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Path dependent preferences: The role of early experience and biased search in preference development ☆

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Abstract

What is the role of early experiences in shaping preferences? What are the mechanisms by which such early encounters influence the way preferences are formed? In this research, we examine the impact of the entry position and favorability of initial (and ongoing) experiences on preference development. We predict that the starting point will heavily influence which particular region people select from initially, and favorableness of early experiences and myopic search will both limit their search to that particular region. Across four studies, we find that when the initial experiences are favorable, subjects engage in lower levels of search, experience only a narrow breadth of possible alternatives, demonstrate less ongoing experimentation, and have a reduction in the amount of preference development.

Keywords: Preference learning; Anchoring

When people begin to experience products in new categories (e.g., wine), they have a multitude of options from which to choose, some of which are highly suited for their individual tastes or preferences and others that are not. How do people choose which options to sample first? Because it is practically impossible to experience all options directly, it is important to understand the factors that influence the selection of options during this influential period. Moreover, to the degree that preferences are shaped by these initial experiences, later preferences are path dependent. In this work, we describe a biased search process and advance the mechanism that is believed to drive preference development in novel domains. In essence, the mechanism is built on three components: the starting point, the favorableness of the early experience, and myopic search. We first present a brief illustration of the biased search process. We then provide a review of the mechanisms that are believed to drive the process and the predictions that emerge from this perspective.

Consider a woman who is searching for her ideal lemonade. Fig. 1A and B, depicts two key dimensions on which lemonade can vary (sweetness and lemon taste). The X at the center of each panel represents the woman's hypothetical ideal point. Next, imagine that her initial experience is not near the ideal point. Two potential starting points are identified in the panels: high intensity (HI) and low intensity (LI). (A) the woman has a favorable evaluation of her initial experience. When she begins to explore (i.e., make lemonade), she likely makes lemonade that is similar to her

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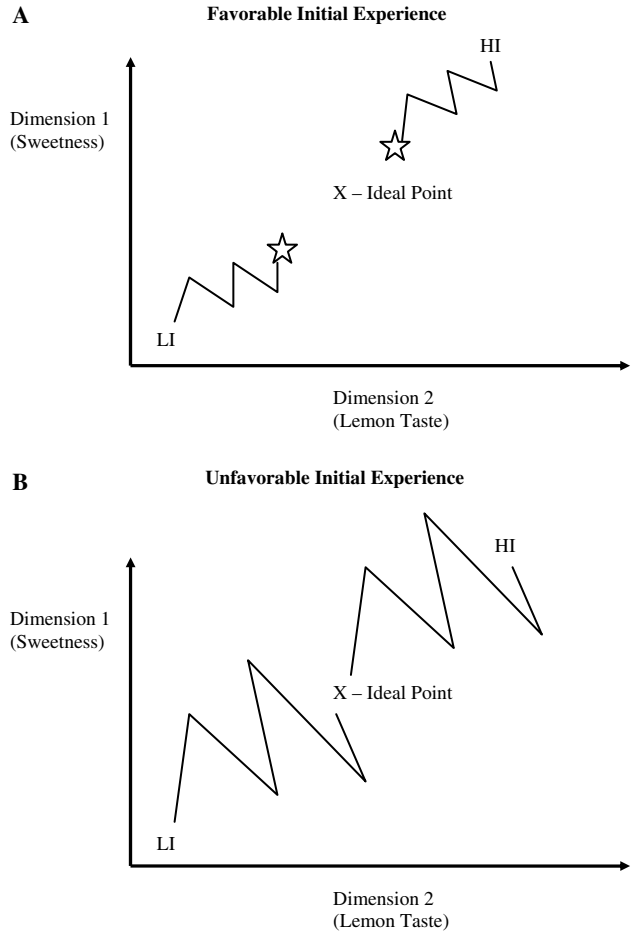

Fig. 1. A path dependent model of preference development A: Favorable Initial Experience B: Unfavorable initial experience. Note: The letters represent the starting point of initial experience (HI = high intensity, and LI = low intensity). (A) each star represents a potential stopping point.

favorable initial drink. Furthermore, to avoid unpleasant trials, she continues to sample products that are only marginally different from the favorable initial experience. Thus, there is a potential that she will be unable to discover her ideal point because she inadvertently searches only a small subset of the attribute space. Conversely, Fig. 1B, depicts a scenario in which the woman does not react as favorably to the initial experience and thus proceeds to experiment across a wider range of the attribute space. Ultimately, she selects a lemonade that is closer to her ideal point. In this research, we advance and test the propositions that (1) the woman's starting point matters because it identifies the region in which trial most likely will occur; (2) if the initial experience is favorable, a biased search process ensues, which limits the breadth of experience that she obtains; and (3) the biased search process hinders her ultimate level of preference development (which is represented in Fig. 1A, as the distance between the stars and the ideal point).

Next, we expand on the previous research that led to our predictions and advance the formal hypotheses that are associated with the biased search model. In the experiments that follow, we test the components of the biased search process (Experiments 1, 2, and 3), the applicability of the biased search process to a completely novel domain (Experiment 2), a necessary condition to engage in biased search (Experiment 3), and, finally, the relevance of the biased search model in a non taste related domain (Experiment 4).

Role of the starting point

A research stream that has examined the influence of the initial starting point is the work on anchoring (Tversky & Kahneman, 1974). For example, Ariely, Loewenstein, and Prelec (2003) demonstrated that the first choice in a novel environment, even when it is arbitrary, can serve as the foundation on which subsequent choices are based and with which they are compared (see also Carpenter & Nakamoto, 1989). The reasons the initial experience can affect preferences may be found in an examination of the mechanisms that are believed to drive anchoring and adjustment (Chapman & Johnson, 1999; Epley & Gilovich, 2001; Strack & Mussweiler, 1997). Although there is debate in the anchoring literature on this issue, one school of thought is that, at least in part, anchoring is caused by a selective attention process and a bias toward positive hypothesis testing (Mussweiler & Strack, 2001; Mussweiler, Strack, & Pfeiffer, 2000; Strack & Mussweiler, 1997). To the extent that these mechanisms are active, an initial experience in a novel environment will serve as a starting point for thinking about subsequent experiences and, ultimately, may influence the selection of such experiences.

Preference learning in novel domains further demonstrates how the starting point and the decision process associated with these early selections can have a lasting impact on future preferences (Heilman, Bowman, & Wright, 2000; Hoeffler & Ariely, 1999). For example, Hoeffler and Ariely (1999) examined the process by which preferences are learned and developed over time in a completely novel environment. In their studies, subjects made a series of choices and experienced the outcomes. Hoeffler and Ariely found that the type of early experience (e.g., easy choices, hard choices) had an enduring effect on subjects' subsequent choices in a similar environment. Notably, early experiences tended to have the most lasting effect when the process was deliberate, that is, when people explicitly considered the trade-offs implied by their decisions.

In summary, prior research on anchoring and preference learning in novel domains emphasizes the potential of the starting point to affect the preference development process. As we demonstrated in the previous section, the

starting point may have an influential role on the process of selecting options to sample:

Hypothesis 1. Initial choices will be alternatives that are similar to initial experiences.

Role of the favorableness of early experiences

The favorability of a person's early experiences can shape learning by influencing the extent to which he or she will limit or expand the range of subsequent choices. Specifically, we propose that patterns of biased search are more likely to follow a positive initial experience and less likely to follow a neutral or moderately negative initial experience. Why would biased search be more likely to occur after a positive initial experience? March (1996, p.315) emphasized the seductive power of learning from sequential sampling by shifting sampling from inferior alternatives to seemingly superior ones:

Much of the power of learning stems from these sequential sampling properties. By shifting sampling from apparently inferior alternatives to apparently superior ones, the process improves performance. However, these same properties of sequential sampling complicate learning from experience. An experiential learning process reduces the rate of sampling apparently inferior alternatives and thus reduces the chance to experience their value correctly, particularly for those with high variance in returns. Correction in estimates of expected return from each alternative is a natural consequence of the unfolding of experience, but it is inhibited by any learning process that quickly focuses choice and thus reduces the sampling rate of one alternative.

Meyer and Shi (1995) examined this phenomenon in a service setting (i.e., airlines) and found that in some situations, subjects were averse to sampling unfamiliar options. Specifically, subjects were unlikely to experiment with unfamiliar options when the more familiar option had a known, high probability for success. In addition, people have been shown to have biased choices toward options that they expect to be favorable (John, Scott, & Bettman, 1986). Furthermore, research with collaborative, filter-based smart agents has demonstrated that agents that base their recommendations on prior favorable experiences continue to recommend similar options and fail to obtain diagnostic feedback about dissimilar options (Ariely, Lynch, & Aparicio, 2004).

From a preference learning perspective, people are likely to undersample options that might involve inferior experiences and oversample favorable ones. This could lead to a biased search process that restricts a person's breadth of experience and perhaps his or her likelihood of finding the most highly suited items:

Hypothesis 2. When compared with unfavorable initial experience, favorable initial experience in a category will lead to (a) the testing of options in closer proximity to initial option, (b) the selection of a narrower range of options, and (c) fewer test trials.

Role of myopic search

Searching for alternatives that match preferences involves an inherent conflict between two goals: a short-term desire to experience favorable outcomes and a long-term desire to learn in order to facilitate experiencing greater utility in the future. This conflict is driven by costs that are associated with a person's experiencing potentially inferior alternatives on route to ultimately finding superior ones (Moorthy, Ratchford, & Talukdar, 1997). Although the main normative force in preference development, and indeed any kind of learning, emanates from the desire to improve in the long run, it is unclear whether decision makers have the patience that such a process requires (Laibson, 1997; O'Donoghue & Rabin, 1999).

Indeed, much research over the past decade shows that people are myopic and impatient (Ariely & Wertenbroch, 2002; Zauberman, 2003). People's tendency to focus on short-term goals may prevent them from discovering the most suitable options if search is ended too soon. Benartzi and Thaler (1999) coined the term "myopic loss aversion" to describe people's failure to take a long-term perspective in a risk-taking environment. Although subjects who were exposed to a long-term perspective showed less effects of myopia and were willing to accept more risk in their choices (Benartzi & Thaler, 1999), the accumulating evidence on people's tendency to have a chronic short-term focus leads us to expect that the more salient goal of extracting immediate utility takes precedence. We predict that this short-term focus will influence preference development by focusing exploration toward similar options:

Hypothesis 3. A favorable experience will lead to (a) the testing of alternatives in closer proximity to the prior alternative and (b) smaller changes in the rating of a subsequent alternative.

Hypothesis 4. An unfavorable experience will lead to the testing of a greater deviation in the mixture of ingredient components on a subsequent trial.

Our predictions are supported by findings from traditional models of search behavior. The fundamental focus of traditional search models is the trade-off between the costs and the benefits of search (Stigler, 1961; Weitzman, 1979). For example, in the classic multiarm bandit problem, a gambler needs to decide which of several potential "arms" of a figurative slot machine

to pull to maximize the payout. The optimal solution calls for a period of trial-and-error sampling to learn the payout distribution associated with each arm (DeGroot, 1970). The penalty for limiting search in these models is that gamblers can become stuck in a local suboptimum and fail to discover a global optimum solution. Analogously, we predict that people can develop local suboptimum preferences.

If people are overly focused on extracting immediate utility, they should be more likely to select an experience that is similar to the favorable one they recently enjoyed. However, people who have a neutral or moderately negative experience should not be affected to the same degree. Ironically, such dependency on the quality of earlier experiences also implies that favorable initial experiences may prevent people from experimenting with dissimilar other products, leading to a biased search process in which entire regions of potentially attractive alternatives are relatively unlikely to be discovered. The starting point may heavily influence which particular region people select from initially, and favorableness and myopic search are the mechanisms that limit their search to that particular region.

Hypothesis 5. Favorable initial experience will lead to more pronounced biased search (Hypothesis 1–4) than will unfavorable initial experience, leading to a lower level of preference development.

We examine the impact of early experience in several ways. First, we isolate the unique impact of initial choice by externally manipulating the entry position in attribute space of people's initial experience (experiments 1–4). Second, we obtain favorability measures of each experience. In combination, this enables us to examine the role of biased search on the preference development process. Furthermore, we construct an environment with a quantified attribute space so that we can more accurately examine the determinants (i.e., breadth of experience through the range of options tried) of self-selected exploration and ultimately final preference development (experiments 1–3). Next, we examine a condition that is necessary for people to engage in a biased search process, namely, the ability to recreate their initial experience (experiment 3). Finally, we manipulate the favorability of the initial experience while examining the predictions of the biased search model in a non-taste related domain (experiment 4).

Experiment 1: The impact of the starting point and early experience

The goal of Experiment 1 is to show how both the initial position in attribute space and the favorability of the initial experience influence preference development through the location, breadth and sequence of self-selected experiences. We examine the impact of initial experience and test whether subjects whose initial experience is favorable engage in biased search. We present process measures demonstrating the search process and finally, we examine the consequences of biased search on preferences.

Subjects

A total of 109 undergraduates at a large U.S. university participated in partial fulfillment of a course requirement.

Design

The experiment was a three-group design with one control condition and two experimental conditions that varied in their initial experience. In the two experimental conditions, we varied subjects' entry position in attribute space (the initial experience was either a low- or a high-intensity drink as described in Procedure). Eighty-one subjects were assigned to experimental groups at the time they signed up to participate in the experiment and 28 subjects were assigned to the control condition. Because of procedural differences between the conditions, we placed subjects in moderate-sized groups (8–12) in which only one condition was run per group. A total of 35 subjects were in the high-intensity condition, and 46 subjects were in the low-intensity condition.

Procedure

The stimuli used in this experiment were lemonade mixtures that were created by mixing sugar, lemon, and water. The basic sugar solution was created by melting two times the volume of sugar into hot water which was cooled to room temperature. The basic lemon solution consisted of ReaLemon lemon juice. All materials were prepared in advance and were room temperature at the time of the experiment. Subjects were instructed that their goal was to: "...create the mixture of lemonade that you think is the best for you." Subjects were given the opportunity to test different mixtures and learn through trial and error what lemonade best suited them. At each trial, one ounce of water was placed into a three-ounce cup. Subjects then used separate eyedroppers to dispense a desired amount of sugar and lemon into their lemonade mixture. Stir straws were provided, and subjects were instructed to mix the test trials thoroughly and to record the number of drops of sugar and lemon before tasting. Subjects were instructed to taste the lemonade by swishing it around in their mouth and spitting it out into a cup to avoid satiation. After subjects tasted the lemonade, they rated each trial on a nine-point

scale anchored by "worst" (1) and "best" (9). Before moving to the next trial, subjects were instructed to take a sip of water to cleanse their palate.

The number of trials each subject experienced was endogenous; subjects continued to make new samples of lemonade until they found their ideal lemonade. Subjects were told that they would need to remain in the room where the experiment took place for the entire time and that debriefing would not begin until the end of the allotted time. This was done to eliminate any incentive of subjects to reduce trials in an attempt to finish the experimental session early.

The first group sessions were composed entirely of subjects in the control condition. These subjects were asked to use the trial process described previously to identify the optimal mixture of sugar, lemon, and water needed to create their ideal lemonade. The control group's final average mixture consisted of one ounce of water, 19 drops of sugar solution, and 25 drops of lemon solution. The outside range of the final mixture from subjects in the control condition (range of sugar = 5–50, range of lemon = 5–75) was used to establish a low-intensity and high-intensity solution that was used in the two experimental conditions, while maintaining a similar ratio of sugar to lemon for both solutions. The weak initial experience condition (low-intensity) consisted of one ounce of water, five drops of sugar solution, and six drops of lemon solution. The strong initial experience condition (high-intensity) consisted of one ounce of water, 50 drops of sugar solution, and 60 drops of lemon solution. Subjects in these two conditions began by tasting and rating the prepared samples of lemonade (low- and high-intensity). After this initial experience, we informed subjects of the content (number of drops of lemon and sugar) of their sample trial and asked them to experiment on their own to identify the optimal mixture of sugar and lemon needed to create their ideal lemonade.

Results

The effect of initial experience on search

We used analysis of covariance to examine the effect of initial experience (both the intensity and the rating of the first trial) on subsequent search for an ideal lemonade mixture. We used the number of drops of lemon (sugar) to assess the perceived sourness (sweetness) of the lemonade mixture that subjects tested at each trial. We used the intensity of lemonades tested in the first and final test trials (Hypothesis 1), the proximity of the second trial to the initial trial intensity (Hypothesis 2a), the range of intensities tested (Hypothesis 2b), and the number of test trials (Hypothesis 2c) separately as dependent variables. The entry position (low- versus high-intensity condition) served as the independent variable, and subjects' rating of the initial experience served as a covariate in all the analyses.[3]

We examined the role of entry position and favorability of initial experience on the intensity of lemonades tested in the first and final test trials. Consistent with Hypothesis 1, the total number of drops of sugar and lemon in subjects' initial trial influenced the total number of drops that subjects chose to use as their starting point in their first controlled test trial ($M_{\text{high-intensity}} = 48.39$ versus $M_{\text{low-intensity}} = 5.85$; $F(1,77) = 46.77$, $p < .001$). This effect of entry position, though diminished in magnitude, carried over to the final test trial ($M_{\text{high-intensity}} = 42.66$ versus $M_{\text{low-intensity}} = 12.10$; $F(1,77) = 3.74$, $p < .1$).

The proximity of the second trial to the initial trial intensity was measured by comparing the number of drops of sugar and lemon used in these separate trials. We operationalized proximity as

$$\text{Proximity} = \sum_{i=1}^{2} |\text{Drops}_{i,n+1} - \text{Drops}_{i,n}|, \tag{1}$$

where i represents the ingredient components of sugar and lemon, and n is trial number. Proximity, or distance between the composition of the second trial and the initial trial, was inversely related to subjects' rating of their initial experience ($b_{\text{proximity}} = -.08$, $F(1,77) = 8.48$, $p < .01$) and unrelated to the number of drops of sugar and lemon in the subjects' initial trial ($F(1,77) = .63$, $p > .1$). The range of intensities that subjects experienced was inversely related to their ratings of the initial experience ($b_{\text{range}} = -.09$, $F(1,77) = 9.99$, $p < .01$) and was not effected by entry position ($M_{\text{high-intensity}} = .77$ versus $M_{\text{low-intensity}} = .89$; $F(1,77) = .05$, $p > .1$; entry position × rating: $F(1,77) = .44$, $p > .1$). In addition, the number of trials that subjects engaged in was inversely related to their ratings of the initial experience ($b_{\text{trials}} = -.28$, $F(1,77) = 6.02$, $p < .05$). The number of test trials that subjects engaged in did not differ by condition ($M_{\text{high-intensity}} = 5.10$ versus $M_{\text{low-intensity}} = 6.07$; $F(1,77) = .45$, $p > .1$; entry position × rating: $F(1,77) = .03$, $p > .1$). Together, these results provide strong support for Hypothesis 2a, b, and c.

Impact of favorability on the search process

Three additional analyses were used to further examine the role of experience on search behavior. We

[3] Note that individual analyses were completed for the number of drops of sugar and lemon with similar patterns and significance levels. Thus, we combine sugar and lemon to create an overall measure of intensity. Stevens (1986) prescribes using the transformation $\log Y = 1.3 \log x$ to convert the number of drops of lemon (sugar) into a psychophysical measure of sourness (sweetness). The transformed data are used for more accurate statistical tests, yet for expositional purposes, we use the actual (untransformed) mean number of drops to report lemonade intensity and range in the text (see also Table 1).

anticipated that favorable experiences would lead to more incremental testing of proximal alternatives (Hypothesis 3a) and smaller changes in perceived improvement (Hypothesis 3b), whereas unfavorable experiences would lead to testing a greater change in the mixtures of ingredients tested (Hypothesis 4).[4] Fig. 2 illustrates all three of these rating dependent process measures of search.

First, we examined the effect of subjects' rating of an alternative n on their subsequent search (change in intensity of the next test trial, $n+1$). Consistent with Hypothesis 3a, we observe that proximity to a prior alternative is inversely related to subjects' rating of the prior alternative ($b_{\text{proximity}} = -1.17$, $F(1,362) = 14.76$, $p < .001$). Second, we examined the effect of subjects' rating of an alternative n on the absolute deviation in the rating of test trial n and $n+1$. Consistent with Hypothesis 3b, we observe that the change in rating between trials was inversely related to subjects' rating of the prior alternative ($b_{\Delta\ \text{rating}} = -.36$, $F(1,362) = 111.35$, $p < .001$). Third, we examined the effect of subjects' rating of an alternative, n, on the change in the relative mixture of lemon and sugar drops in the next trial, $n+1$. The relative mixture of lemon to sugar drops was assessed with the percentage of overall drops in a given trial. Consistent with Hypothesis 4, we observe an inverse relationship between subjects' ratings on a previous trial and the change in relative mixture of lemon to sugar drops ($b_{\Delta\ \text{mixture}} = -01$, $F(1,362) = 25.64$, $p < .001$).

The effect of initial experience on preference development

To measure preference development, we established a surrogate ideal point. We chose the average final lemonade mixture from subjects in the control group.[5] With the surrogate ideal point in place, assessing preference development requires examination of the deviation between subjects' final lemonade intensity, I_s, and the mean lemonade intensity of the control group, I_c. To scale the measure so that larger values indicate more preference development, we operationalized preference development by the following:

$$\text{Preference development} = -1 * |I_s - I_c|. \quad (2)$$

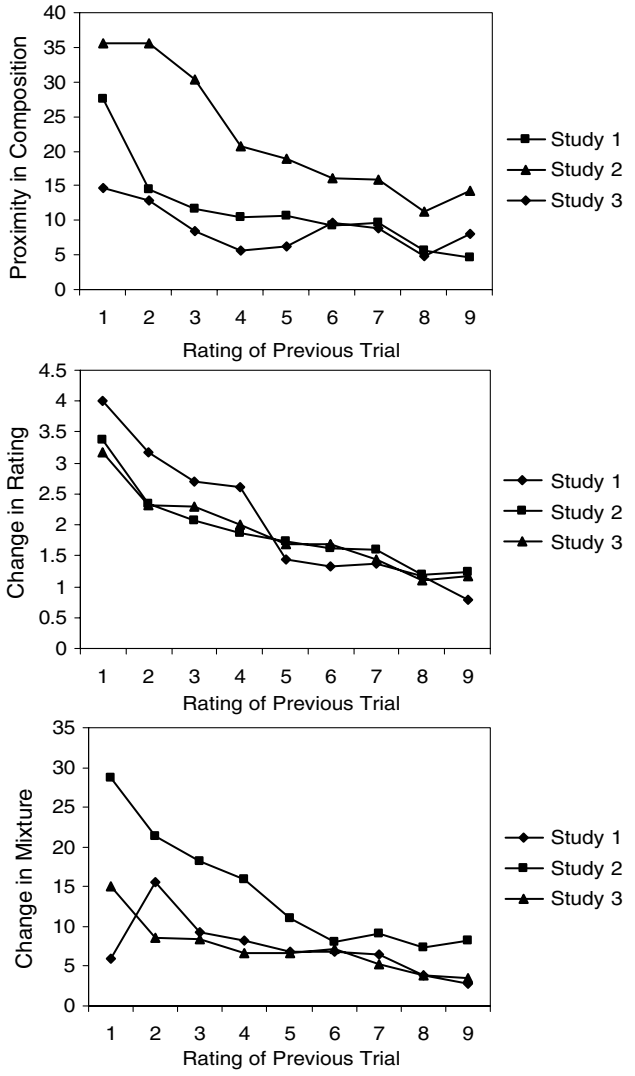

Fig. 2. Rating dependent process measures of search behavior in Experiments 1, 2, and 3.

Consistent with Hypothesis 5, we observe that preference development was inversely related to subjects' rating of their initial experience ($b_{\text{preference}} = -.17$, $F(1,77) = 10.36$, $p < .001$) but not effected by the intensity of the initial experience ($M_{\text{high-intensity}} = -1.97$ versus $M_{\text{low-intensity}} = -1.52$; $F(1,77) = .08$, $p > .1$; entry position × rating: $F(1,77) = .23$, $p > .1$).

We performed an additional analysis to better understand exactly how biased search affects preference development. In this analysis, we simultaneously tested four factors to determine which factor had the greatest impact on preference development. Factors included in the analysis were the range of lemonade intensities experienced, entry position, the rating of the initial experience, and the number of test trials. The range of lemonade intensities alone best predicted preference development ($b_{\text{range}} = 1.21$, $F(1,76) = 37.2$, $p < .001$; entry position: $F(1,76) = 2.89$, $p = .09$; rating of the

[4] The authors would like to an anonymous reviewer for the suggestion to include these additional process measures of search.

[5] We ran a post test to validate the use of the control group as a surrogate ideal point. A total of 46 undergraduates from the same population who did not participate in the main studies blindly tasted the average final mixture from the control group, the high-intensity group, and the low-intensity group. The control group's lemonade ($M_{\text{control}} = 6.39$) was rated higher on an 11-point attractiveness scale than either the low-intensity lemonade ($M_{\text{low-intensity}} = 3.70$; $t(46) = 6.48$, $p < .001$) or the high-intensity lemonade ($M_{\text{high-intensity}} = 5.46$; $t(46) = 2.59$, $p < .01$).

initial experience: $F(1,76) = 2.10$, $p > .1$; number of trials: $F(1,76) = .07$, $p > .1$).

Discussion

The results from Experiment 1 support Hypothesis 1–5. First, subjects who were first exposed to low-intensity lemonade tended to begin their testing with fewer drops and to prefer weaker lemonade in their final test trials than did subjects who were first exposed to high-intensity lemonade. Second, subjects whose initial experience was favorable chose to begin their testing with alternatives that were in closer proximity to their initial experience (Hypothesis 2a), tested a narrower range of lemonade intensities (Hypothesis 2b), and engaged in fewer test trials (Hypothesis 2c) than did those whose initial experience was less favorable. Our process measures support this notion and also demonstrate that this effect is not restricted to initial experiences. Favorable experiences directly influence future search by restricting the range of alternatives tested (Hypothesis 3a), resulting in incremental improvements (Hypothesis 3b). In contrast, unfavorable experiences stimulate a broadening of search. As we observed, subjects experimented with more variety in the mixture compositions after an unfavorable experience (Hypothesis 4). By expanding the range of alternatives considered, these negative experiences may facilitate preference development.

Relative to the control groups, our experimental subjects exhibited hindered preference development (Hypothesis 5). The finding that low- and high-intensity subjects created initial and ideal lemonades that were different from the control group is consistent with the basic findings from the anchoring literature. Yet when we examined the factors together, the range of mixtures tried, not the starting point, had the greatest impact on preference development.

Why did the favorability of the initial experience lead to a reduction in preference development? One explanation is that subjects' favorable evaluation of their initial experience led to myopic search, which took the form of a reduction in the range of mixtures tried and fewer trials tested. Ultimately, subjects experienced only a subset of the available alternatives and eventually chose their preferred option from the sampled set.

Thus, the driving force that hindered full preference development was the lack of knowledge about the full range of the attribute space. However, another explanation for our results must be considered. Subjects who were informed of the number of drops in their initial lemonade sample may have inferred that the mixture content provided information about others' ideal lemonade mixture. If so, subjects may have been exhibiting compliance with a perceived social norm. Although this explanation does not explain why subjects' rating of their initial experience was instrumental in both search and preference development, or why the same process was observed across the range of experimental trials, it must be considered. In Experiment 2, we provide subjects with a purely random starting point to rule out this alternative explanation.

In addition, although the task of creating an ideal lemonade using drops of sugar and lemon mixed with water is a novel task for subjects, most are probably familiar with the taste of lemonade, and many may already know what they like. This issue calls into question whether we are actually examining preference development or the ability to discriminate differences from an already established ideal point. Ideally, our aim is to extend our findings beyond the realm of lemonade (a familiar taste) to an unfamiliar domain to determine whether the biased search process can be reproduced. Product pioneering research suggests that initial experiences in a product category tend to shape people's ideal points (Carpenter & Nakamoto, 1989), and thus we would expect to observe similar effects with an unfamiliar product. Experiment 2 accomplished this objective by replacing the lemon concentrate with a tamarind concentrate, thus requiring subjects to create an ideal tamarind drink rather than lemonade. Although tamarind juice is commercially available, pretesting revealed that few people in the subject pool had experienced its taste.

Experiment 2: The impact of the starting point and early experience in an unfamiliar domain

The goals of Experiment 2 are twofold: First, we wanted to extend our findings to an unfamiliar domain to examine the role of early experience on search when people lack a preconceived notion of the consumption experience. Second, we wanted to eliminate the impact of compliance with a perceived social norm. We designed Experiment 2 to replicate Experiment 1 with three changes. First, we used a clearly arbitrary starting point rather than a high-intensity versus low-intensity initial starting point. The arbitrary starting point provided a range of initial experience rather than two distinct starting points and eliminated the possibility that subjects would infer a normative value to the content. Second, rather than using familiar ingredients, subjects were asked to combine drops of tamarind concentrate with sugar to produce a drink. Third, because of the random nature of the starting point, which led participants to create their initial tamarind drink across a broad spectrum of the attribute space, we did not include a control condition.

The experimental procedures were the same as those in Experiment 1; the only difference was that subjects were asked to create their initial experience by taking the last digit of their student identification number and multiplying it by seven. The product of these two

numbers was used as the number of drops of tamarind and the number of drops of sugar to combine with one ounce of water to produce the initial sample. As with Experiment 1, after the initial experience, subjects were able to experiment on their own with different mixtures to obtain the ideal tamarind drink.

Subjects

A total of 119 undergraduates from a large U.S. university participated in the experiment for partial fulfillment of a course requirement.

Results

Consistent with Hypothesis 1 and Experiment 1, the total number of drops of tamarind and sugar in subjects' initial trial influenced the intensity of the first controlled test trial ($b = .29$, $t(117) = 4.77$, $p < .001$), but not the final test trial ($b = .02$, $t(117) = .23$, $p > .1$). The proximity of the second trial to the initial trial intensity and the range of drink intensities that subjects experienced were inversely related to subjects' rating of their initial experience ($b_{\text{proximity}} = -.16$, $t(117) = -3.01$, $p < .01$; $b_{\text{range}} = -2.58$, $t(117) = -1.90$, $p < .1$), thus supporting Hypothesis 2a and b and extending the prior findings into an unfamiliar domain. Subjects' rating of the initial experience did not reliably predict the number of test trials ($b_{\text{trials}} = -.07$,$t(117) = -.79$, $p > .1$), however the results are directionally consistent with Hypothesis 2c.

Impact of favorability on the search process

Consistent with Hypothesis 3a and b and Study 1, we observe that proximity to a prior alternative and the change in rating between trials are inversely related to subjects' ratings of the prior alternative ($b_{\text{proximity}} = -2.33$, $t(535) = -5.63$, $p < .001$; $b_{\Delta\ \text{rating}} = -.19$, $t(535) = -6.36$, $p < .001$). Consistent with Hypothesis 4, we observe an inverse relationship between the change in subjects' relative mixture of sugar to tamarind drops and their ratings of a previous trial ($b_{\Delta\ \text{mixture}} = -.03$, $t(535) = -7.67$, $p < .001$).

Discussion

The results from Experiment 2 replicate the most important results from Experiment 1 in a completely unfamiliar domain with random initial starting points. First, the number of drops in the first trial influenced subjects' first controlled trial. Second, subjects who had a favorable initial experience showed a similar pattern of biased search, whereby they reduced the range or breadth of alternatives that they systematically chose to experience in later trials. Furthermore, our process measures indicate that subjects' favorable experiences invoked a similar biased search process. Recall that with the range of starting points, we did not include a control condition. Thus, we do not have a surrogate ideal point and are not able to test for the impact on preference development in the same manner as we did in Experiment 1.

Experiment 2 allows us to rule out any role that social norms, or compliance, may have played in determining subjects' reliance on their initial starting point. In this experiment, subjects were told that the number of drops of tamarind and sugar used to create their initial experience was purely arbitrary and contained no information about others' ideal drink. Yet we still observed a basic entry position in the attribute space effect and biased search when the subjects' initial experience was favorable.

An alternative explanation, which we cannot rule out in the first two studies, is that people' tastes were changed in response to the early experiences. Carpenter and Nakamoto (1989) point to this type of explanation—namely, a changing of ideal points—as a potential mechanism behind the pioneering advantage of products that are first to market. The literature on how people acquire food preferences also points to the impact of an acquired taste. Perhaps the most widely studied example of food preference learning is that of the development of a taste for chili peppers. Rozin and Schiller (1980) systematically examined different contexts for acquiring a taste for chili peppers and, specifically, the irritation associated with chili peppers, which they call "chili burn." They found that two factors were the most likely mechanisms to lead to an acquired taste for chili peppers: exposure through physiological changes to taste and social factors.

If taste receptors can adapt or become sensitized, a person's reaction to a given stimulus can be affected by the stimuli that precede it (i.e., the perceived weight of a target stimulus can change depending on whether a heavy or a light object was previously assessed). If this explanation describes the effect that we observed in Experiments 1 and 2, the results show only a psychophysical adaptation based on the taste of the low- and high-intensity initial experiences. The question of whether the impact of early experience is driven by changes in taste or a biased search process is unresolved. Specifically, does the initial experience itself lead to a reduction in preference development through an adaptation to taste, or is any reduction in preference development due to biased search?

In Experiment 3, we explore a condition that is necessary for subjects to engage in a biased search process. We do so by isolating the role that is played by the physical taste of the initial lemonade versus content knowledge (number of drops in the original mixture). This is important because our account relies on subjects' ability to use the knowledge associated with the initial experiences (i.e., number of drops) to bias search in the

environment. We tested this by including an unlabeled initial experience condition in which subjects did not know the exact number of drops of lemon and sugar in their initial drink. We designed the unlabeled conditions to inhibit the biased search process by preventing subjects from recreating their initial experience. However, the unlabeled conditions should not affect any physical taste adaptation to the lemonade. As such:

Hypothesis 6. Initial experience that limits the ability to recreate that experience will decrease the likelihood of a biased search process.

Experiment 3: A test of a necessary condition for biased search

In the first two experiments, we observed that subjects whose initial experience was favorable tended to engage in a biased search process for their ideal lemonade or tamarind drink, which led to final mixtures that deviated from the control group (Experiment 1), which was not exposed to an initial starting point. The main prediction to be tested in Experiment 3 is that the initial experience had this type of influence because it was replicable, causing subjects' initial experience to influence both search and the final outcome. Without the knowledge of how many drops of lemon and sugar are contained in their initial sample, we propose that subjects will not easily be able to reproduce their initial experience, which is expected to reduce biased search and produce a higher level of preference development.

Design

We designed Experiment 3 to replicate Experiment 1, again documenting the negative effect of a favorable initial experience on preference development through biased search. Therefore, we included the same entry position manipulation in Experiment 3 as that in Experiment 1 (high-intensity or low-intensity as the initial experience) and added an additional manipulation of the knowledge of the number of drops of lemon and sugar in the initial experience. The experiment was a 2×2 between-subjects design. The first experimental manipulation was entry position (low-intensity or high-intensity). The second experimental manipulation was knowledge of the number of drops of sugar and lemon used to create the subjects' initial experience (label or no-label condition). Subjects in the label conditions were informed of how many drops of lemon and sugar were used to create their initial experience (low-intensity: six drops of sugar, five drops of lemon; high-intensity: 60 drops of sugar, 50 drops of lemon), whereas subjects in the no-label conditions were not informed of the quantity.

We chose to use lemonade instead of tamarind because of the amount of variance in subjects' reaction to the taste of tamarind in Experiment 2, in which some subjects indicated an optimal number of drops of tamarind of zero in their final mixture. This is consistent with prior research on food preferences learning that has documented an inherent aversion to novel foods (Rozin & Vollmecke, 1986).

Procedure

Subjects were given the same set of instructions as that in the first two experiments. Following their initial trial, subjects were given the opportunity to test alternative mixtures of lemon, sugar, and water to determine their optimal solution. The same sampling and rating procedures were used. Subjects began by tasting and rating a prepared sample of lemonade (high-intensity or low-intensity). Only subjects in the label conditions were informed of the number of drops of lemon and sugar used to create their initial sample. All subjects were given the same tasting instructions ("swish, spit, and cleanse") and were asked to rate each of the samples they tested on a nine-point scale.

Subjects

A total of 91 undergraduates from a large U.S. university participated in the experiment in partial fulfillment of a marketing course requirement. We assigned subjects to the experimental conditions randomly at the time they signed up to participate in the experiment.

Results

The effect of initial experience and knowledge on search

To test whether the results reported in Experiments 1 and 2 are due to biased search or changes in taste, we examined subjects' search in the no-label conditions to determine whether they exhibited the same pattern as subjects in the labeled conditions. The average intensity of subjects' first and final controlled tests, the number of trials, and the range of intensities tested for subjects in each of the four experimental conditions are reported in Table 1.

We examined the nature of subjects' search for an ideal lemonade mixture using analysis of covariance to compare the number of trials and range of intensities tested in the label and no-label conditions. For subjects in the no-label conditions, there was no impact in the number of drops used in their first or final controlled tests (first test trial: $M_{\text{high-intensity no-label}} = 7.25$ versus $M_{\text{low-intensity no-label}} = 8.02$; $F(1,41) = 2.12$, $p > .1$; final test trial: $M_{\text{high-intensity no-label}} = 15.25$ versus $M_{\text{low-intensity no-label}} = 16.25$; $F(1,41) = .16$, $p > .1$). In

Table 1
Summary of Search Measures: Experiments 1 and 3

	Label Conditions				No-Label Conditions			
	High-Intensity		Low-Intensity		High-Intensity		Low-Intensity	
	Lemon	Sugar	Lemon	Sugar	Lemon	Sugar	Lemon	Sugar
Experiment 1								
Number of Drops								
First Test Trial	41.71	43.68	6.87	7.54	n/a	n/a	n/a	n/a
Final Test Trial	34.76	38.50	9.76	11.26	n/a	n/a	n/a	n/a
Range of Drops	21.63	25.40	7.24	8.02	n/a	n/a	n/a	n/a
Number of Trials	5.13		6.09		n/a		n/a	
Experiment 3								
Number of Drops								
First Test Trial	46.28	51.70	6.29	8.12	6.75	4.98	7.42	6.94
Final Test Trial	32.41	39.13	10.07	13.54	10.67	16.01	13.26	15.53
Range of Drops	8.90	13.14	9.71	11.00	15.82	15.33	6.50	7.41
Number of Trials	5.24		5.82		7.13		6.78	

Note: Cell values represent the mean of the associated measures for each condition. n/a = not applicable.

contrast, consistent with Hypothesis 1 and Experiment 1, for subjects in the label conditions, there was an impact in both (first test trial: $M_{\text{high-intensity label}} = 49.86$ versus $M_{\text{low-intensity label}} = 7.60$; $F(1,42) = 529.20$, $p < .001$; final test trial: $M_{\text{high-intensity label}} = 39.07$ versus $M_{\text{low-intensity label}} = 12.89$; $F(1,42) = 87.19$, $p < .001$).

As in Experiment 1, entry position had no effect on the number of trials or range of intensities tested by subjects (number of trials: $M_{\text{high-intensity}} = 6.18$ versus $M_{\text{low-intensity}} = 6.04$; $F(1,84) = .15$, $p > .1$; range: $M_{\text{high-intensity}} = .85$ versus $M_{\text{low-intensity}} = .92$; $F(1,84) = .73$, $p > .1$). However, the absence of information about the content of the initial experience increased both the number of test trials and the range of intensities tested (number of trials: $M_{\text{label}} = 5.58$ versus $M_{\text{no-label}} = 6.98$; $F(1,84) = 15.64$, $p < .001$; range: $M_{\text{label}} = .66$ versus $M_{\text{no-label}} = 1.11$; $F(1,84) = 31.13$, $p < .001$). In addition, there was a significant interaction between entry position and label for number of trials, such that labeling had a stronger effect in the high-intensity conditions ($t = 5.09$, $p < .001$) than in the low-intensity conditions ($t = 1.12$, $p = .27$; entry position × label: $F(1,84) = 5.70$, $p < .05$).

Consistent with Hypothesis 2a and b, the proximity of the second trial to the initial trial intensity, the number of trials and the range of intensities experienced were inversely related to subjects' rating of their initial experience ($b_{\text{proximity}} = -.106$, $F(1,84) = 4.93$, $p < .05$; $b_{\text{trials}} = -.21$, $F(1,84) = 6.54$, $p < .01$; $b_{\text{range}} = -.06$, $F(1,84) = 9.38$, $p < .001$).

Impact of favorability on the search process

Consistent with Hypothesis 3a and b and Studies 1 and 2, we observe that proximity to a prior alternative and the change in rating between trials were inversely related to subjects' ratings of the prior alternative (label condition: $b_{\text{proximity}} = -.72$, $F(1,210) = 6.91$, $p < .01$; $b_{\Delta\ \text{rating}} = -.245$, $F(1,210) = 46.31$, $p < .001$; no-label condition: $b_{\text{proximity}} = -.57$, $F(1,204) = 23.21$, $p < .001$; $b_{\Delta\ \text{rating}} = -.19$, $F(1,207) = 46.41$, $p < .001$).[6] Consistent with Hypothesis 4, we observe an inverse relationship between the change in subjects' relative mixture of sugar to lemon drops and their ratings on a previous trial (label: $b_{\Delta\ \text{mixture}} = -.01$, $F(1,210) = 6.71$, $p < .01$; no-label: $b_{\Delta\ \text{mixture}} = -.005$, $F(1,248) = 24.39$, $p < .001$).

The effect of initial experience and knowledge on preference development

As in Experiment 1, we assessed preference development by comparing the intensity of the experimental groups with the surrogate ideal point (i.e., the control group from Experiment 1). Consistent with Hypothesis 5 and 6, we observe that preference development is inversely related to subjects' rating of their initial experience in the label conditions only ($b_{\text{label}} = -.15$, $t = -2.91$, $p < .001$; $b_{\text{no-label}} = -.02$, $t = -.46$, $p = .64$; $F(1,85) = 3.85$, $p < .05$; label × rating: $F(1,85) = 5.72$, $p < .05$).

We performed a follow-up analysis to determine the role of biased search in preference development, and we incorporated the range of lemonade intensities experienced, entry position, label, the rating of initial experience, and the number of test trials. Consistent with Experiment 1, the range of lemonade intensities alone best predicted preference discovery ($b_{\text{range}} = .75$, $F(1,82) = 7.96$, $p < .01$; entry position: $F(1,82) = .94$, $p > .1$; label: $F(1,82) = 2.59$, $p > .10$; rating of initial

[6] When analyzing the proximity to a prior alterative, the first test trial data in the no-label condition were not used because subjects were not able to make an informed choice about their initial test trial.

experience: $F(1,82) = .83$, $p > .36$; number of trials: $F(1,82) = .09$, $p > .1$).

Discussion

The main result of Experiment 3 was that the impact of the favorability of the initial experience on search and the final lemonade mixture did not hold for subjects who did not know the number of drops of lemon and sugar and were not able to recreate their initial experiences. Subjects in the no-label conditions searched more extensively, both in terms of the range of intensities tested and the number of trials, and their preference development was not adversely influenced by a favorable initial experience.

This pattern of results demonstrates a necessary condition for a biased search process to occur, specifically, the ability of subjects to recreate their initial experience or, in other words, the presence of a specific anchor to guide search. Only subjects who were informed of the number of drops of lemon and sugar used to create their first lemonade were able to replicate when favorable or consciously avoid when unfavorable the experience in their test trials, and thus they were able to engage in a biased search process. This evidence supports the notion that greater breadth of experience leads to enhanced preference development. We also observed the same process unfold for subjects in the no-label condition once they had created their first test trial.

To this point, we have extensively documented the presence of a biased search process that is triggered by a favorable initial (and ongoing) experience. However, all three prior studies are perceptually based (with juice taste) and have measured favorability. In the final experiment, we attempt to broaden the domain of inquiry by finding evidence for biased search in a non-taste domain. In addition, we manipulate, rather than measure, the key construct of favorability of initial experiences.

Experiment 4: Manipulating favorability in a non-taste domain

The goals of experiment 4 were to manipulate the favorability of the initial experiences and to test the phenomena in a new domain. To determine the domain to examine, we tried to satisfy multiple criteria. First, we wanted to move away from the taste domain to demonstrate biased search in another domain. Second, we sought an environment in which we could capture process measures. In the prior studies, we asked subjects to self-report the components of each trial. Although this information was critical for us to test the hypotheses, it is possible that self-reporting on the process interfered with the preference exploration process. Thus, the ability to capture process unobtrusively was important. Finally, we also chose a task with an explicit measure of performance, such that we could include an incentive to subjects to maximize their performance (i.e., a portion of their pay being performance dependent). We selected a task in which subjects chose restaurants in a computer-based experiment, whereby we could manipulate the outcome of the restaurant choice and capture the order in which restaurants were chosen; we describe the procedure in the subsequent Procedure section.

Subjects and procedure

A total of 51 residents of a large northeastern city participated in experiment 4. The experiment was a two-group between-subjects design in which we manipulated the favorability of early experiences in the domain. In the experiment, subjects were shown 20 icons that represented the restaurants they could visit. They were told that they would have 100 dining experiences; each dining experience was represented by a mouse click on a restaurant. After subjects selected a restaurant, they would be informed of the quality of the experience by receiving a point score that varied from a low of 1 to a high of 20 (in the experiment we only gave scores in the range of 3–18). Participants were informed that each restaurant had its own quality with a certain variance, such that they would not obtain the same number of points each time they visited. They were told that their goal was to maximize the number of points they received, because part of their pay depended on the number of points they accumulated.

In reality, we gave participants the same string of results regardless of the restaurant they selected. In one condition, participants' first 10 trials were favorable (ranging from 11 to 18), whereas in the other condition, their first 10 trials were unfavorable (ranging from 5 to 9). Note that the total points participants acquired were exactly the same in the unfavorable (or low initial points) and favorable (or high initial points) conditions (since the numbers were the same 100 numbers in reverse order).

Results

To gauge search in this environment, we measured three key dependent variables. The first measure was the total number of restaurants experienced. The second was the number of restaurants participants visited more than once. The final dependent measure was the number of times participants visited their most frequented restaurant. For all three measures, there were significant differences between the unfavorable and the favorable initial experience groups.

For the total number of restaurants visited, subjects in the unfavorable condition visited more restaurants

than subjects in the favorable condition (number of restaurants visited: $M_{Unfavorable} = 19.28$, $M_{Favorable} = 16.92$, $F(49) = 10.17$, $p < .01$). Participants in the unfavorable condition were also more likely to visit a restaurant more than once than subjects in the favorable condition (number of restaurants visited more than once: $M_{Unfavorable} = 16.88$, $M_{Favorable} = 14.00$, $F(49) = 7.82$, $p < .01$; see Fig. 3). For the final measure, participants in the unfavorable condition again showed a greater tendency not to favor or repeatedly select the most favored option (number of times visited the most favored restaurant: $M_{Unfavorable} = 18.16$, $M_{Favorable} = 23.73$, $F(49) = 10.17$, $p < .01$).

Discussion

The basic results predicted by the biased search model were found. Participants who had a more unfavorable initial experience were more likely to select a greater number of restaurants and to select more restaurants more than once and were less likely to fixate (i.e., choose repeatedly) on a favored option. This is important because it demonstrates that the key predictions of the biased search model hold in an environment in which (1) we manipulated rather than measured the favorability of the initial experience, (2) there was an incentive to explore the environment to find the best options, (3) the sensory components of preference and taste were not a factor, and (4) in a very different type of preference learning experience (i.e., holistic choice process).

General discussion

In this research, we advanced the notion of path dependent preferences and examined the impact of a biased search process on preference development. Four experiments demonstrated that the entry position in attribute space, the favorability of people's early

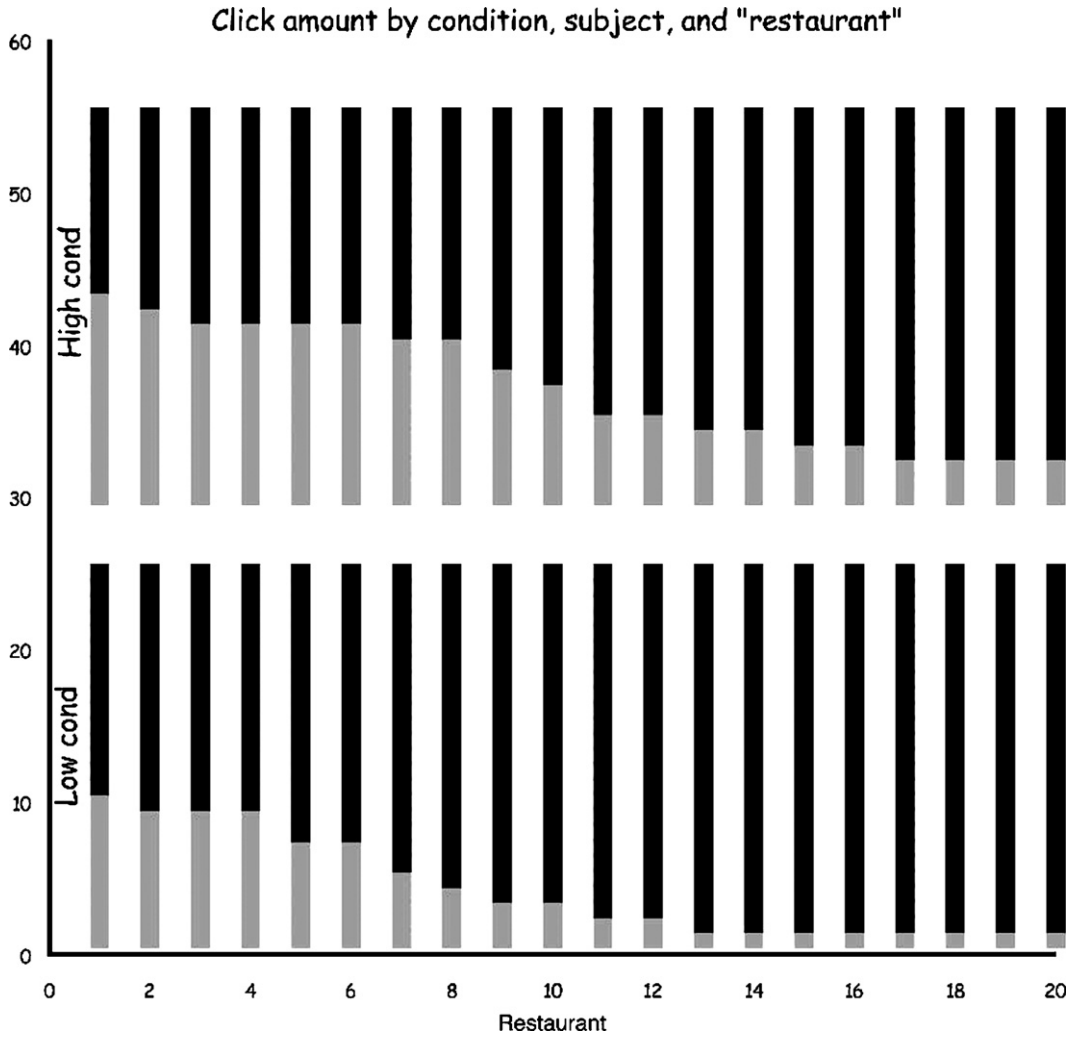

Fig. 3. Experiment 4 results. Note: The lighter portion of the bar represents the number of subjects who did not try a restaurant or tried it only once. The darkest portion of the restaurant indicates the number of subjects who visited more than once.

experiences in a category, and myopic search influence the preference development process. A key finding is that the evaluation of the initial experience plays a critical role in the process of preference exploration. In the first three experiments, a bias in search occurred when subjects had a favorable initial experience and had full information about the number of drops of lemon or tamarind and sugar contained therein. When the initial experiences were favorable, subjects engaged in lower levels of search, experienced only a narrow breadth of possible alternatives, demonstrated less ongoing experimentation, and had a reduction in the amount of preference development. Conversely, when the initial experience was unfavorable, subjects engaged in more search, experienced a wider range of the possible alternatives, and exhibited higher levels of preference development.

In Experiment 1, subjects' final preferences were influenced by their initial experience. When subjects tasted an initial lemonade and were allowed to experiment to identify their ideal lemonade, they created a final lemonade mixture that was different (more or less intense) from the final mixture created by an independent control group that did not have the same extreme initial experience. Furthermore, subjects who had a more favorable evaluation of their initial experience were more likely to truncate search early, sample a smaller subset of the attribute space, and experience less preference development than subjects who had a less favorable evaluation of their initial experience.

In Experiment 2, we replaced lemon juice with tamarind juice and replicated the most critical findings in a novel domain. Namely, subjects' rating of their initial trial affected the range of intensities experienced and the preference exploration process. In Experiment 3, we tested a necessary condition for a biased search process by manipulating subjects' ability to recreate their initial experience. Subjects who did not know the number of drops of lemon and sugar were not able to recreate their initial experience and did not engage in a biased search process, even when the initial experience was favorable. Conversely, subjects who knew the number of drops were susceptible (when initial experience was favorable) to the same biased search process that we documented in Experiments 1 and 2. Finally, we demonstrated in experiment 4 that the basic predictions of the biased search model were evident in a non-taste environment where favorability of the initial experience was manipulated instead of measured. In the remainder of our paper, we discuss the implications of these findings in greater detail.

First, the starting point can serve as an important factor in determining the region that tends to be sampled during early exploration. Although this impact of the initial experience is consistent with findings of the anchoring literature (Ariely et al., 2003), our results indicate the importance of a specific mechanism (i.e., biased search) by which anchors contribute to a potentially lasting influence on preferences. In both Experiments 1 and 3, it was this biased search process and not the initial starting point that had the greatest impact on preference development. The identification of the role of biased search in preference development is perhaps the critical finding in the current research.

Second, people tend not to follow the prescriptions of optimal search theory. Recall that traditional search models examine search from the lens of the trade-offs between the costs and the benefits of search. In a preference development environment, it appears that people may have trouble gauging both the costs and the benefits of exploration. If people are predominately focused on short-term satisfaction (i.e., myopia), the costs associated with an unfavorable, immediate experience will loom large and will be rigorously avoided. Conversely, the benefits of search may be misjudged as well. Meyer and Shi (1995, p.820) (italics in original) found "a tendency for subjects to fail to fully see that choosing unfamiliar—and perhaps unpromising—options provides *information value* which can be used to make better choices on later trials." If people fail to appreciate the information value of experimentation, the benefits of preference exploration will be undervalued.

Third, although initial experiences play a role in preference development, neither psychophysical adaptation nor changes in taste can explain the results. We were able to rule out these alternative explanations by examining what happened to subjects who were presented with either a low-initial or a high-initial experience without information about the number of drops of lemon or sugar included in their initial taste test. This showed that the ability to recreate initial experience is a necessary condition for a biased search process to ensue. These results demonstrate that the shaping of preferences is not based on simply perceptual taste-based factors. Rather, the shaping of preferences is driven by people's ability to control and shape their future experiences.

We conducted this research in a lab with simple stimuli that varied along two dimensions, sweetness and juice taste (lemon and tamarind for studies 1–3) or provided a utility score associated with the selection of an option (restaurant) in study 4. Note that in this artificial environment subjects were instructed to create a juice that was best for them or to continue selecting restaurants. In this context, an unfavorable experience led to greater preference exploration and, ultimately, more developed preferences. Yet, preference development in the real world could be completely suppressed if the initial experience were to be so negative that further exploration was not pursued at all. Thus, we conjecture that the degree of favorability should be thought of as a boundary condition where at some point negative initial experience could be strong enough to completely

suppress additional search. Further research on this interesting question is warranted.

The question remains as to what extent the results would translate to real-world consumption utility. In the real world, product categories in which preferences mature and change are more complex. For example, a popular wine tasting Web site (www.tasting-wine.com) lists 12 basic definitions of wine (e.g., body, legs), 33 definitions of wine character (e.g., balanced, robust), and 28 definitions of wine taste (e.g., buttery, oaky, and velvety). In an environment with this type of complexity, the cost of becoming stuck after limited exposure (e.g., because a person likes what he or she has tried) could be considerable. We are not suggesting that people are unable to find an acceptable alternative. Rather, people can become stuck by continuing to select alternatives that are similar to what may have been an arbitrary starting point.

In addition, in the real world, the manner in which people experience breadth is likely to be different from the experience of breadth in the lab. Instead of creating breadth of experience by varying ingredients, people experience breadth by sampling various alternatives. In a separate research project, we have tried to assess the implications of biased preference development on people's ability to discriminate quality and predict their future preferences. In a series of studies, we asked subjects to self-report their frequency and breadth of experience with complex products, such as red wine, beer, and cheese. In these studies, we measured the breadth of experience that occurred through accumulated usage by counting either the number of subtypes experienced (e.g., Beaujolais, Pinot Noir) or the specific number of exemplars experienced (e.g., Steele Chardonnay, Liberty School Cabernet). Across this diverse set of field studies, we consistently observed a positive correlation between breadth of experience and preference knowledge. Specifically, people who report having consumed a wide range of alternatives in a product category are better able to discriminate product quality in blind taste tests and to predict more accurately their own preferences for a future consumption experience than are people who report having a narrow range of experience. In these studies, breadth of experience consistently outperformed more simple measures of total experience (i.e., frequency of consumption), thus explaining people's ability to discriminate quality and predict preferences. This set of studies provides further evidence that the biases in search, which affect preference development, may have a lasting impact on consumers.

Thus, what can consumers do to eliminate the hold of a biased search process? One way is to methodically examine a greater spectrum of the attribute space. For example, the explicit goal of many wine clubs is to expose people systematically to a greater variety of wine than they would choose if left to their own accord. Indeed, as a wine expert's prescriptive advice shows, it is important to have a variety or breadth of experience in developing wine preferences:

> Nearly every week someone asks me, "How should I begin if I want to learn about wine?" That's why I've put together this simple wine primer, a set of do's and don'ts for the budding wine lover. Do start with simple and inexpensive wines, and work your way up to the powerhouse bottles. Do try a variety of wines. Trying everything is the only way to build your sensory memory and discover your own tastes. You'll never make any progress with wine if you stick to the same Chardonnay or Cabernet Sauvignon, no matter how much you like them. (Blue, 2002).

The results of this research suggest that progress in developing preferences for wine (or any product) is hindered by the tendency to stay with favorites. We argue that the early repeat selection of favorites creates a bias in preference exploration, whereby potentially superior options are not discovered.

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