Sampling Data for Covariation Assessment: The Effect of Prior Beliefs on Search Patterns

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Two experiments were conducted to investigate the effect of prior beliefs on consumers' information search strategies in estimating covariation relationships. Consumers were asked to sample four sets of products to determine whether price was related or unrelated to quality for each one. Those consumers who believed that price and quality are positively related elected to sample higher-priced products than consumers who believed that there is little relationship between price and quality. This effect was observed across products, sources of prior beliefs (own experience or experimenter-manipulated), and costs of search. High search costs, however, also affected the average price of products picked for the search task, the range of prices sampled (Study 1), and the number of products chosen to decide whether price and quality were related (Study 2). These findings are discussed in terms of the process of covariation judgment persistence and consumer information search.

The ability to detect associations among everyday events is one of the most basic cognitive skills, and may be one of the most important ways of organizing consumers' past experiences. Do high-performance cars usually get poor gas mileage? Are foreign-made products usually better than domestically made ones? Are department stores usually overcrowded on the first day of a big sale? Are high-priced brands of Scotch usually better than lower-priced alternatives? Simple questions like these require an assessment of the relationship between two classes of events, types of situations, or product attributes. Once formed through direct or indirect experience, these beliefs about covariation may play an important role in guiding subsequent information processing and in directing behavior, as knowledge of these relationships enables individuals to understand, predict, and even control some aspects of their experience.

Much prior research, however, suggests that in many instances people are remarkably poor estimators of covariation and that covariation beliefs may be quite resistant to change once they are established (see Alloy and Tabachnik 1984, Crocker 1981, and Nisbett and Ross 1980 for reviews). Existing beliefs about covariation often persist even in the face of incoming contradictory evidence. In consumer behavior contexts, for example, researchers have noted the persistence of beliefs in a positive relationship between price and quality despite environmental evidence that no such correlation between these two variables exists (see Riesz 1979; Sproles 1977). To the extent that covariation beliefs are nonveridical, or that the environment changes over time, consumers may be operating under unsatisfactory assumptions about the marketplace. A better understanding of some of the reasons for belief persistence, however, may be a necessary precursor to designing effective change strategies.

The purpose of the present article, then, is to examine one mechanism proposed to underlie the persistence of covariation beliefs. Specifically, we report two experiments testing the basic notion that consumers' existing beliefs about covariation relationships result in infor-

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mation searches that will be more likely to confirm their existing beliefs than to disconfirm them. Beliefs about the relationship between price and quality were the focus of the studies because of their seeming tenacity, and because of their traditional, central role in consumer behavior literature. Thus, although the primary contribution of the research is an increased understanding of why covariation beliefs in general might persist, it may also shed light on some of the consequences that price-quality beliefs have on other important aspects of consumer behavior.

BACKGROUND

Individuals' prior beliefs appear to exert a powerful influence, in many situations, on the process of covariation assessment. Prior beliefs, according to Crocker (1981), have the potential to affect judgments at several points in the assessment process, which includes (1) deciding which data are relevant, (2) sampling cases, (3) interpreting cases, (4) recalling the data and estimating frequencies, (5) integrating the evidence, and finally (6) using the covariation estimate to make other judgments or predictions. Indeed, an impressive body of literature has accumulated to support the view that prior beliefs affect covariation estimates in the later stages of this process involving the interpretation and integration of information (see Chapman and Chapman 1967, 1969; Hamilton and Gifford 1976; Jennings, Amabile, and Ross 1980). In one of the earliest and most influential studies in this vein, for example, Chapman and Chapman (1967) demonstrated that prior beliefs about symptoms and associated psychiatric problems caused individuals to "see" similar relationships in new data which, in fact, had been designed to show the opposite relationship.

The possibility that prior beliefs affect the covariation process at much earlier stages of data selection and sampling, however, has not received empirical support to date. Studies of the "illusory correlation" phenomenon just cited have typically bypassed these stages by presenting individuals with prepared sets of information. As a result, existing findings in this area shed little light on the potential influence of prior beliefs on the selection and sampling stages. These early stages, of course, are particularly interesting to marketers because in many instances they are dependent upon consumers seeking out information on products from secondary sources or actual product trial.

The nature of the impact that prior beliefs might have on data collection and sampling is suggested by recent research on hypothesis-testing processes. This research indicates that individuals tend to choose pieces of information that are more likely to confirm a hypothesis being tested rather than pieces of information that might disconfirm it (Snyder and Swann 1978; Snyder 1981; c.f., Trope and Bassok 1982 and Fischoff and Beyth-Marom 1983). Snyder and Swan (1978), for example, found that individuals sampled more information likely to produce confirmatory evidence when they were asked to test a hypothesis about another person ("Determine whether this person is an extrovert") and were allowed to ask questions that would tend to either confirm ("In what situations are you most talkative?") or disconfirm ("What factors make it hard for you to really open up to people?") this hypothesis. Similar tendencies have been reported in studies asking people to judge relationships between two variables (Crocker 1981). Not only do individuals place more emphasis on cases that confirm the existence of a relationship, but they also favor cases in which both variables occur together (positive confirming cases) rather than those in which both variables are absent (negative confirming cases). For example, if a consumer wanted to test the hypothesis that high-priced wines are of higher quality, these findings suggest that s/he might restrict the sample of wines tried to those of a relatively high price range, read only about wines known to be fairly expensive, and so on (positive confirming instances). Negative confirming instances (low-priced wines of low quality) may be viewed as less relevant to the hypothesis, and messages about disconfirming instances (low-quality, high-priced and high-quality, low-priced wines) may be ignored.

The studies reported in this article were designed primarily to examine whether consumers' prior covariation beliefs would in fact function in the same way as hypotheses in the studies by Snyder and Swann (1978) and Snyder (1981), and thus direct information search and case sampling. This test was conducted in the context of frequently purchased consumer products, where actual product trial is a normal way of gaining information, where feedback is usually available quickly from one's own experience or from those of family members, and where there may be some incentive for sensing and adapting to any environmental changes. In this kind of setting, it might be argued that individuals have learned sophisticated search strategies that they rely on more so than prior beliefs. Equally plausible, however, is the possibility that consumers have not learned such strategies and that prior beliefs will continue to exert the same directive influence found in other settings. Learning may be as difficult in this context as in others, considering the costs often involved in gathering information through product trial, the sequential nature of feedback from the environment, and the ambiguity present in much of the feedback available from the environment. Secondly, these studies contribute to the general literature on search processes in

1Note that subjects in hypothesis-testing situations such as these usually do not receive data or answers to the questions they have selected, which would provide actual evidence to either confirm or disconfirm their hypotheses. In these studies, and the ones reported in this paper, the terms "confirmatory" and "disconfirmatory" refer more to the intention to confirm or disconfirm than to the actual confirmation or disconfirmation of an hypothesis.
consumer behavior by examining specific patterns of search, given a particular search goal, and by investigating how the content of prior beliefs affects the content of information selected to achieve the search goal.

**STUDY 1**

In the first experiment, the effects of prior beliefs about the relationship between price and quality on information search patterns were examined. First, we examined the direction of search, i.e., which particular items a consumer might choose to examine. The general hypothesis was that consumers believing in a positive relationship between price and quality would concentrate their search on more expensive brands, thereby selecting a set of brands with a higher average price, than consumers who feel there is little or no relationship between price and quality. Our reasoning here was that consumers believing in a positive relationship between price and quality would tend to frame these beliefs in terms such as "high quality is associated with high price," would seek to confirm these beliefs in sampling new information, and would therefore focus their search on high-priced items that would be more likely to yield positive confirming evidence. This assumption appeared to be quite plausible in the search context given that consumers are more likely to think of the focus of their usual shopping behavior in terms of finding high-quality, rather than low-quality, goods and services.

The generality of this effect was also examined in this study by introducing two conditions designed to affect the salience of prior beliefs during the task. Although prior beliefs were expected to produce strong differences in search patterns, the possibility that these effects might be observed only within certain boundary conditions seemed plausible. This concern was furthered by Alley and Tabachnik's (1984) recent suggestion that prior beliefs may exert a directive influence on covariation judgments only in situations where these beliefs are relatively well established and salient at the time judgments are made. It seemed judicious, therefore, to test the strength of the predicted effects of prior beliefs by including conditions which would render these beliefs more or less salient.

Two conditions were designed for this purpose. These entailed reminding half of the participants of their prior beliefs before the search task, and varying the consequences, or costs, of search decisions. Both manipulations were expected to have an impact on the effects of prior beliefs on the average price of brands selected. The reminder was anticipated to strengthen the effects of prior beliefs. Although we expected prior beliefs to affect search patterns whether they had been prompted or not, we felt that these effects might be stronger when prior beliefs were made more salient and available through the reminder manipulation. The consequences or costs of search, on the other hand, might decrease the effects of prior beliefs when they are made larger. That is, where greater consequences of search exist, those consequences may be more influential than prior beliefs in directing search (i.e., the consequences may become more salient and prior beliefs less salient). For example, if the consequences of search include having to pay for an item in order to try it, consumers may be more inclined to try lower-priced items than if they did not have to pay anything to obtain quality information. Thus, greater consequences might lessen the effects of higher prior beliefs. Whether this lessening effect is compensatory (i.e., there are independent opposing effects for increases in prior beliefs and consequences) or is interactive is not clear a priori.

The primary focus of this study, then, was on the effects that prior beliefs exert on the direction of search and the strength of such effects under conditions varying the salience of these beliefs. The inclusion of search costs in the experiment, however, also allowed us to examine a related aspect of search patterns. Although prior beliefs should influence the direction of search by affecting the average price level of brands selected as argued above, the coverage or intensity of search may be determined by other variables such as search costs. Prior beliefs were not expected to affect intensity; rather, the intensity of search, as Bettman (1979) notes, should be largely influenced by the trade-offs consumers make as they weigh the costs of obtaining information against the benefits that might be derived from using that information. Consequently, higher search costs may discourage individuals from searching widely and may result in attempts to lower the costs of search by restricting the range of information gathered (see Punj and Staelin 1983). Thus, in the current study, it is quite possible that differences in search costs might produce differences in the range of information sampled. Specifically, individuals in the higher cost condition may attempt to lower the costs of search by selecting brands in a narrower price range.

These contentions were examined by asking consumers to complete a search task that entailed selecting several brands to examine in order to determine whether price is or is not related to quality. Selections were made from a list of brands identified by letter and price only, and search patterns, characterized by the average price level and the range of prices of brands chosen, were examined for differences due to prior beliefs, the presence of a reminder for prior beliefs, and costs of search.

**Method**

Sample. One hundred seventy-five women were recruited from a large suburban shopping mall to participate in this study. Potential respondents were inter-
accepted in the mall by professional interviewers, screened to ensure that they did “most of the grocery shopping” for their family, and then offered a monetary incentive to participate in a marketing research study. Those agreeing to participate represented a wide range of ages from 18 to over 45 (median = 35–44 years), educational levels from less than high school to graduate work (median = some college), household sizes from one to five or more (median = three), and income levels from $5,000 to $40,000 or more (median = $25,000–29,999).

Procedure. Participants were seated at individual tables and were given a booklet containing general instructions for the study, instructions for specific items, and several sets of questions. They were asked to read all of the instructions very carefully, and to ask one of the experimenters for further explanation if they did not understand the instructions.

The first set of questions measured prior beliefs about the relationship between price and quality for a number of product categories, including five that were of experimental interest. Participants indicated their beliefs by marking an “X” on a scale ranging from +10 (perfectly positive relationship) to 0 (no relationship) to −10 (perfectly negative relationship). Detailed explanations of several points on the scale were given to avoid confusion. Next, three sets of questions were included as a buffer between the measurement of prior beliefs and the search task. These questions included a personality inventory, ratings of several product categories, and questions about product purchase for several product categories. Product categories included in these questions were the same as those mentioned earlier. After completing these items, participants were given a search task with the following general instructions:

We are interested in learning how consumers like you find out about products. For example, you might gather information about several brands of some product to find out whether price is related or unrelated to quality. The following pages contain some questions about how you would find out whether price is related or unrelated to quality for several different kinds of products. There aren’t any right or wrong answers—we just want to know your opinions.

This bidirectional wording (related or unrelated) was important to avoid response biases inherent in unidirectional questions (Crocker 1982).

Following these instructions, participants were given a search task for each of five product categories. Included were four specific product categories and a fifth category described only as a “new grocery product you’ve never seen before.” The order in which the four specific product categories were presented was counterbalanced across subjects to minimize order effects as a rival hypothesis for the results. The fifth category was always presented last to discourage subjects from using price–quality beliefs about grocery products in general as a reference point for all five product categories. For each product category, participants were given a set of 10 brands, labeled A through J, along with their prices. The order of brands within each product category was varied such that prices were not in strictly ascending or descending order. No information about the brands was provided.

Half of the participants were asked to select the four brands (out of 10) that they would like to try in order to decide whether price is related or unrelated to quality for that category (high search cost condition). The other half were asked to select the four brands for which they would like to see quality ratings in order to decide on the relationship between price and quality (low search cost condition). The number of brands subjects were allowed to select was controlled to avoid the possibility that they might pick all 10 brands, thereby reducing the ability to detect possible differences between experimental conditions. This procedure also seemed necessary to avoid confounding the measures of average price level and range of prices with the number of brands used to estimate these variables. The availability of prior beliefs was increased for half of the participants (high availability condition) by reminding them of their price–quality beliefs just prior to each search task. This was done by asking them to check one of two statements that best represented their beliefs about price–quality for that product category. Participants in the low availability condition completed the search task without answering this additional question.

Product Selection. Four of the product categories were selected on the basis of several criteria. First, the products had to be frequently purchased, nondurable items readily available in grocery stores. Consumers are likely to have well-established prior beliefs that are grounded in experience about these products. And the notion of “trying a few out” to test beliefs or suggestions should seem natural to them. Second, the set of product categories had to include those with both low and high “actual” price–quality relationships.3 Of the four that were ultimately selected, two had positive price–quality correlations: one of these had a wide range of prices (beef hot dogs), while the other had a relatively small range of prices (Italian salad dressings). Two other product categories had price–quality correlations near zero, and again, one had a wide range of prices (creamy peanut butter), while the other had a smaller range (vegetable oil). A fifth set of brands was developed and described to participants as “a typical grocery product which you’ve never seen before.” This set was included to examine beliefs consumers may have about price–

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3Price and quality data on frequently purchased grocery products taken from Consumer Reports issues from 1978 through 1981 were used to select products with a range of actual price–quality relationships. This list was trimmed and altered by dropping categories with few brands or with boundaries either too narrow or too wide to be meaningful, and by eliminating brands not available in the local market. Price–quality correlations were computed using quality rankings from Consumer Reports and the rank of prices adjusted for inflation.
quality relationships in general as opposed to price-quality beliefs about specific product categories. Prices for this brand set were created by using the price list for beef hot dogs and subtracting 15 cents for each brand.

**Dependent Measures.** Two summary measures were constructed to characterize respondents' search patterns and to test our hypothesis. The prices corresponding to each brand selected were used to compute a measure of central tendency (the average price of the four brands) and variance (the range of prices of brands selected) to describe the sample selected for each product category.

### Results

Two groups with different prior beliefs about the relationship between price and quality were formed separately for each product category by using the responses to the +10/−10 scale. Respondents below the median value for the total sample for a product category were assigned to the “low” prior belief group for that category, and respondents above the median were classified as a “high” prior belief group.

A 2 (prior beliefs) × 2 (belief availability) × 2 (search costs) analysis of variance was performed on the average price and range measures for each product category separately. A repeated measures analysis of variance across product categories could not be performed due to the fact that individuals were often assigned to different prior belief groups for different product categories. Because subjects were asked for their prior beliefs for each separate product category, and because beliefs often differed from category to category, an individual could be assigned to the high prior belief group for one product category and to the low prior belief group for another.

The overall pattern of findings suggests that prior beliefs exert a powerful influence on the direction of search, whereas search costs most heavily influence the intensity of search (see Table 1 for means and standard deviations). Consistent with our predictions, prior beliefs influenced the average price of selected brands such that participants in the high prior belief group chose brands with higher average prices than did subjects with low prior beliefs for four of the five product categories (hot dogs: $F(1, 167) = 5.52, p < 0.05$; oil: $F(1, 165) = 14.70, p < 0.01$; peanut butter: $F(1, 167) = 4.65, p < 0.05$; salad dressing: $F(1, 166) = 3.25, p < 0.10$; general product: $F(1, 167) = 10.38, p < 0.01$). The degree to which prior beliefs affected average price levels, however, was not affected by the manipulations of belief availability or search costs. The interactions between prior beliefs and belief availability as well as the interactions between prior beliefs and search costs did not

### Table 1

**Means and Standard Deviations for Average Price and Range of Prices: Study 1**

<table>
<thead>
<tr>
<th>Product Category</th>
<th>Average Price</th>
<th>Search Cost</th>
<th>Prior Belief</th>
<th>Price Range</th>
<th>Search Cost</th>
<th>Prior Belief</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low</td>
<td>High</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Hot dogs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2.06</td>
</tr>
<tr>
<td>Mean</td>
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<td>.304</td>
<td>.302</td>
<td>.267</td>
<td>.569</td>
<td>.558</td>
</tr>
<tr>
<td>SD</td>
<td>89</td>
<td>86</td>
<td>94</td>
<td>81</td>
<td>89</td>
<td>86</td>
</tr>
<tr>
<td>Oil</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.76</td>
</tr>
<tr>
<td>Mean</td>
<td>.119</td>
<td>.125</td>
<td>.119</td>
<td>.115</td>
<td>.202</td>
<td>.211</td>
</tr>
<tr>
<td>SD</td>
<td>88</td>
<td>85</td>
<td>89</td>
<td>84</td>
<td>88</td>
<td>85</td>
</tr>
<tr>
<td>Peanut butter</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.95</td>
</tr>
<tr>
<td>Mean</td>
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<td>.185</td>
<td>.195</td>
<td>.160</td>
<td>.461</td>
<td>.480</td>
</tr>
<tr>
<td>SD</td>
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<td>86</td>
<td>85</td>
<td>90</td>
<td>89</td>
<td>86</td>
</tr>
<tr>
<td>Salad dressing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.60</td>
</tr>
<tr>
<td>Mean</td>
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<td>.042</td>
<td>.045</td>
<td>.039</td>
<td>.069</td>
<td>.089</td>
</tr>
<tr>
<td>SD</td>
<td>88</td>
<td>86</td>
<td>92</td>
<td>82</td>
<td>88</td>
<td>86</td>
</tr>
<tr>
<td>General product</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.88</td>
</tr>
<tr>
<td>Mean</td>
<td>.258</td>
<td>.274</td>
<td>.249</td>
<td>.273</td>
<td>.504</td>
<td>.634</td>
</tr>
<tr>
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<td>86</td>
<td>90</td>
<td>85</td>
<td>89</td>
<td>86</td>
</tr>
</tbody>
</table>

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4 The median points for the product categories were: hot dogs, 0.60; vegetable oil, 0.04; creamy peanut butter, 0.40; Italian salad dressing, 0.04; and the “new grocery product,” 0.30, after transforming the +10 to −10 scale to a +1 to −1 index. These median points do not necessarily correspond to the correlations computed based on the Consumer Reports data.
reach significance for any one of the five product categories. As expected, though, search costs did have an independent effect on search behavior by influencing the range of prices selected for all five product categories (hot dogs: $F(1,167) = 8.21, p < 0.01$; oil: $F(1,165) = 3.82, p < 0.05$; peanut butter: $F(1,167) = 8.40, p < 0.05$; salad dressing: $F(1,166) = 4.18, p < 0.05$; general product: $F(1,167) = 12.90, p < 0.01$) and by affecting the average price level for three of the five categories (peanut butter: $F(1,167) = 4.09, p < 0.05$; salad dressing: $F(1,166) = 5.10, p < 0.05$; general product: $F(1,167) = 4.20, p < 0.05$). Subjects in the high search cost condition selected a narrower range of prices and a lower average price level than did consumers in the low search cost condition. As anticipated, no other main effects or interactions were significant.

Discussion

The results of this experiment demonstrate the powerful influence that prior beliefs and search costs exert on selecting and sampling data to assess covariation. Prior beliefs strongly affect the direction of search by influencing the average price level of brands selected. Search costs primarily influence the intensity or coverage of search, as indicated by their strong effects on the range of prices selected, but also have a moderate impact on the average price level sampled. Although minor variations do occur across product categories, findings that prior beliefs influence average price levels and that search costs influence ranges of prices selected are robust across almost every product studied.

By guiding the search process in this manner, both factors would appear to contribute to the persistence of prior beliefs about covariation by reducing the probability of discovering inaccuracies in one's beliefs by seeking new information and trying new products.

Belief availability, on the other hand, did not affect the search process. The lack of difference between our high and low availability conditions, coupled with the strong main effect of prior beliefs, indicates that prior beliefs were quite salient during the experiment even in the absence of our prompting manipulation.

Although this study provides confirmation of our primary prediction, two factors make interpretation of these findings somewhat problematic. First, prior beliefs in this first experiment were measured rather than manipulated. Thus, it is possible that some third variable, highly correlated with prior beliefs about price and quality, was responsible for these effects. Stronger evidence for the causal role played by prior beliefs would be provided by manipulating these beliefs experimentally. Second, in this study, respondents were forced to select four out of 10 possible brands. Although this procedure was adopted to avoid several problems with the search measures, it may have inadvertently produced the effects on the range variable if four brands provided redundant information. Additional evidence regarding the intensity of search, and the factors influencing it, could be provided by including an alternative measure of search intensity such as the number of brands consumers inquire about or select to try. Both issues were addressed in a second experiment that included a manipulation of prior beliefs about price and quality and an additional measure of search intensity as suggested above.

STUDY 2

To provide stronger evidence for the causal role of prior beliefs in determining search patterns, a methodology for manipulating individuals' beliefs about price–quality relationships was developed, and participants were randomly assigned to high and low prior belief conditions. To facilitate this manipulation, a subject population with limited shopping experience and without well-established beliefs was selected for this study. Study 2 also expanded the measures examined in the first experiment by including a search task in which respondents specified the number (from zero to 10) of brands they would want to know about in order to determine whether price was related or unrelated to quality for a product category.

As in the first study, the primary hypothesis was that prior beliefs would influence the direction of search such that participants in the high prior belief condition would choose brands with a higher average price than would participants in the low prior belief condition. Search costs were expected to influence the intensity of search such that high search costs would result in a narrower range of prices selected and a smaller number of brands selected than would low search costs. The possibility that search costs might also affect average price levels, with high search costs resulting in a lower average price selected, was also anticipated. No other effects were expected to emerge.

Method

Sixty-eight graduate students from several marketing classes at a large midwestern university were recruited to participate in this study. As compensation for their participation, students were entered in a lottery for several $25 cash prizes.

Procedure. After agreeing to participate in a "consumer survey," student participants were given a questionnaire booklet containing general study instructions, instructions for using the measurement scales, and several sets of questions. They then proceeded to the first of three experimental tasks. Participants were told that Consumer Reports was interested in developing a new format for presenting product information to consum-
ers and had developed several new formats for consumers’ comments. They were asked to read one of these and to rate it on several dimensions. In fact, this information was presented to manipulate subjects’ prior beliefs about the relationships between price and quality for one product (i.e., vegetable oil), which was selected because the student sample did not hold strong prior beliefs about the price–quality relationship for this product. After reading the Consumer Reports information, subjects rated the new format on several factors. They were then asked about their impressions of the product discussed in the format. Embedded in this set of questions was an item measuring the success of the prior belief induction.

Next, subjects were asked to complete a search task like that given in Study 1. To mask any direct connection with the previous rating task, the search task was done for two other product categories as well as for vegetable oil. As before, respondents were asked to select four brands (out of the 10 listed) for which they would like to have quality data in order to decide whether price is related or unrelated to quality for the product class. Brands were identified by the letters A through J and by their corresponding prices. As in Study 1, half of the participants were told they could receive quality ratings from an independent testing service (low search costs) while the other half were told that quality data could be obtained through actual product trial (high search costs). Participants recorded their brand selections in spaces provided at the end of each brand list.

Finally, participants were asked to complete a third task. Here they were given the same brand lists as before, but were asked to indicate the number of brands for which they would like to receive quality data to decide about the price–quality relationship. The instructions to this task emphasized that they could select as many or as few as they wished. Although some subjects were undoubtedly influenced by the number of brands specified in the search task, the bias of such an influence would seem to be in the direction of the null hypothesis for the desired number of brands. Participants recorded their responses by writing only the desired number of brands in a space provided. They were then debriefed and dismissed.

Prior Beliefs. Prior beliefs about the relationship between price and quality were manipulated by giving participants a page of information about the focal product ostensibly excerpted from Consumer Reports. The top of this page clearly identified the product category (vegetable oil) and included pictures of several brands taken from Consumer Reports. The rest of the page contained information about 10 brands, identified by name, in a table format. For each brand of vegetable oil, the following items were reported: quality ranking, cost per ounce, smoke point, and percent polyunsaturated fat. A summary statement about the price and quality of the product category was given at the bottom of the page. Individuals assigned to the high prior belief condition received the statement: “For better quality, buy more expensive brands—low-priced brands tend to be lower in quality.” This contrasted with the statement received by those assigned to the low prior belief condition: “Price is not a good indicator of quality—some expensive brands are poor in quality, and some cheap brands are very good.” Both statements were pretested by asking a sample of students to read one of them, to rate the information on several factors, and to give opinions about the focal product. Pretest respondents in the high prior belief condition agreed with the statement “To get a high-quality vegetable oil, you should buy a high-priced brand,” with an average rating of 3.0 on a 1 (strongly agree) to 7 (strongly disagree) scale. Subjects in the low prior belief condition disagreed with this statement ($X = 5.27$ vs. 3.00, $t(20) = 2.97, p < 0.01$). No differences were found between groups on ratings of complexity, ease of understanding, believability, clarity, or interest.

Dependent Measures. For the search task, subjects’ search patterns were characterized by the same two measures used in Study 1: average price, and range of prices of brands selected. Subjects’ responses regarding the number of brands for which they would like quality data were used as a second, and slightly different, indicator of the intensity of search.

Results

To assess the effectiveness of the prior belief manipulation, subjects were asked to agree or disagree with the following statements, using a 1 (strongly agree) to 7 (strongly disagree) scale: “To get a high-quality vegetable oil, you should buy a high-priced brand” and “low-priced brands are generally as good as high-priced brands of vegetable oil.” Responses to both questions indicated that the manipulation was effective. Individuals in the high prior belief condition agreed with the first statement ($X = 2.92$) and disagreed with the second statement ($X = 5.05$), while those in the low prior belief condition disagreed with the first statement ($X = 5.56$) and agreed with the second ($X = 3.91$). Differences between groups were significant for both the first ($F(1,66) = 44.32, p < 0.01$) and second ($F(1,66) = 9.43, p < 0.01$) statements. No differences were found for ratings of the information in terms of complexity, ease of understanding, believability, clarity, or interest (all $p’s > 0.20$).

A 2 (prior beliefs) × 2 (search costs) analysis of variance was performed on the average price of brands selected, the range of prices of brands selected, and the number of brands requested. The overall pattern of findings suggests that search patterns were once again influenced by prior beliefs and search costs (see Table 2 for means and standard deviations). Prior beliefs affected the average price of brands selected in the manner predicted: those subjects believing that the correlation between price and quality was highly positive tended
to select higher-priced brands than did subjects believing the correlation to be near zero \( F(1,64) = 21.70, p < 0.01 \). As expected, search costs influenced the number of brands requested. Subjects in the high search cost condition selected fewer brands than did subjects in the low search cost condition \( F(1,64) = 38.61, p < 0.01 \). Search costs, however, failed to affect the range of prices sampled as they did in the first study. And finally, search costs affected average price levels: participants in the high search cost condition selected brands with a lower average price than did those in the low search cost condition \( F(1,64) = 6.03, p < 0.05 \). No other main or interaction effects were significant.

Discussion

The results of the second experiment provide additional evidence of the role of prior beliefs in search processes. Prior beliefs, directly manipulated in this study, once again affected the direction of search via the average price level of brands selected. This finding reduces the possibility that some factor related to prior beliefs was responsible for the search differences observed in the first study. Results from both studies point to prior beliefs as a strong influence in directing the search process.

In addition to prior beliefs, search costs also produced differences in search patterns. Search costs influenced the intensity of search, as evidenced by their strong effects on the number of brands selected, and even influenced the direction of search through moderate effects on the average price level of brands selected. These results are consistent with those observed in previous research on external search patterns in finding that higher search costs result in the selection of fewer items of information and the greater use of cost reduction mechanisms (Bettman 1978; Punj and Staelin 1983). It appears, then, that search costs can influence both the number and type of information items selected in the process of judging covariation. It is interesting to note that prior beliefs, in contrast, tend to exert their influence only on the type of information selected. This possibility suggests that search costs, which have not been incorporated into current thinking about search patterns in the covariation literature, may be just as important as prior beliefs in understanding the formation and persistence of covariation beliefs in everyday situations.

Despite the influence that search costs displayed in this study, they did not influence the price range of brands selected as observed in Study 1. In this study, most subjects selected the same price range, including the lowest-priced brand and the highest-priced brand in their brand set, regardless of search costs. These differences in results between the two studies may be due to differences in the subject populations. Subjects in the second study were graduate students with prior training in statistics and little experience shopping for vegetable oil; subjects in the first study were mainly housewives with little or no training in statistics and a great deal of experience in shopping for vegetable oil. It seems likely that individuals with statistical training would understand the importance of sampling a full range of price levels more than individuals without such knowledge. And, having little actual experience buying the product, the graduate students may have felt less confident about excluding certain price levels. Instead, they were willing to reduce search costs by reducing the number of alternatives selected while holding the range of prices sampled constant. That even the sophisticated students' prior beliefs affected their average price levels may be due to the difficulty of calculating the average of the 10 prices in the set. Under these conditions, a reliance on prior beliefs would be expected.

**GENERAL DISCUSSION AND CONCLUSION**

Findings from both studies point to prior beliefs as a strong source of influence on consumers’ search patterns. Prior beliefs about the nature of the relationship between price and quality for frequently purchased grocery products influenced the specific cases selected by individuals searching for information to determine whether price and quality were or were not related. In particular, consumers who believed that higher prices are associated with higher quality sampled brands with higher average prices, a sample of potentially positive confirming cases. This effect of prior beliefs was observed for several products, whether the prior belief was an experimentally manipulated one or a measured and
naturally occurring one, or whether the costs of search (represented here by the consequences implied by trying versus gaining secondary information) were high or low. Further, search costs themselves (regardless of prior beliefs) tended to restrict the amount of information gathered by decreasing either the range of items selected (Study 1) or the number of items consumers would request (Study 2). Thus, we may expect that normal marketplace conditions, often characterized by high search costs, would result in greater polarity of beliefs about the true covariation relationship. High prior belief consumers may sample only a few high-priced brands that vary only slightly in price, while low or neutral prior belief consumers may sample a few lower-priced brands that vary only slightly in price. The effects on direction (through prior beliefs) and intensity (through search costs) of search may thus result in a strengthening of the different beliefs or inferences.

These results extend our understanding of why covariation judgments may persist. Previous investigations have focused on the effect of prior beliefs once individuals have been given a set of data (see Alloy and Tabachnik 1984; Crocker 1981). The current experiments provide evidence that prior beliefs may act as hypotheses that influence the initial steps in covariation assessment and thus affect the judgment process much earlier than past research would suggest. Beliefs such as "you get what you pay for" may have a serious impact on what pieces of evidence are subsequently acquired and, in turn, on the effectiveness of strategies designed to change that belief.

Whether prior beliefs and search costs result in a biased search process, however, is difficult to determine, as one must first define what an "optimal" search pattern and what an "unbiased" collection of cases to examine would be. Unfortunately, as in many consumer behavior contexts, what the optimal search pattern would be in these experimental situations is not entirely clear. Thus, we make no claim whether prior beliefs "bias" search patterns or whether "biased" search thus results in "biased" judgments of covariation. Rather, we observe that the content of prior beliefs has a systematic effect on search patterns, and thus that individuals may be less likely to discover any potential inaccuracies in their beliefs. That is, many consumers may continue to believe that higher prices are associated with higher quality even when they are not (cf., Riesz 1979; Sproles 1977), in part because consumers seldom try lower-priced products that could provide disconfirmatory evidence. Optimality is an important issue from the standpoint of public policy, of course, since we might be less concerned about findings that consumers consider only a small number of brands when making purchase decisions (perhaps because of higher search costs) if we knew that this small sample was likely to be representative of the population of brands.

The findings of this research suggest several areas in need of further investigation. First, differences in search patterns due to prior beliefs should be examined under conditions varying the nature of the search task. As Alloy and Tabachnik (1984) argue, the influence of prior beliefs in the process of covariation assessment probably depends not only on the salience or availability of these beliefs but also on the strength or availability of incoming information. This line of reasoning suggests that changing the nature of the information available during the search task may affect the robustness of the prior belief effects observed here. For example, introducing brand names, as opposed to the labels A through J used in these experiments, may make the data "stronger" and overwhelm other effects. In contrast, requiring consumers to gather information in a sequential fashion, rather than sampling information at the one point in time allowed here, may make the data "weaker" by increasing the memory load required to remember case information throughout the task. Prior beliefs may have a stronger impact in this case as the outcomes of the search process fade over time or as one piece of "confirmatory" evidence increases the probability that similar information will be sampled in subsequent choices (cf., Crocker 1981).

In a similar fashion, differences in search patterns due to search costs should be examined under conditions varying the nature of these costs or consequences. It is quite possible that different operationalizations may produce different effects on variables such as the average price level of brands and the number of brands selected during the search process. For example, search costs could be manipulated by varying monetary costs or time costs. Varying monetary costs may cause consumers to attempt to lower the costs of search by sampling fewer brands of a lower average price. Varying time costs, however, may result in consumers attempting to lower the costs of search by sampling fewer brands without regard to price.

Finally, in addition to search, other potential effects of prior beliefs in the covariation judgment process are worthy of investigation. The interpretation of data, for example, may be influenced by prior beliefs, particularly when an element of ambiguity is present. Ratings of quality, for example, can be quite subjective, and consumers may interpret product quality in a manner consistent with their prior beliefs. Data may be interpreted as being consistent with prior beliefs, and belief-consistent information may be more memorable and thus more likely to be used in making and updating judgments.

Data from future investigations such as these should contribute not only to our understanding of covariation
assessment, but also to our understanding of how prior beliefs influence ongoing processing. This type of research may provide a more complete explanation of how consumers interpret and organize information in their environment.

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