent can negatively impact choice satisfaction and other variables in a controlled laboratory experiment, empirical research should validate these effects in a field setting, for example, by examining consumers' purchase histories at websites that include electronic recommendation agents and at those that do not but are otherwise similar. Additionally, some retailers (e.g., Amazon.com, Nike.com) provide optional recommendation agents. Future research could examine the purchase histories and product ratings of consumers who selected products at such sites by using the optional electronic recommendation agents with those who did not use these agents.

Second, the results that we report suggest that use of an electronic recommendation agent leads to decreased choice satisfaction specifically because most such agents available online today fail to capture the importance of hedonic considerations in choice, thereby biasing users to overweight utilitarian considerations. But certainly there must be ways to correct this state of affairs. Developing recommendation algorithms that properly take account of hedonic considerations, even in relatively utilitarian product categories, and

testing the effects of such agents on consumer choice, are perhaps the most important directions for future research.

Some popular websites, such as Amazon.com, currently offer recommendation agents based on collaborative filtering algorithms. In contrast to the type of agents discussed in this article, collaborative filtering agents typically do not ask users to respond to questions about individual factors or product attributes. Instead, they ask users to rate a group of products that they have utilized previously, and then use these ratings to identify a set of users ("neighbors") who have similar preferences. Such an agent then recommends other products that the users' neighbors have liked, but which the user has not yet tried. This process likely takes both hedonic and utilitarian considerations into account, in proportion to the relative importance that the user places on these two types of factors. Thus, examining how use of this type of agent affects consumer choice, and contrasting that with the results reported in this paper and in extant research in this area, would be highly interesting.

Finally, our research examines the case in which a product category is clearly divided into relatively hedonic and relatively utilitarian options. But what happens when all the options in a category are relatively hedonic or relatively utilitarian? One possibility is that in such cases use of an electronic recommendation agent simply does not influence satisfaction. A second possibility is that negative effects may be observed in both cases, since even when all options are relatively hedonic (or relatively utilitarian) consumers may still naturally divide them into relatively more hedonic and relatively more utilitarian groups, such that the same effects observed in this article will result. A third possibility is that use of a recommendation agent may have no effect when all the options are relatively hedonic (since in this case consumers may perceive the agent's recommendations as valueless and thus ignore them), but may have a positive effect when all the options are relatively utilitarian (since in this case, given that there are no relatively hedonic options to forgo, decision quality

and choice satisfaction may be highly correlated). Future research should examine these possibilities.

Implications for Managers

Many retailers (e.g., Amazon.com, Nike.com) provide optional electronic recommendation agents to help their customers select products. Additionally, many advice websites that do not sell products (e.g., MyProductAdvisor.com, MyShoppingPal.com) provide electronic recommendation agents to assist consumers before they continue to retail sites to make purchases. Since managers want consumers to choose their products, they have an incentive to adjust descriptions of their products and perhaps even alter their products' actual characteristics so that such agents recommend them more frequently. Additionally, since electronic recommendation agents at advice websites typically only rate a limited number of brands, managers seemingly have an incentive to ask, or even pay, these websites to include their products in their consideration sets.

Our results give managers a word of caution. We have shown that use of an electronic recommendation agent can negatively influence consumers' long-term choice satisfaction, sensory experiences, purchase intentions, and likelihood of recommending a product to a friend. Thus, including one's products in an electronic recommendation agent can be highly unproductive. In particular, our results suggest that marketers who manage relatively utilitarian brands within product categories in which both relatively hedonic and relatively utilitarian brands are established should be especially cautious. Although recommendation agents might help increase short-term sales of such products by leading consumers to overweight utilitarian product attributes and underweight hedonic product attributes in choice, this boost may come at the cost of long-run profitability.

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FIGURE 1:

DETAILED DESCRIPTION OF A HEDONIC BRAND

Nutrition Facts

Serving Size 1 bar (25 g)

Amount per Serving	
Calories 93	Calories from Fat 9
	%Daily Value*
Total Fat 1 g	**2%**
Saturated Fat 1 g	**5%**
Trans Fat 0 g	
Cholesterol <5 mg	**2%**
Sodium 800 mg	**33%**
Potassium 300 mg	**9%**
Total Carbohydrate 8 g	**3%**
Dietary Fiber 4 g	**16%**
Sugars 4 g	
Protein 13 g	**26%**

Vitamin A	90%	Vitamin C	90%
Calcium	100%	Iron	100%
Vitamin E	100%	Thiamin	100%
Riboflavin	100%	Niacin	100%
Vitamin B6	90%	Folate	100%
Vitamin B1	90%	Biotin	100%
Pantothenic	100%	Phosphorus	100%
Iodine	100%	Magnesium	90%
Zinc	75%	Selenium	100%
Copper	75%	Chromium	100%
Molybdenum	100%	Chloride	100%

*Percent Daily Values are based on a 2,000 calorie diet. Your daily intakes may be higher or lower depending on your calorie needs

EXTRA SET NUTRITION BAR INGREDIENTS: Cane sugar, soya grains, powdered concentrated milk, cocoa, honey, chocolate butter

MAY CONTAIN TRACES OF NUTS

FIGURE 2:

DETAILED DESCRIPTION OF A UTILITARIAN BRAND

Nutrition Facts

Serving Size 1 bar (23 g)

Amount per Serving	
Calories 85	Calories from Fat 9
	%Daily Value*
Total Fat 1 g	**2%**
Saturated Fat 0 g	**0%**
Trans Fat 0 g	
Cholesterol 10 mg	**3%**
Sodium 240 mg	**10%**
Potassium 280 mg	**8%**
Total Carbohydrate 12 g	**4%**
Dietary Fiber 2 g	**8%**
Sugars 10 g	
Protein 7 g	**14%**

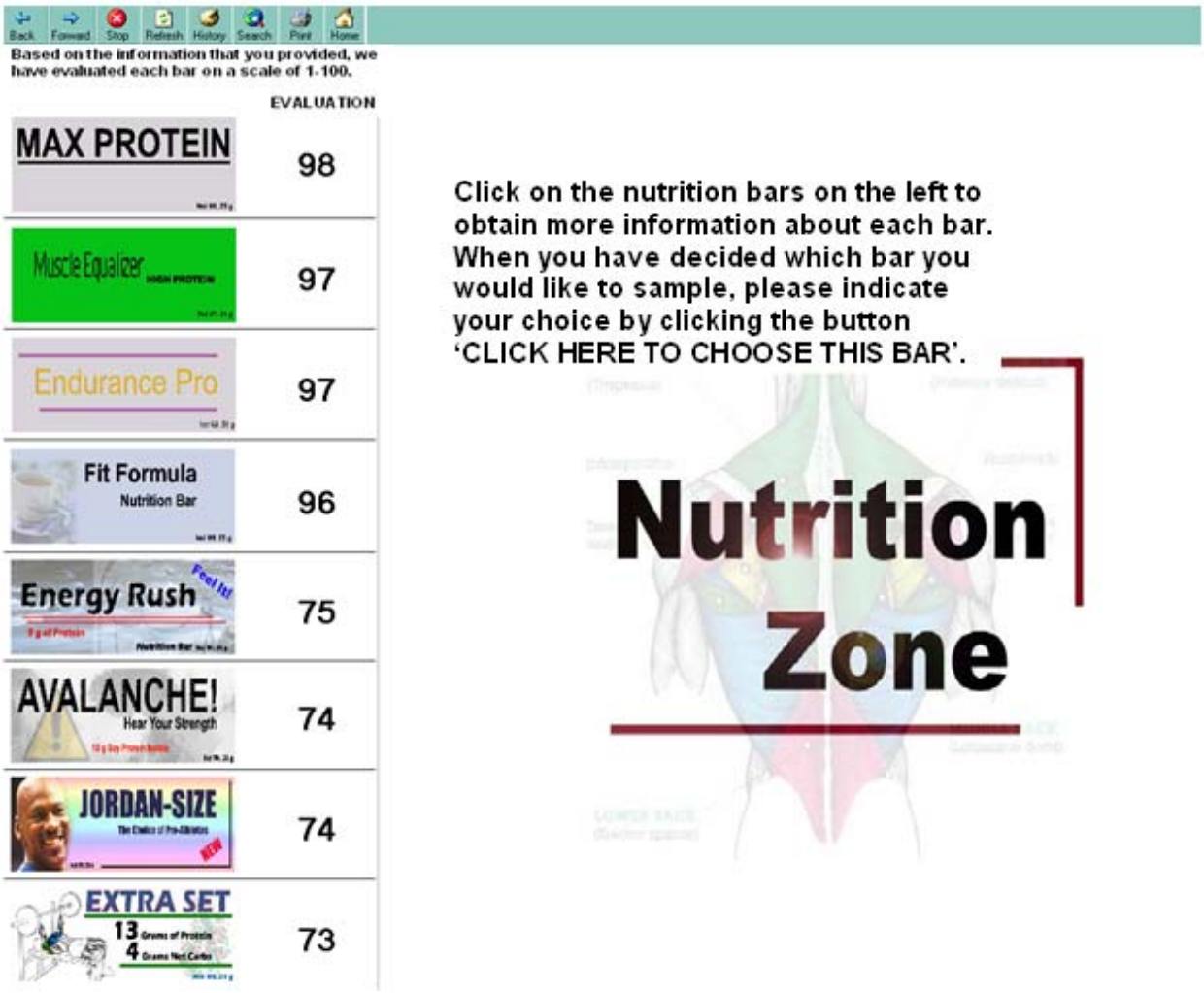
Vitamin A	100%	Vitamin C	100%
Calcium	100%	Iron	100%
Vitamin E	100%	Thiamin	100%
Riboflavin	100%	Niacin	100%
Vitamin B6	100%	Folate	100%
Vitamin B1	100%	Biotin	100%
Pantothenic	100%	Phosphorus	100%
Iodine	100%	Magnesium	100%
Zinc	100%	Selenium	100%
Copper	100%	Chromium	100%
Molybdenum	100%	Chloride	100%

*Percent Daily Values are based on a 2,000 calorie diet. Your daily intakes may be higher or lower depending on your calorie needs

FIT FORMULA NUTRITION BAR INGREDIENTS: Soya grains, powdered concentrated milk, cocoa, honey, cane sugar, chocolate butter

FIGURE 3:

SCREENSHOT FROM ELECTRONIC RECOMMENDATION AGENT PROGRAM



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