The preference-signaling effect of search

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Abstract

Consumers often make choices in settings where some alternatives are known and additional alternatives can be unveiled through search. When making a choice from a set of alternatives, the manner in which each of these was discovered should be irrelevant from a normative standpoint. By contrast, we propose that consumers infer from their own decisions to search for additional alternatives that previously known alternatives are comparatively less attractive, and that this results in an increase in preference for an alternative precisely because it was initially out of sight (rather than known). Evidence from four experiments provides support for this theorizing, demonstrating that paradoxically placing an alternative out of sight (while providing the consumer with the opportunity to unveil it) can render that alternative more likely to be chosen. Moreover, the findings indicate that this shift in preferences is driven specifically by a devaluation of alternatives that were known prior to the decision to search. Finally, the preference-signaling effect of search is shown to be persistent in that it systematically influences a consumer’s subsequent choices among new alternatives.

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Search is costly to consumers. Therefore, conventional wisdom suggests that it is in a firm’s best interest to minimize the need for consumer search with respect to its own offerings. Indeed, vendors typically spend substantial amounts of money to advertise their products and services, thus making it easier for consumers to find out about them and reducing the need for consumer search (Ehrlich & Fisher, 1982; Nelson, 1974). Moreover, Wernerfelt (1996) argued that profit-maximizing firms should design efficient communication plans that provide as much information as possible to prospective customers and that minimize the latter’s cost of acquiring this information.

In sharp contrast to this view, we propose that it can actually be detrimental to a firm if its offerings are immediately within consumers’ sight. The proposed underlying mechanism is that when a consumer chooses to engage in effortful search to unveil an additional alternative (e.g., making the effort to visit a store or website), this serves as a signal to the consumer about her own preference — a psychological mechanism in line with self-perception theory (Bem, 1967, 1972). In particular, the consumer infers from her decision to engage in the costly discovery of an additional alternative a reduced preference for the alternative(s) she knew about prior to that. Thus, paradoxically, placing an alternative out of sight (while providing the consumer with the opportunity to unveil it) can render that alternative more likely to be chosen.

Consumers must often decide between (1) choosing among a set of previously discovered alternatives and (2) searching to discover additional alternatives before making a choice. A substantial body of prior work examines consumer choice from pre-determined sets of alternatives. As a result, we know much about the influence of choice set composition and decision context on choice (e.g., Bettman, Luce, & Payne, 1998; Simonson, 1989). Similarly, work on search behavior addresses important questions such as what governs the extent of search

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and, in particular, how we decide whether to stop or continue searching at a given point in the search process (e.g., Häubl, Dellaert, & Donkers, 2010; Weitzman, 1979). However, the interplay between search and choice has escaped research attention. In fact, prior research tends to assume that the two are independent. The present work refutes this assumption by showing that search behavior has a systematic effect on choice.

The previous research has studied search both from an analytical perspective, producing microeconomic models of optimal search behavior considering both the costs and the anticipated benefits of search (e.g., Ratchford, 1982; Rothschild, 1974; Stigler, 1961; Weitzman, 1979), and from an experimental perspective, examining how actual search behavior departs from the prescriptions of normative models (e.g., Brannon & Gorman, 2002; Schotter & Braunstein, 1981). Recently, Häubl et al. (2010) developed and empirically validated models of search behavior that incorporate psychological influences in addition to microeconomic principles. While prior work in this domain treated search behavior as the outcome of interest, the present research examines how engaging in search — i.e., unveiling an alternative that is initially out of sight influences preference among a set of alternatives.

The remainder of this article is organized as follows. First, we review relevant prior work, develop our key hypotheses about the signaling effect of search, and characterize the psychological mechanism proposed to underlie this effect — inferences about one’s own preferences through self-perception. After that, we present evidence from four experiments designed to demonstrate the overall effect and examine the underlying mechanism. We conclude with a discussion of the theoretical and practical implications of our findings.

Theoretical framework

Consumer purchase decisions typically involve some uncertainty as to which of the available products to choose (Muthukrishnan, 1995; Urbany, Dickson, & Wilkie, 1989). Moreover, consumers often do not have well-defined preferences and, when making purchase decisions, they tend to construct their specific preferences on the fly based, in part, on properties of the decision environment or context (Bettman et al., 1998; Häubl & Murray, 2003; Mandel & Johnson, 2002). We argue that, in the face of such uncertainty, consumers may observe their own behavior of unveiling additional alternatives, and then use these observations as input in the construction of their preferences for an impending purchase decision.

The notion that an individual might make inferences about her own attitudes, emotions, and other inner states by observing her own behavior is the central tenet of self-perception theory. In his seminal work, Bem (1967, 1972) extended attribution theory from the person-perception domain into the self-perception domain, arguing that people attempt to validate not only their perceptions of others, but also their perceptions of themselves by observing their own behavior. For a behavior to be indicative of, and thus be used as a basis for making inferences about one’s attitudes, it must be perceived as relevant and salient (Salancik & Conway, 1975). The act of unveiling an out-of-sight alternative clearly has these properties with respect to a choice that a consumer is facing.

We note that self-perception theory was initially proposed as an alternative account for behaviors previously explained by the theory of cognitive dissonance (Bem, 1967); and there are many situations where what is observed is consistent with both of these theories. However, we concur with Fazio, Zanna, and Cooper (1977) that, while cognitive dissonance theory (Festinger, 1957) is most applicable when one engages in a behavior that is in conflict with a strongly held attitude, self-perception theory (Bem, 1967, 1972) is best suited for understanding how one’s actions influence formation of one’s attitudes when the latter are uncertain. A consumer’s decision to search for an additional alternative before making a choice is unlikely to result in a conflict with a strongly held attitude and thus arouse dissonance. By contrast, since consumers are often uncertain about their preferences (Bettman et al., 1998; Häubl & Murray, 2003; Mandel & Johnson, 2002), it is conceivable that the decision to unveil an out-of-sight alternative might serve as a signal from which consumers infer their own preferences via a self-perception mechanism.

In particular, we propose that consumers perceive their decision to engage in the costly discovery of additional alternatives as informative about their unfavorable disposition toward alternatives that they had already considered. This proposition is consistent with prior work by Brehm (1956), who demonstrated that, relative to pre-choice ratings, rejected alternatives were rated as less desirable following the selection of a competing alternative. Furthermore, if consumers do not know anything about an out-of-sight alternative prior to search, they have no basis for inferring that their decision to search indicates a favorable disposition toward the out-of-sight alternative. Thus, we hypothesize that the act of unveiling additional alternatives through search results in the devaluation of previously known alternatives. In turn, this devaluation leads to an increase in the probability that the consumer chooses an alternative that was initially out of sight. The essential predictions associated with this preference-signaling effect of search are captured by the following two hypotheses.

**H1.** Removing an alternative from sight while giving consumers the opportunity to unveil it increases preference for that alternative among those who choose to unveil. This enhanced preference can be strong enough to increase the alternative’s overall (i.e., unconditional) choice probability.

**H2.** The increase in preference for alternatives that were initially out of sight is driven (mediated) by the devaluation of previously known alternatives.

Research on self-perception theory suggests that a behavior must be attributed to internal rather than external forces in order to serve as a basis for inferences about one’s own internal state (Hansen, 1980; Kelley, 1973; Reingen & Kernan, 1977). According to this work, people are less likely to draw conclusions about their own attitudes on the basis of actions that are attributed to external forces than actions that are perceived to have been
caused by motives internal to the self. For instance, Reingen and Kernan (1977) found that, when a monetary incentive was provided for completing a short initial survey, the rate of participation in a longer follow-up survey was lower compared to when no such reward was offered. Moreover, it has been shown that, while economic incentives can increase response rates in surveys, they tend to reduce the quality of responses (Hansen, 1980), which suggests that attributing one’s compliance with the request to complete a task to an explicit incentive undermines the motivation to complete that task diligently. Thus, we propose that, for the unveiling of an out-of-sight alternative to serve as a signal of one’s own preference, this search must have been initiated at one’s discretion. That is, if search is imposed as an external requirement, the preference-signaling effect of search will not arise. The next hypothesis summarizes an important boundary condition of the preference-signaling effect of search.

H3. A necessary condition for the preference-signaling effect of search is that consumers are free to choose whether to unveil an additional alternative or not.

Extant literature on effort has shown that the meta-cognitive experience of effort can lead to the inference that an alternative associated with more effort is more desirable (Kim & Labroo, 2011; Labroo & Kim, 2009; Lee & Norton, 2011). Such inferences can arise because consumers have been conditioned to associate certain types of effort or costs with superior outcomes. For example, consumers might infer that a store that charges an entrance fee has better prices (Lee & Norton, 2011), and that during goal pursuit, greater effort can indicate that an alternative is more instrumental to goal achievement (Labroo & Kim, 2009). In related work, Norton, Mochon, and Ariely (2012) found that effort invested toward building an object by oneself increases valuation of the object. However, this prior work focuses on the consequences of effort — it is typically confined to the evaluation of a single target object following some mandatory investment of effort or cost associated with the object.

A key departure for the current work is that we examine the antecedents of that effort, particularly how the consumer’s decision to incur the effort influences preference. The prior research suggests that self-perception reveals a person’s internal state (Bem, 1967, 1972), and that attitudes formed through self-perception can be quite stable and manifest themselves consistently across similar contexts (Amir & Levav, 2008; Dejong, 1979; Reingen & Kernan, 1977). Against this background, we argue that inferences a consumer makes about her own preferences, when she observes herself engaging in the effortful discovery of an out-of-sight alternative, should be persistent and influence other choices that the consumer makes in the same domain later on.

H4. Preferences shaped by the unveiling of an out-of-sight alternative persist to influence subsequent choices among new alternatives.

Next, we present evidence from four experiments that were designed to test the predicted preference-signaling effect of search on consumer preferences, as well as to provide insight into the psychological mechanism underlying this effect. Experiments 1 and 2 provide support for the basic effect in a consequential choice task and in a simulated online shopping task, respectively (H1). Experiment 3 shows that an autonomous decision to unveil an out-of-sight alternative is a critical component of the preference-signaling effect of search, and that externally imposed search does not influence preference (H3). Experiment 4 demonstrates that the effect of unveiling an out-of-sight alternative on preference is mediated by the devaluation of the previously-known alternative (H2), and that preference shaped by the unveiling of an out-of-sight alternative persists to influence subsequent choices (H4).

Experiment 1

The objective of Experiment 1 was to provide the first evidence of H1. This experiment demonstrated that it is possible to increase the choice probability of a product by keeping it out of sight and providing consumers with the opportunity to unveil it. Participants were asked to choose one of the two snack bars of different flavors. These choices were consequential in that participants actually received the snack bar they chose for their own consumption. While one alternative (flavor) was displayed prominently, seeing the second alternative (flavor) was displayed alone — merely aware of its existence, but had no specific information about it. Participants were informed that, as a reward for completing the earlier design and procedure

Having completed an unrelated study in an adjacent room, participants arrived at the laboratory individually, in intervals of about 10 min. The experimenter greeted participants, and informed them that, as a reward for completing the earlier participation in a longer follow-up survey, the rate of participation in a longer follow-up survey was lower compared to when no such reward was offered.
study, they were to receive a granola bar. Participants were told that they had a choice between two different flavors. Bars of one flavor (P) were displayed in a box on a table near the entrance. The experimenter first showed participants what that flavor was, and then let them know that the bars of the other flavor (V) were incidentally placed on a table located at the opposite end of the room that was not visible from their current location — the room was divided using partitions. Participants were asked whether they wished to find out what the other flavor (V) was before making their choice. If they decided not to do so, they received P at the first table and were dismissed. If they decided to find out about V, the experimenter directed them to the second table at the back of the room, where both V and P were displayed side by side in two separate boxes. After participants learned the flavor of V, they were asked to choose one of the two alternatives. Note that choosing P at that point involved no additional cost as participants did not have to return to the first table to obtain it. The experimenter always left the participant to make their choice in private. After each participant left the lab, the experimenter counted the remaining bars in each box and recorded that individual’s choice.

Results and discussion

H1 predicts that from a set of two, the choice share of V should be greater than the chance probability of 50%. Ignoring the manipulation (i.e., the assignment of flavors to V vs. P), the overall choice shares of apple and raspberry were 48.5% and 51.5%, respectively. These choice shares are statistically indistinguishable from 50% (binomial test: \( p = .75 \)), indicating that the two flavors were equally likely to be chosen a priori.

In this and all subsequent experiments, we report both unconditional choice shares and choice shares conditional on the decision to unveil the additional alternative. Unconditional choice shares include those participants who chose not to unveil V and, therefore, had no chance of selecting it.

Of the 161 participants, 151 chose to walk to the second display position to learn the flavor of V, whereas the remaining 10 participants selected P directly without looking at V. Of those who decided to search for V, 72.2% chose that alternative, which represents the choice share of V conditional on V being inspected. The unconditional choice share of V was 67.7%. Both the conditional choice share and the unconditional choice share of V are significantly greater than 50% (binomial test: both \( p \)-values < .001). These results support H1 by showing that it is indeed possible to increase an alternative’s choice probability by placing it out of sight and allowing consumers to search for it.

Experiment 1 provided an initial demonstration of the proposed signaling effect of search on consumer choice. The next three experiments were designed to examine this effect more thoroughly and shed light on its underlying psychological mechanism.

**Experiment 2**

Experiment 2 was designed to test H1 in a simulated online shopping task. In this experiment, participants were asked to choose, in each of the six product categories, their preferred alternative from a set of two. The experimental task was computer-based and resembled what consumers experience when shopping on the Internet. Exposure to the two products in a category was manipulated so that either both alternatives were presented to the participant or one alternative was presented and participants then chose whether to see the second alternative before selecting their preferred alternative.

**Method**

**Subjects**

Seventy-three members of a research panel at a major North American university participated in the study. Each participant received a payment of $3.

**Materials**

Six product categories — cordless phones, binoculars, clock radios, digital music players, backpacks, and flash drives were used in this study. The order of the product categories was determined at random, independently for each subject. In each product category, two products, described in terms of two alignable attributes involving a trade-off between them, were presented. In each pair, we denote one alternative as “presented” (P) and the other as “veiled” (V). To control for possible differences in attractiveness, which of the two products served as P versus V was counterbalanced within each category. The horizontal display position of P and V was also counterbalanced (independently) within each product category and for each participant, and the alternative shown on the left (right) was always labeled “A” (“B”).

**Design and procedure**

Participants were informed that they were going on an online shopping trip, and that the online shopping center would present six product categories to them. Each participant made a series of six choices in a 2 (simultaneous-presentation vs. optional-search, between-subjects) × 6 (product category, within-subject) mixed design, with participants randomly assigned to one of the two between-subjects conditions. In the simultaneous-presentation condition, the descriptions of both P and V for a given product category were displayed simultaneously, side by side on the screen. After reading the product descriptions, participants were asked to choose their preferred alternative from the set. In the optional-search condition, only the description of P was displayed initially, and participants could either choose it immediately or elect to find out about V before making their choice. (That is, they had the opportunity to choose P without inspecting V.) The cover story read “For some product categories, our online shopping center has only one product in stock. However, it allows you to obtain product information from another store. In that case, you need to input a four-digit product batch number so that the system will retrieve and return the information of a second product from another store for you.” To obtain information about V, participants were required to enter (using a keyboard) a four-digit code, which was displayed on the screen. Once that code had been entered,
the description of V appeared beside that of P, thus yielding the
same screen display that those in the simultaneous-presentation
condition were presented with. After that, participants were
asked to choose their preferred alternative from the set. They
completed this procedure for each of the six product categories
in sequence.

Results

Participants’ choices were analyzed using a Generalized
Estimating Equation (GEE) regression model (Horton &
Lipsitz, 1999), which are appropriate for binary responses
obtained in within-subject designs. There was no systematic
tendency for participants to prefer one of the two base alternatives
in any of the six product categories (all p-values > .35). Thus, in
each of the categories, the two products were equally likely to be
chosen a priori.

H1 predicts that if a set of two, the choice probability of V
should be greater than the chance probability of 50% in the
optional-search condition, but not different from 50% in the
simultaneous-presentation condition. In the simultaneous-
presentation condition, the choice probability of V was exactly
50% (z = 1, p > .99). In the optional-search condition, 4.8% of
the choices were made by selecting P without unveiling V. When participants did unveil V, that alternative was chosen
60.5% of the time, which represents V’s choice share conditional
on it being unveiled. This conditional choice share is greater than
50% (z = 3.13, p < .01). In addition, the unconditional choice
share of V was 56.7%, which is also significantly greater than
50% (z = 2.18, p = .02). None of the main effects of
product category (all p-values > .18), nor any interactions
between product category and simultaneous-presentation versus
optional-search (all p-values > .16), are significant. In line with
H1, these results provide further evidence that letting consumers
decide whether to obtain information about an out-of-sight
product can increase that alternative’s choice share.

Discussion

The results of Experiments 1 and 2 are consistent with H1.
However, in both experiments, participants acquired the
information about V (if they chose to do so) after learning
about P. This temporal sequence suggests the possibility that
participants might have preferred V not as a result of their
decision to unveil it, but rather because its description was
presented closer to the time at which the choice was made — in
line with a recency effect (Hastie & Park, 1986). To examine
this possible alternative explanation, we ran an additional
“condition” of Experiment 2, with an independent sample of 30
members of the same research panel. The same stimuli and
general procedure were used. In each of the six product
categories, the description of P appeared on the screen first, but
this time it remained visible for 15 s. Following that, the
description of V appeared, and it also remained on the screen for
15 s. After that, the descriptions of both P and V were displayed
side by side, and participants were asked to choose their preferred
alternative. Thus, participants were exposed to V after P, but this
time without deciding whether or not to look at V. If the increase
in preference for V had been caused merely by the more recent
exposure to it, the choice share of V should have been greater
than that of P. However, that was not the case — the choice share
of V was 48.3%, which is statistically indistinguishable from
50% (z = 0.32, p = .75). Thus, the timing of exposure to the
alternatives can be ruled out as an alternative explanation for the
effect.

Experiment 3

The objective of Experiment 3 was to examine an important
boundary condition for the proposed signaling effect of search
(H3). In order for a behavior to signal one’s beliefs or
preferences, it must be perceived to have been driven by one’s
own motivations (Hansen, 1980; Kelley, 1973; Reingen &
Keman, 1977). Thus, if participants are required to search for a
veiled alternative (i.e., the inspection of the alternative is
mandatory), the act of doing so does not reveal anything to
them about their own preferences, and should not influence their
choice. To test this boundary condition, we manipulated whether
the inspection of an out-of-sight alternative was optional or
mandatory. A pattern of results that would provide strong support
for H3 is increased choice share for the out-of-sight alternative
when search is optional, but not when search is mandatory.

The overall experimental paradigm was similar to that of
Experiment 2. In a computer-based environment, participants
were asked to choose, in each of the several product categories,
their preferred alternative from a set of two. The unique aspect
of Experiment 3 was the addition of a condition in which the
inspection of the veiled alternative was mandatory. Thus, the
presentation of the two products in a category was manipulated
so that (1) both alternatives were displayed simultaneously, (2)
one alternative was displayed and participants were free to
either inspect a second one or not, or (3) one alternative was
displayed and participants were required to inspect a second
one before making their choice.

Method

Subjects

Three hundred and seven undergraduate students in an
introductory marketing course at a major North American
university participated for course credit.

Materials

Twelve product categories — backpacks, flash drives,
camping tents, digital watches, electric toothbrushes, coffee
makers, humidifiers, foot spas, digital music players, DVD
burners, printers, and weather stations were used in this
experiment. For each product category, the choice set consisted
of two products, described in terms of two alignable attributes
involving a trade-off between them. While the description of
one of these two products (i.e., P) was always displayed
immediately on the computer screen, participants in some of the
experimental conditions had to click a button on the screen to
uncover the description of the veiled product (V). Which of the
two products served as P versus V and the horizontal display position of P and V were counterbalanced within each product category and for each participant, and the alternative shown on the left (right) was always labeled “A” (“B”).

**Design and procedure**

From the twelve product categories, four were randomly selected for each participant. Each participant made a series of four choices in a 3 (simultaneous-presentation vs. optional-search vs. mandatory-search, between-subjects) × 4 (product category, within-subject) mixed design, with participants randomly assigned to one of the three between-subjects conditions. In the simultaneous-presentation condition, the descriptions of both P and V for a given product category were displayed simultaneously, side by side on the screen, and participants were asked to choose their preferred alternative. In the optional-search condition, only the description of P was displayed initially, and it was up to participants to either choose P at that point or also obtain information about V before making their choice. To find out about V, participants had to click (using a computer mouse) a button on the screen. Once that button had been clicked, the description of V appeared beside that of P, thus yielding the same screen display that those in the simultaneous-presentation condition were presented with. After that, participants were asked to choose their preferred alternative from the set. Finally, in the mandatory-search condition, once the description of P had appeared on the screen, participants were informed that they were required to also look at the description of V, and that they were to obtain it by clicking the appropriate button on the screen. After participants clicked that button, P and V were displayed side by side, and participants were asked to choose their preferred alternative. This procedure was repeated four times in sequence.

**Results**

Participants’ choices were analyzed using GEE regression models. There was no systematic tendency for participants to prefer one of the two base alternatives in any of the product categories (all p-values > .44). Thus, in each of the categories, the two products were equally likely to be chosen a priori.

To assess the influence of search behavior on choice, we examine the choice probabilities of V in each of the three conditions. As expected, in the simultaneous-presentation condition, the choice share of V (50.7%) did not differ from 50% (z = 0.32, p = .81). In the optional-search condition, 42.2% of the choices were made by selecting P without acquiring information about V. When participants did search for V, that alternative was chosen 63.9% of the time, which represents V’s choice share conditional on it being inspected. This conditional choice share of V is significantly greater than 50% (z = 5.37, p < .01). The unconditional choice share of V was 61.3%, which is also significantly greater than 50% (z = 4.29, p < .01). These results are consistent with H1. In the mandatory-search condition, the choice share of V was 53.4%, which is statistically indistinguishable from 50% (z = 0.92, p = .18). In addition, both the conditional choice share (63.9%, z = 4.01, p < .01) and the unconditional choice share of V (61.3%; z = 2.33, p < .05) in the optional-search condition were greater than the choice share of V in the mandatory-search condition (53.4%). None of the main effects of product category (all p-values > .23), nor any interactions between product category and search condition (all p-values > .15), are significant.

Experiment 3 shows that the effect is not driven by the mere effort associated with unveiling V, but rather by consumers’ autonomous decision to do so. When inspection of V was optional, we demonstrated an increase in the choice share of V. Critically, however, no such effect was observed when participants were required to inspect V. Thus, making search mandatory wiped out the preference-signaling effect of search on choice. This finding provides clear support for H3.

**Discussion**

Experiment 3 indicates that, in line with a self-perception mechanism, the internally-driven decision to find out about V is the critical component of the preference-signaling effect of search. The findings of Experiment 3 rule out an alternative explanation consistent with the notion of a “sunk cost fallacy,” according to which the more resources individuals have invested in a particular project, the more committed they are to it (Arkes & Blumer, 1985). Thus, people tend to be reluctant to abandon an option in which they have made a prior investment that is irrecoverable, or “sunk” (Brockner, 1992; Garland & Newport, 1991). If the increase in preference for V had been driven by the mere effort that consumers invested in the discovery of it, the choice share of V should have increased in the mandatory search condition. However, as demonstrated, this was not the case. Therefore, the observed signaling effect of search cannot be explained by the sunk cost fallacy.

**Experiment 4**

We test H2 and H4 in this experiment by examining the nature of the inferences consumers draw based on their decisions to unveil V. In particular, we examine whether the inferences consumers make based on their search behavior carry over to subsequent product evaluation and choice tasks. If the decision to search for V leads to inferences about one’s underlying preference, the preference should persist for some time and influence subsequent evaluations of, and choices among, different alternatives in the same domain. On the other hand, if the inferences are specific to a given alternative, the search should not exert an impact on subsequent decisions. Furthermore, we recorded participants’ thoughts as they evaluated P and V, and we measured the perceived attractiveness of V and P to determine whether the effect is driven by enhancement of V or devaluation of P.

This experiment consisted of two stages — (1) a focal choice in which participants were randomly assigned to either a simultaneous-presentation condition or an optional-search condition, and (2) four follow-up choices in which no search was involved and both alternatives were always presented simultaneously. The follow-up choices were designed to test
whether preferences shaped by the decision to search persist and influence subsequent product evaluations and choices.

**Method**

**Subjects**

Two hundred members of a student panel at a major North American university completed the study in exchange for partial course credit.

**Materials**

Ten pairs of restaurants were employed as stimuli in this experiment — one for the focal choice, four for the follow-up choices, and five for filler choices. Each restaurant was described in terms of its name and national origin of its cuisine (See Appendix A for details.). Unfamiliar cuisine types and corresponding restaurant names were used, avoiding the names of actual local restaurants. Pairs of restaurants were pre-tested to ensure that the two alternatives in each set were perceived to be equally desirable, attractive, and familiar. Which of the two alternatives served as P versus V was counterbalanced, and the alternative shown on the left (right) was always labeled “A” (“B”).

**Design and procedure**

Each participant made ten choices (in fixed order). First, for the focal choice, participants were randomly assigned to either the simultaneous-presentation or the optional-search condition. In the simultaneous-presentation condition, both alternatives were presented at the outset, and participants were asked to choose their preferred alternative. In the optional-search condition, participants first only saw P and then had the option to unveil V before making a choice. Unveiling required the participant to click on a button and then wait for 2 s for the description of V to appear. Following this choice, participants rated the attractiveness of P and V on a scale with endpoints 0 (“very unattractive”) and 10 (“very attractive”). After that, participants were asked to list all the thoughts they had in considering the two alternatives.

For each of the nine subsequent choices, both alternatives were presented simultaneously. Of the four follow-up choices, two included both cuisine types from the focal choice — Persian and Tunisian but different restaurant names (sets 3 and 10 in Appendix A), and each of the other two follow-up choices (sets 5 and 8) pitted one of the original cuisine types against a new one — Nepalese or Burmese. All cuisine types and restaurant names included in the filler choices were distinct from those used in the focal and follow-up choices. After making each choice, participants rated the attractiveness of each alternative.

Finally, participants were presented with the thoughts they had listed immediately after the focal choice, one by one, and asked to code each of their own thoughts as one of the following: positive thought about V, negative thought about V, positive thought about P, negative thought about P, or other. This thought generation and self-coding procedure is adapted from the prior work on how specific types of thoughts drive evaluative processes (Johnson, Häubl, & Keinan, 2007).

**Results**

**Focal choices**

In this experiment, all participants in the optional-search condition chose to reveal V before making their choice. Therefore, there is no separate analysis of choice shares conditional on the decision to search. Participants’ focal choices were analyzed using a logistic regression model. Participants in the optional-search condition were significantly more likely to choose V (58.0%) than those in the simultaneous-presentation condition (46.3%; z = 2.07, p < .05). This result is consistent with H1. There was also a nuisance effect of alternative such that the Persian restaurant “Kateh” was selected more often (63.3%) than the Tunisian restaurant “Nomad” (36.7%; z = 4.21, p < .01). However, this effect did not interact with the simultaneous-presentation/optional-search manipulation (z = 0.93, p = .35).

**Attractiveness ratings and mediation analysis of focal choices**

We performed a repeated-measures ANOVA on attractiveness ratings of the alternatives for the focal choice that included a main effect of the simultaneous-presentation/optional search manipulation and whether P or V was being rated (within-subject), and an interaction effect between the two (see Model 1 in Table 1 for a summary of the results). The key interaction effect between the simultaneous-presentation/optional-search manipulation and whether P or V was being rated is significant (F(1, 395) = 5.64, p < .05; see Fig. 1). Follow-up pair-wise comparisons indicate that while the perceived attractiveness of V did not differ between the simultaneous-presentation (M = 4.42) and optional-search conditions (M = 4.53, t(198) = 0.35, p = .73), P was perceived to be significantly less attractive in the optional-search (M = 3.74) than in the simultaneous-presentation condition (M = 4.60, t(198) = 3.24, p < .01). These results indicate that the decision to unveil V reduced the perceived attractiveness of P, while leaving the attractiveness of V unaffected.

Next, we tested whether this devaluation of P mediated the effect of search on choice. Following Hayes (2013) and Preacher and Hayes (2004), we performed a bootstrap test to examine this hypothesis using the PROCESS macro (“model 4” in Hayes, 2013). The model is shown in Fig. 2. The indirect effect of search on the choice probability of V via (a reduction in) the perceived attractiveness of P is positive and significant (b = 1.76; z = 2.84, p < .01). By contrast, the indirect effect of search on choice of V via the perceived attractiveness of V is not significant (b = 0.25; z = 0.37, p = .71). The direct effect of search on choice was also not significant (b = 0.12; z = 0.38, p = .70). These results indicate “indirect only” mediation (Zhao, Lynch, & Chen, 2010), and they show that the effect of search on the inclination to choose V is fully mediated by the devaluation of P. Thus, H2 is supported.

**Thought protocols and mediation analysis of focal choices**

On average, each participant provided 2.5 thoughts about how s/he made the focal choice. We calculated a difference score between the numbers of positive and negative thoughts for each alternative and for each participant. We performed a
repeated-measures ANOVA on the difference scores that included a main effect of the simultaneous-presentation/optional-search manipulation (between-subjects), a main effect of whether the difference score pertained to P or V (within-subject), and an interaction effect between the two (see Model 2 in Table 1 for a summary of the results). The interaction effect between the simultaneous-presentation/optional-search manipulation and whether the difference score pertained to P or V was significant ($F(1, 395) = 8.57, p < .01$). Follow-up pairwise comparisons show that the difference between positive and negative thoughts about V did not differ between the optional-search condition ($M = +0.05, t(198) = -0.34, p = .79$). However, with respect to P, participants in the simultaneous-presentation condition had more positive than negative thoughts ($M = +0.35$) while participants in the optional-search condition had more negative than positive thoughts ($M = -0.21, t(198) = 3.80, p < .001$). This finding provides additional support for H2 that the preference-signaling effect of search is driven by the devaluation of previously known alternatives.

We next analyze whether the difference in positive versus negative thoughts generated about P mediated the effect of search on choice, using the PROCESS macro (“model 4” in Hayes, 2013). The model is shown in Fig. 3. The indirect effect of search on the choice probability of V via a reduction in the difference between positive and negative thoughts about P is positive and significant ($b = 0.66; z = 2.28, p < .05$). By contrast, the indirect effect of search on choice of V via the difference between positive and negative thoughts about V is not significant ($b = 0.10; z = 0.31, p = .76$). The direct effect of search on choice was also not significant ($b = 0.26; z = 0.65, p = .52$). Consistent with H2, we find that the effect of search on the choice probability of V is fully mediated by the relative decrease in positive thoughts and increase in negative thoughts about P.

**Choices and attractiveness ratings in the follow-up rounds**

The choices made in the four follow-up rounds were analyzed using a GEE regression model. Alternatives featuring the same cuisine type as P from the focal choice were significantly less likely to be chosen in the optional-search condition (48.0%) than those in the simultaneous-presentation condition (64.3%; $z = 2.09, p < .05$). In contrast, alternatives sharing the cuisine type of V were significantly more likely to be selected in the optional-search condition (58.5%) than those in the simultaneous-presentation condition (47.3%; $z = 2.34, p < .05$).

We analyzed the attractiveness ratings of the alternatives in the follow-up choices using a GEE model that included a main effect of the simultaneous-presentation/optional-search manipulation during the focal choice, a main effect of whether the alternative being rated shared the cuisine type of P or V, and an interaction
effect between the two (see Model 3 in Table 1 for a summary of the results). The analysis revealed an interaction effect between the optional-search/simultaneous-presentation manipulation and whether the alternative being rated shared the cuisine type of V or P \( (z = 1.96, p = .05) \). Alternatives sharing the cuisine type of P were rated as less attractive when V had to be revealed through optional search in making the focal choice \( (M = 3.89) \) than when both alternatives were presented simultaneously for that choice \( (M = 4.71; z = 3.16, p < .01) \). In contrast, there was no difference in the attractiveness ratings for alternatives sharing the same cuisine type as V between the optional-search \( (M = 4.40) \) and simultaneous-presentation conditions \( (M = 4.59; z = 0.73, p = .47) \).

The choices and attractiveness ratings observed in the follow-up rounds support H4. They demonstrate that the preferences participants had inferred from their decision to search for V in connection with the focal choice were persistent and had a systematic impact on subsequent choices involving new alternatives.

**Discussion**

The results of Experiment 4 provide insight into the proposed self-perception mechanism by which the preference-signaling effect of search operates. First, we demonstrate that the decision to search for V led to the devaluation of P. It was this devaluation of P, rather than enhancement of V, that increased choice incidence of the latter. Thus, participants inferred a lack of preference for P from their decision to search for V. This finding contrasts prior work showing that incurring effort for an
alternative can lead to increased desirability of that alternative (Kim & Labroo, 2011; Labroo & Kim, 2009; Lee & Norton, 2011; Norton et al., 2012). Moreover, this finding is inconsistent with an alternative explanation based on conversational norms, whereby the fact that V is initially out-of-sight signals that it is more attractive than P. Second, preference shaped by the decision to search for an alternative not only influenced the focal choice, but also persisted to influence the evaluation of other alternatives encountered during subsequent choices. This result is consistent with the hypothesis that, from the decision to search, participants made inferences about their underlying preferences.

General discussion

Summary of findings

This article examines the impact of the decision to search for an initially out-of-sight alternative on consumers’ preferences among a set of competing alternatives. Conventional wisdom suggests that it is in a firm’s best interest to make information about itself easily available to consumers and that a seller should, therefore, facilitate consumers’ search for its offerings (Wernerfelt, 1996). Our findings challenge this intuition by showing that an alternative can benefit from being out of sight, necessitating consumer search; and in addition, there can be a significant cost to being the first alternative a consumer sees, when the consumer subsequently chooses to unveil additional alternatives.

The results of Experiment 1 provide the first demonstration of the preference-signaling effect of search. In a consequential choice task, participants are more likely to select a veiled alternative (than a competing alternative readily presented to them) following a decision to travel a certain distance to find out about the veiled alternative. Experiment 2 demonstrates, in a simulated online shopping task, that letting participants decide whether to obtain information about a veiled alternative increases the likelihood that participants choose this alternative, relative to the case where information about both alternatives is simultaneously presented to participants. Experiment 3 indicates that an internally driven decision to search for the veiled alternative is the key to the signaling effect of search, and that the effect is wiped out when participants search for the veiled alternative simply to conform to the requirement of the experiment. Experiment 4 illustrates that rather than enhancing the perceived attractiveness of the veiled alternative, participants infer a lack of preference for the presented alternative when they make a decision to search for the veiled alternative. Mediation analysis confirms that this devaluation of the presented alternative drives the differences in choice share. Furthermore, preferences shaped by the decision to search for the veiled alternative in connection with one choice persist to influence subsequent choices and product evaluations involving different alternatives.

The findings reported here indicate that the preference-signaling effect of search does not hinge on search costs per se. The effect persists even when search costs are as small as a single mouse-click (e.g., Experiment 3). However, the decision to engage in costly search underlies the inference consumers are making. The consumer who observes herself voluntarily incurring search costs in order to unveil an additional alternative infers that she was not attracted to the alternative already presented to her. Interestingly, consumers appear to be completely unaware that their search behavior can influence their choices. Across the four experiments, none of the participants successfully guessed the research hypotheses. This lack of understanding could potentially lead consumers to make sub-optimal choices when they engage in sequential product search, particularly if the best options are discovered first.

Theoretical implications

Our work has established a link between the literature on information search and that on preference construction. A large body of research on information search has focused on economic theories and issues such as the effect of search cost on the extent of information search and the implications of changes in search costs for individual firms or markets as a whole (e.g., Bakos, 1997; Kogut, 1990; Lynch & Ariely, 2000; Moorthy, Ratchford, & Talukdar, 1997; Ratchford, 1982; Ratchford & Srinivasan, 1993). Whereas we demonstrate that the decision to search for an out-of-sight alternative plays an important role in shaping consumer preference. In particular, the attractiveness of previously inspected alternatives is reduced as a result of the search, which in turn increases the choice share of the initially veiled alternative. The findings reported here demonstrate the relevance of including the search process in research on preference and choice. We welcome future work along these lines to improve our understanding of the connection between the two processes.

We propose that consumers infer, through self-perception (Bem, 1967, 1972), their preferences when they observe their decisions to engage in the effortful discovery of an initially out-of-sight alternative. In a manner similar to when consumers interpret equivocal or irrelevant information to resolve decision ambiguity (Brown & Carpenter, 2000; Russo, Meloy, & Medvec, 1998), the present research shows that consumers interpret their decision to search for alternatives as an internal cue, which they then use in constructing their preferences.

We have demonstrated that the preferences that consumers infer from their own search behavior—in particular, their unveiling of an out-of-sight alternative as they make one choice persist and influence subsequent choices involving different alternatives, such that alternatives similar to the previously known alternative in connection with the original choice are also devalued. This result contrasts prior work that examines how the difficulty of obtaining an alternative may result in inferences about the desirability of that specific alternative (Kim & Labroo, 2011; Labroo & Kim, 2009; Lee & Norton, 2011; Norton et al., 2012).

A limitation of this article is that we fix the amount of information about the out-of-sight alternative made available to consumers prior to the search. We focus on a setting in which consumers are only aware of the existence of an additional alternative, but know nothing about it. In this situation, we have proposed (and tested) the hypothesis that consumers infer from
their engaging in the effortful discovery of the out-of-sight alternative that the previously known alternative is not sufficiently appealing to them. However, sometimes consumers have partial information about an out-of-sight alternative. We conjecture that this may cause consumers to draw different inferences and lead to different evaluations of the alternatives. For instance, if a consumer had partial information about an out-of-sight alternative prior to search, she might infer that she engaged in the effortful unveiling of that alternative because she found it appealing. Further work is needed to shed light on the construction of preferences when consumers search based on partial information about out-of-sight alternatives.

Lastly, this article relates to the general spirit of the work by Ge, Häubl, and Elrod (2012). The latter demonstrated that delaying the presentation of some favorable information about a particular product until after consumers have completed their initial screening of the available alternatives can increase the choice share of that product. However, that research has distinct differences from the present work in that it examined settings where descriptions of all available products were shown at the outset (i.e., there were no out-of-sight alternatives) and the presentation of the additional information was incidental and exogenous (i.e., participants did not choose to obtain it).

**Practical implications**

A common intuition is that sellers should make information about their offerings as easily accessible to consumers as possible. In addition, advances in information technology and the wide-spread adoption of the Internet for information search have made it less costly for firms to provide information to interested consumers. Thus, the cost associated with facilitating consumer information search has become less of a constraint for sellers. However, the key practical implication of the findings reported here is that it may be detrimental to be the first alternative viewed if the consumer subsequently chooses to unveil additional alternatives prior to choice. The challenge for firms seeking to capitalize on this effect is that it requires a delicate balance between the product being inconspicuous enough that the consumer does not have access to information about it right away, but not so inconspicuous that the consumer never becomes aware of its existence or is unwilling to make the effort to acquire detailed information about it.

We have demonstrated the counterintuitive possibility that making an offering relatively less accessible can actually increase demand for that offering. In our experiments, we demonstrated that the overall (unconditional) choice share can more than offset the initial disadvantage for an out-of-sight alternative due to reduced exposure to it. However, there is an obvious boundary to this effect — once the effort required to unveil the offering becomes prohibitive for a sufficiently large share of the population of potential customers, demand for it will drop because too few consumers will find out about it in the first place. Thus, there exists a sweet spot within which a firm might benefit from making it more costly for consumers to learn about its offerings without making it too costly. While determining the demand-maximizing level of search cost for a firm or offering in practice is a complex problem that can only be solved on a case-to-case basis in light of the specific market circumstances, the present research provides some guidance in this regard by suggesting that firms can benefit from allowing consumers to actively seek out their products.

**Appendix A. Experiment 4 choice sets**

<table>
<thead>
<tr>
<th>Choice set</th>
<th>Restaurant 1</th>
<th>Restaurant 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Name</td>
<td>Cuisine</td>
</tr>
<tr>
<td>1</td>
<td>Kateh</td>
<td>Persian</td>
</tr>
<tr>
<td>2</td>
<td>Parbat</td>
<td>Nepalese</td>
</tr>
<tr>
<td>3</td>
<td>Lavash</td>
<td>Persian</td>
</tr>
<tr>
<td>4</td>
<td>Coast Sushi</td>
<td>Japanese</td>
</tr>
<tr>
<td>5</td>
<td>Casimir</td>
<td>Tunisian</td>
</tr>
<tr>
<td>6</td>
<td>Cho Sun</td>
<td>Korean</td>
</tr>
<tr>
<td>7</td>
<td>Coast Sushi</td>
<td>Japanese</td>
</tr>
<tr>
<td>8</td>
<td>Lavash</td>
<td>Persian</td>
</tr>
<tr>
<td>9</td>
<td>Shanghai</td>
<td>Chinese</td>
</tr>
<tr>
<td>10</td>
<td>Bandar</td>
<td>Persian</td>
</tr>
</tbody>
</table>

Note. Set 1 was the focal choice. Sets 3, 5, 8, and 10 were follow-up choices. The remaining sets were filler choices.

**References**


