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A Selective Hypothesis Testing Perspective on Price-Quality Inference and Inference-Based Choice

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Consumers often rely heavily on price as a predictor of quality and typically overestimate the strength of this relation. Furthermore, the inferences of quality they make on the basis of price can influence their actual purchase decisions. Selective hypothesis testing appears to underlie the effects of information load and format on price–quality inferences. Results of 5 experiments converge on the conclusion that quality inferences are more heavily influenced by price when individuals have a high need for cognitive closure, when the amount of information presented is high (vs. low), and when the information presented is rank ordered in terms of quality rather than presented randomly. Furthermore, because consumers are willing to purchase more expensive brands when they perceive a high price–quality correlation, these variables can also influence their purchase decisions.

Consumers frequently make judgments based on limited information or knowledge, relying on preconceived beliefs and expectations. One such belief is that a strong relation exists between price and quality. In this article, we examine both situational and individual differences in consumers' use of price to infer quality. In addition, we demonstrate that consumers' perceptions of the relation between product price and quality affect their choice behavior.

Consumers' a priori beliefs about the general relation between price and quality can exert a powerful influence on their subjective perceptions of the actual relation that exists in any particular instance (Baumgartner, 1995; Bettman, John, & Scott, 1986; Broniarczyk & Alba, 1994; Kardes, Cronley, Kellaris, & Posavac, 2004; Kardes, Posavac, & Cronley, 2004; Pechmann & Ratneshwar, 1992; Rao & Monroe, 1988, 1989). For example, Broniarczyk and Alba found that participants consistently overestimated the strength of the relation between price and quality unless they were forced to examine the evidence on a case-by-case basis. In addition, participants relied less heavily on objective information to predict the quality of 10 new products than they did to assess the correlation between the variables provided. Broniarczyk and Alba suggested that participants' anticipation of a prediction task affects the strategies they use during stimulus encoding and accessing prior beliefs and also encourages confirmatory processing. In contrast, their correlation assessments are more stimulus bound. The possibility that consumers' prior beliefs or theories about the price–quality relation can override objective data is consistent with evidence that implicit theories (i.e., theories of casual and temporal relations) influence judgments, attributions, inferences, and behaviors (for a review, see Wyer, 2004; see also Dweck, 1996; Dweck, Chui, & Hong, 1995; Dweck & Leggett, 1988; Hong, Chiu, Dweck, & Sacks, 1997).

Baumgartner (1995) found that people who have a theory to guide them in making predictions adopt a hypothesis-testing approach in evaluating covariation evidence (see also Wright & Murphy, 1984). This processing bias is consistent with work by Snyder, Campbell, and Preston (1982). Snyder et al. found that when asked to confirm the existence of a stereotype, participants framed their questions to confirm the accuracy of the belief under scrutiny. That is, hypothe-

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sis-confirming evidence is preferentially collected (Snyder & Cantor, 1979). With regard to price–quality predictions, this suggests that individuals use their a priori beliefs about the relation between price and quality to guide the examination of additional evidence. Unfortunately, confirmatory biases can prematurely curtail the hypothesis-testing process such that information consistent with the initial hypothesis is selectively attended to, and other information is misinterpreted to conform to initial expectations.

These studies and others (e.g., Alloy & Tabachnik, 1994; Nisbett & Ross, 1980) have focused on the moderating influence of prior beliefs on covariation judgments and predictions. However, research on other moderators is limited. Kardes, Cronley, et al. (2004) proposed that selective hypothesis testing underlies the tendency for consumers to overestimate the price–quality relation. Kardes, Cronley, et al. (2004) suggested that consumers typically believe that the price of a product is predictive of its quality and this implicit belief acts as a hypothesis (cf. Sanbonmatsu, Posavac, Kardes, & Mantel, 1998) when consumers process information about brand attributes. Thus, when a consumer forms an inference about the strength of the price–quality correlation in a particular category, he or she is likely to neglect cases that are hypothesis inconsistent. Both Baumgartner (1995) and Broniarczyk and Alba (1994) identified individuals who explicitly described this type of selective processing. Kardes, Cronley, et al. (2004) reasoned that if selective processing leads to an overestimation of the price–quality relation, variables that increase the likelihood of selective processing would commensurately increase the magnitude of this overestimation.

Like Broniarczyk and Alba (1994), Kardes, Cronley, et al. (2004) demonstrated that consumers dramatically overestimate the price–quality relation when generating inferences of quality. This finding supports Broniarczyk and Alba's (1994) conclusion that prediction tasks are extremely susceptible to the intrusion of prior beliefs. However, Kardes, Cronley, et al. (2004) also demonstrated that this overestimation was much more severe when information was presented under conditions that encouraged selective processing: that is, when information load was high, when information about brands' prices and quality was presented in rank-ordered format, and when the concern about cognitive closure was high. These effects generalized over a number of product types (e.g., wine, digital cameras, interior house paint, and boxed chocolates).

This study extends the results of Kardes, Cronley, et al. (2004) in several ways. First, we manipulate information load, format, and the need for cognitive closure in the same experiment and test for a three-way interaction (Experiment 1). Second, we also increase the generality of Kardes, Cronley, et al.'s (2004) results by using time pressure instead of accuracy instructions to manipulate the need for cognitive closure and test for a time pressure by measured need for cognitive closure interaction (Experiment 2). Third, although the findings of Kardes, Cronley, et al. (2004) are consistent with the proposed selective processing account, no process evidence was presented in their article. We provide more direct evidence that selective processing mediates the effects of information format on consumers' perceptions of the relation between price and quality (Experiment 3). (Participants were instructed to list as many brands as they could remember from the learning phase, and mediation analyses were performed using recall for belief-inconsistent cases as an index of sensitivity to belief-inconsistent information.)

Fourth, we examine the role of implicit theories in price–quality inference by explicitly instructing participants to focus on the evidence (rather than on implicit theories) and by determining whether implicit theories change as a result of this focus (Experiment 4). Finally, and perhaps most important, we examine the behavioral consequences of price–quality inferences on a real choice task (Experiment 5). Price–quality inferences suggest that quality increases as price increases. We expected that consumers' willingness to pay for a product would increase in relation to how strong they perceived the price–quality relation to be.

SELECTIVE HYPOTHESIS TESTING THEORY: MECHANISMS AND MODERATORS

The conceptualization we propose can be stated more formally as follows. First, we assume that judgment involves both the generation and the testing of tentatively held interpretations, expectations, evaluations, or possibilities (Hoch & Deighton, 1989). When the evidential bases for judgment are scattered and complex, consumers often simplify the judgment formation and evaluation process by focusing on a single hypothesis or possibility at a time and neglecting hypothesis-inconsistent evidence (for a review, see Sanbonmatsu et al., 1998). When the evidence supporting a focal hypothesis meets a minimum confirmation threshold, the hypothesis is accepted, and evaluative processing ceases. Because the first hypothesis that is considered is often plausible and because support for a plausible hypothesis seems stronger when it is considered in isolation rather than as part of a set of multiple alternative hypotheses, premature acceptance of the first hypothesis is a common hazard. Consequently, a plausible hypothesis that is considered first is more likely to be accepted than a less focal but more viable alternative. This often leads to judgments that are more extreme and that are held with greater confidence than the available evidence warrants.

In covariation estimation, the belief or expectation that two variables are related encourages people to neglect cases that disconfirm it (Alloy & Tabachnik, 1984; Crocker, 1981). For example, consumers who believe that a strong positive relation exists between price and quality are likely both to notice high-price and high-quality and low-price and low-quality products. At the same time, they may neglect information about high-price and low-quality products

or about low-price and high-quality products. This is especially likely when processing is difficult due to cognitive load or time pressure (Kardes, Cronley, et al., 2004; Stangor & McMillan, 1992; Wyer & Srull, 1989). To the extent that selective information processing mediates contextual influences on perceptions of the relation between price and quality, any variable that encourages consumers to consider belief-inconsistent evidence should reduce the reliance on price–quality inferences.

Moderators of Selective Information Processing

Information load and format. The extent of selectivity in information processing is influenced by the amount of information available to serve as a basis for judgment. Extensive prior research has shown that consumers use simplifying strategies in judgment and choice under conditions of high information load (Hutchinson & Alba, 1991; Payne, Bettman, & Johnson, 1993). Belief-consistent information is easy to process and is often accepted at face value (Lord, Ross, & Lepper, 1979). In contrast, belief-inconsistent information is difficult to process because it requires effortful inconsistency resolution (Wyer & Srull, 1989). Consequently, people exhibit greater memory for belief-consistent information when information load is high and processing is difficult and greater memory for belief-inconsistent information when information load is low and the processing resources needed for inconsistency resolution are available (Stangor & McMillan, 1992; Wyer & Srull, 1989). Therefore, consumers should be more likely to neglect belief-inconsistent information and to engage in selective processing when information load is high than when it is low. In this context, this implies that consumers' use of price as a basis for inferring quality should be reduced when the amount of information presented is low.

How the information presented is organized is also an important determinant of processing difficulty (Baumgartner, 1995; Sanfey & Hastie, 1998). Bettman, Creyer, John, and Scott (1988; see also Broniarczyk & Alba, 1994) hypothesized that the relation between variables should be estimated more accurately when information is presented in a way that is easy to process. For example, estimates should be more accurate when the data are rank ordered in terms of quality than when they are ordered randomly. In fact, no effects of information presentation order have been found in these studies. However, the amount of information presented may have been too small for the effects to be detected.

We suggest that the order of presenting information can both influence ease of processing and sensitivity to belief-inconsistent evidence. Ease of processing is a capacity-related variable, and sensitivity to belief-inconsistent evidence is an informational variable. Although a rank-ordered format should facilitate processing, it should also decrease sensitivity to belief-inconsistent evidence. Consumers are more likely to encounter belief-inconsistent evidence when information is presented in a haphazard manner, and consequently, a random format should increase sensitivity to belief-inconsistent evidence. Hence, in this case, the informational effects of format could override the capacity-related effects.

A rank-ordered format is actually less effective than a random format because it encourages biased, confirmatory processing of hypothesis-consistent information. When information is rank ordered in terms of quality, it is easy to focus on hypothesis-consistent information such as expensive, high-quality brands and inexpensive, low-quality brands and to avoid or ignore inconsistent data. In contrast, with a random format, participants are more likely to encounter unexpected cases unintentionally such as expensive, low-quality brands and inexpensive, high-quality brands. In summary, regardless of participants' initial belief about the relation between price and quality, information format should matter only when a relatively large amount of information is presented. In this case, a random presentation order should reduce the reliance on price–quality inferences.

Need for cognitive closure. Selective processing should be less likely under low information load and when this information is presented in random format. However, random presentation is unlikely to increase reliance on the objective information under all conditions. For example, this format is unlikely to be beneficial when consumers have a desire to attain cognitive closure (Kruglanski & Webster, 1996). The need for cognitive closure refers to a desire to reach a definite opinion, thus avoiding confusion or ambiguity. This desire can be influenced by processing strategies that emphasize the benefits of attaining judgmental closure or alternatively, that downplay the costs of reaching closure prematurely. When the need for cognitive closure is high, people are motivated to reach a judgment or decision quickly and to maintain it for as long as possible. The effects of need for cognitive closure are observed regardless of whether the need is manipulated experimentally (e.g., by varying the difficulty or unpleasantness of information processing; Kruglanski & Webster, 1996) or is measured as an individual difference variable (Webster & Kruglanski, 1994).

Selective information processing is more likely to occur when the need for cognitive closure is high, so preexisting schemas are likely to be used to draw conclusions. We predict that random presentation will decrease the use of price to infer quality for those low in need for cognitive closure when information load is high but not when it is low. These effects provide insight into the moderating role of information load. In Kardes, Cronley, et al. (2004, Experiments 1 and 3), information format was found to interact with need for cognitive closure. The data in both experiments included a high information load context of 100 brands, but low information load contexts were not examined.

Price–Quality Inference and Choice

Selective hypothesis testing suggests that consumers' perceptions of the strength of the price–quality relation can influence their actual purchase behavior as reflected in their willingness to pay for products. Specifically, consumers should be willing to pay more for a product when they believe the price–quality relation is strong. Inherent in the belief that higher prices coincide with higher quality is that incremental increases in price paid should yield better outcomes. That is, if you pay more for a product, it must be of higher quality, and therefore, you are likely to have a better or more enjoyable product experience. In contrast, when the perceived association between price and quality is weak, consumers should be less willing to pay because spending more would not necessarily result in higher quality.

Information format is expected to produce the greatest variability in price–quality inferences when need for cognitive closure is low and information load is high (Experiment 1). We expect that when these two conditions exist and when information is rank ordered by quality, participants would not only make stronger price–quality inferences but would be willing to spend more money on the purchase of a product in the category (Experiment 5).

EXPERIMENT 1

In Experiment 1, we examined the combined interactive effects of information load, format, and need for cognitive closure on price–quality inference. We hypothesized that when information load was high, rank ordering stimulus information according to quality and inducing high need for cognitive closure would both increase the use of price to infer quality.

Participants and Procedure

Participants were 275 students at a large Midwestern university. Participants were randomly assigned to conditions in a 2 (rank ordered by quality vs. random presentation of information) × 2 (50 vs. 25 brands presented) × 2 (high vs. low need for cognitive closure) between-subject design.

The procedure and measures were adapted from Broniarczyk and Alba (1994; see also Kardes, Cronley, et al., 2004). Participants received a questionnaire booklet stating that the purpose of the study was to examine people's perceptions of quality given specific information about a product. The preliminary instructions offered a brief tutorial on the purpose and procedure of making predictions:

> To operate in this world efficiently, it is often helpful to know how strongly related things are. … [M]any everyday judgments involve prediction. For example, when you choose which electives you want to take, you are making a prediction about which courses will be most enjoyable … based on … the course title, its catalog description, the recommendations of friends, and so on. The same process occurs when you buy a product for the first time. Often the quality of a product cannot be determined just by looking at it, so you must predict its quality based on whatever information is available (Broniarczyk & Alba 1994, p. 137).
>
> On the next few pages you are going to see information for several different brands of wine. This information consists of (1) an independent quality rating of each brand (on the left hand side of the page) on a scale of 0 to 100, where higher numbers indicate higher quality, and (2) the average retail price for each brand for a bottle of wine (on the right hand side of the page). Please review this information. Afterward, you will be presented with the prices of some additional brands of wine and asked to predict their quality.

Before participants received the product information, however, the need for cognitive closure was also manipulated using instructions adapted from Kruglanski and Webster (1996). Participants in the high need for cognitive closure condition were told that it was not necessary to spend a lot of time pondering the questions and that they should try to answer the questions as quickly as possible while still providing a true, accurate answer. In addition, participants were reminded that their responses would be combined with those of many others who participated in the study. In the low need for cognitive closure condition, participants were told that it was extremely important to take their time and to consider their responses carefully, and that people sometimes overestimate or underestimate the relation between price and quality and therefore that they should be careful when answering questions. In addition, they were told that because only a small group of people would be responding to the survey, their responses would have a strong impact on the results.

The presented information consisted of a list of either 50 or 25 wines and included the brand name, the type of wine (e.g., Cabernet Sauvignon, Merlot, Pinot Noir, etc.), the region where the wine is produced (e.g., Napa Valley, France, Italy, etc.), the retail price (ranging from $7 to $20), and a quality rating (on a scale ranging from 0 to 100 with higher numbers indicating higher quality) provided by a panel of experts. Brands in the smaller list were a selection of those in the larger list that had the same average quality ($M = 89$) and the same price–quality correlation ($r = .27$). In the rank-ordered list, wines were presented in order from highest quality to lowest quality and were not ordered along any of the other available pieces of information. In the randomly ordered list, the wines were not presented in any particular order. To account for the possibility that participants might focus more on the top and bottom portions of the list than on other portions, we ensured that the average quality and average price did not differ significantly across the rank-ordered (average

quality = 89.4; average price = $13.74) versus random lists (average quality = 89.3; average price = $13.60) for the top and bottom fourth of the lists.

Participants were given as much time as they wanted to review the wine list. Then they were asked to generate predictions of quality (on a scale from 0 to 100) for 10 hypothetical brands of wine. Participants were instructed to "estimate the quality rating for each brand of wine, based on the list you just reviewed." Participants were allowed to proceed through the questionnaire at their own pace but were not allowed to look back at previous pages at any time. The correlation between price and quality estimates was computed for each participant separately, and this correlation served as the main dependent variable (Broniarczyk & Alba, 1994).

Finally, participants responded to several demographic questions and questions pertaining to familiarity with different varieties of wine, different brands of wine, and wine consumption. Participants were then debriefed and excused. No significant differences were found on quality estimates as a function of the demographic or expertise variables in this or any of the experiments.

Results and Discussion

The price–quality correlation coefficient was computed for each participant.[1] As expected, the average subjective price–quality correlation ($r = .83$, $p < .01$) was much higher than the presented objective price–quality correlation ($r = .27$, $p < .05$). Analyses of variance (ANOVAs) performed on mean price–quality correlations as a function of information load, format, and need for cognitive closure showed that price–quality correlations were higher when information load was high ($M = .86$) than when it was low ($M = .81$), $F(1, 267) = 4.95$, $p < .03$; when presentation format was rank ordered ($M = .86$) rather than random ($M = .80$), $F(1, 267) = 8.89$, $p < .01$; and when need for cognitive closure was high ($M = .87$) rather than low ($M = .80$), $F(1, 267) = 10.26$, $p < .01$. In addition to these main effects, a significant three-way interaction emerged, $F(1, 267) = 3.75$, $p < .05$. Price–quality correlation coefficients as a function of information load, format, and need for cognitive closure are presented in Table 1.

Follow-up tests showed that under high-load conditions, the effects of information format were more pronounced in low than in high need for cognitive closure conditions. Hence, the degree to which consumers used price to infer quality and overestimated the price–quality relation decreased when a large amount of information was presented randomly to individuals low in need for cognitive closure. In contrast, under low load conditions, as predicted, no significant effects emerged for information format or need for cognitive closure.

TABLE 1
Mean Subjective Price–Quality Correlations as a Function of Need for Cognitive Closure, Information Format, and Information Load (Experiment 1)

	High Load		*Low Load*	
Need for Closure	*Random*	*Rank Ordered*	*Random*	*Rank Ordered*
High	$.90_{a}$	$.89_{a,b}$	$.80_{c,d}$	$.86_{a,c}$
Low	$.75_{d}$	$.88_{a,c}$	$.76_{d}$	$.82_{b,c,d}$

Note. Cell means with different subscripts differ at $p < .05$ in Fisher's least significant difference test.

These results suggest that the amount of information presented, the manner of presentation, and the need for cognitive closure influence the likelihood of selective information processing and play a role in intuitive-based inferences about the relation between variables. It appears that when a relatively large amount of information was presented in an organized, rank-ordered format, consumers reduced search costs and construal costs by ignoring belief-inconsistent cases. This likely serves to reinforce preexisting implicit belief structures that serve as the plausible hypothesis. Conversely, a random format may increase the likelihood of exposure to belief-inconsistent cases, promoting the generation of competing hypotheses and the processing of belief-inconsistent information. However, it appears that information format had little effect when a relatively small amount of information was presented because search costs and construal costs were sufficiently low to discourage consumers from further simplifying the judgment task.

For people under heightened need for cognitive closure, attaining closure quickly and perpetuating that closure is of utmost importance. Selectively focusing on belief-consistent cases and ignoring belief-inconsistent cases promotes closure because it allows the individual to reconfirm and maintain previously achieved closure in the form of preexisting beliefs.

EXPERIMENT 2

In Experiment 2, we enhanced the generality of Experiment 1 and Kardes, Cronley, et al.'s (2004) results by examining the moderating influence of chronic and situationally induced need for closure on price–quality inference using a different manipulation of cognitive closure (time pressure rather than accuracy instructions) and by reexamining the role of information load.

To manipulate need for cognitive closure, we varied the time pressure that participants were under when making their decisions (Kruglanski & Webster, 1996; Suri & Monroe,

[1]The price–quality correlation coefficient was computed for each participant and then converted to a z score using Fisher's r to z transformation. All analyses were performed on both raw correlations and transformed data, and except where noted, results did not differ appreciably. All analyses reported in the text are based on raw correlations.

2003). Specifically, we assumed that when participants were under time pressure, they would be less apt to search for additional belief-inconsistent information and more likely to use preexisting expectations to draw conclusions. Consequently, they should be more inclined to use price to infer quality, producing a relatively higher price–quality correlation than would otherwise be the case. In short, we predicted that participants would be most sensitive to belief-inconsistent evidence and less likely to overestimate the price–quality relation when time pressure and measured need for cognitive closure were low than when they were high.

Method

Participants were 75 students at a large Midwestern university. Participants were randomly assigned to conditions in a 2 (time pressure vs. no time pressure) × 2 (high vs. low dispositional need for cognitive closure) between-subject design.

In the time pressure condition, participants were given 30 sec to review a list of wines. Participants in the no time pressure conditions were allowed to examine the wine list at their own pace for as long as they wished. Dispositional need for cognitive closure was measured using the 42-item Need for Cognitive Closure Scale (Webster & Kruglanski, 1994), and participants were blocked into high versus low measured need for cognitive closure conditions based on a median split performed on their scores (Webster & Kruglanski, 1994).

Similar to Experiment 1, the questionnaire booklet contained the tutorial and instructions on predictions and information about a set of brands of wine. The presented wine information consisted of a randomized list of 100 wines similar in content and format to the randomized list presented in Experiment 1. The average quality rating of the wines was 89.2, and prices ranged from $7 to $30 per bottle. The objective price–quality correlation was $r = .27$, $p < .05$. After studying the wine list, participants were asked to provide quality predictions (on a scale ranging from 0 to 100) based on the list they had just examined for 10 hypothetical test brands. Finally, participants were asked to respond to several demographic and product-related questions and were debriefed and excused.

Results and Discussion

As expected, the average subjective price–quality correlation ($r = .78$, $p < .01$) was much higher than the objective price–quality correlation ($r = .27$, $p < .05$). A 2 (30-sec time limit vs. no time limit) × 2 (high vs. low need for cognitive closure) ANOVA performed price–quality correlation coefficients yielded a main effect of measured need for cognitive closure, $F(1, 71) = 4.63$, $p < .05$ and an interaction of this variable with time pressure, $F(1, 71) = 6.56$, $p < .02$. Data relevant to this interaction indicated that participants' tendency to infer quality from price was less when time pressure and self-reported need for closure were both low ($M = .57$) compared to any other combination of these variables ($M = .86$), $F(1, 71) = 5.01$, $p < .02$, whereas the means of the latter three conditions did not differ appreciably (Ms = .90, .86, and .83 in the three conditions). These results suggest that the degree to which consumers used price to infer quality was reduced when individuals were low (vs. high) in the need for cognitive closure and were not forced to seek cognitive closure by situational processing constraints.

The results of Experiment 2 extend findings reported in Experiment 1 and Kardes, Cronley, et al. (2004) by using a different manipulation of cognitive closure. In addition, they indicate that the need for cognitive closure has similar effects regardless of whether it is measured or directly manipulated. More generally, the results of Experiments 1 and 2 demonstrate the overriding importance of information load. Individuals with low need for cognitive closure may have been willing to consider new information. When a large amount of new information was provided in a rank-ordered format, however, they were more likely to process the information in a biased fashion, avoiding a consideration of nonsupportive information.

EXPERIMENT 3

To gather further evidence that selective hypothesis testing drives consumers' price–quality inferences, in Experiment 3, we investigated the effects of information format on brand recall and the mediating effect of nonselective processing on subjective price–quality inferences. Nonselective processing was measured via recall for belief-inconsistent cases. We predicted that the effect of information format would vary by type of case recalled (belief consistent vs. belief inconsistent) and that the effect of information format on subjective price–quality inferences would be mediated by recall for belief-inconsistent cases.

Method

Participants were 56 undergraduates from a large Midwestern university and were randomly assigned to rank-ordered (by quality) or random format conditions of the wine list used in Experiment 2. Low need for cognitive closure was held constant across all conditions via accuracy instructions.

Consistent with the previous experiments, participants received the tutorial and instructions on predictions, then the wine list, and then generated their quality predictions. Participants were then given a surprise recall task and asked to list as many of the brand names from the wine list review phase as they could remember. Two judges who were blind to the hypotheses and experimental conditions coded each of the recalled brand names into one of four categories: (a) high-price and high-quality brands, (b) high-price and low-quality brands, (c) low-price and high-quality brands, and (d) low-price and low-quality brands. Prices and qual-

ity scores were blocked into high versus low groups based on a median split. The judges were given a list of brand names belonging to each of the four categories. Agreement between judges was 99%; disagreement was resolved by discussion. The high-price and high-quality and low-price and low-quality brands were collapsed into a single belief-consistent brands category. The high-price and low-quality and low-price and high-quality brands were collapsed into a single belief-inconsistent brands category. The number of belief-inconsistent brands recalled served as the indication on nonselective processing and the mediating variable. Following the recall task, demographic and product-related questions were given, and the participants were debriefed and excused.

Results and Discussion

Consistent with Experiment 1, subjective price–quality correlations were greater in rank-ordered than in random format conditions (*M*s = .75 vs. .63), $F(1, 54) = 5.23$, $p < .03$. The number of brands listed by participants in the brand recall task averaged 3.18 out of a possible 100. Although this seems low, it is not surprising given participants' unfamiliarity with the product category. An analysis of brand-name recall as a function of format and belief consistency indicated that recall was higher when the information was presented in random order ($M = 3.82$) than when it was rank ordered ($M = 2.54$), $F(1, 54) = 5.32$, $p < .03$ and was higher for belief-consistent brands ($M = 1.75$) than for belief-inconsistent ones ($M = 1.43$), $F(1, 54) = 5.07$, $p < .03$. However, this latter effect was significantly greater when the information was rank ordered (*M*s = 1.57 vs. 0.96), $t(27) = 2.92$, $p < .01$ rather than presented randomly (*M*s = 1.93 vs. 1.89, *ns*).

To test the hypothesis that nonselective processing measured via recall of belief-inconsistent cases mediates the influence of information format on subjective price–quality inferences, we performed mediation analyses (Baron & Kenny, 1986). Information format (0 = rank ordered, 1 = random) accounted for significant variation in recall for belief-inconsistent information ($\beta = .4047$), $t(54) = 3.25$, $p < .01$ and for subjective price–quality correlations ($\beta = -.2971$), $t(54) = -2.29$, $p < .03$. When information format and recall were both included in the regression analysis, recall for belief-inconsistent information influenced subjective price–quality correlations ($\beta = -.2760$, $t(54) = -2.00$, $p < .05$, and the previously significant effect of information format on subjective price–quality correlations was not significant ($\beta = -.1854$, *ns*). Hence, recall for belief-inconsistent cases mediated the effect of information format on price–quality inference. This pattern was observed even though recall is an insensitive measure of responsiveness to belief-inconsistent information: Many participants were unable to recall any brands. Nevertheless, the results are consistent with the results of Kardes, Cronley, et al. (2004; Experiment 3) who found a similar pattern using a more sensitive measure (recognition instead of recall).

EXPERIMENT 4

In Experiment 4, we examined the role of implicit theories in price–quality inference by manipulating the presence or absence of explicit instructions encouraging participants to focus on the data rather than on their preconceptions and by measuring implicit theories before and after exposure to the data.

Participants and Procedure

Participants were 58 students at a large Midwestern university. Participants were randomly assigned to conditions in a 2 (rank-ordered vs. random presentation of information) × 2 (before vs. after exposure to the data) × 2 (explicit instructions to focus on the data vs. no explicit instructions) mixed design with one within-subjects factor (before/after exposure to the data). The explicit instructions stated the following:

> Please estimate the quality rating of each brand of wine, based on the list you just reviewed. The 10 brands shown below were randomly drawn from the original list you just studied, therefore, try to base your quality predictions on what you learned from the original list as much as possible.

The experimental procedure was similar to the previous experiments. Before examining the wine list and then again after making their predictions, participants were asked to indicate their "current opinion about the strength of relationship between the price and quality of wine." A single scale ranging from 0 (*no relationship at all*) to 10 (*extremely strong relationship*) was used. In addition, perceived task difficulty ("How difficult was the prediction task you just did?") and perceived learning ("How much do you feel that you learned from the original list?") were measured on scales ranging from 0 (*extremely easy* and *nothing,* respectively) to 10 (*extremely difficult* and *a lot,* respectively).

Results and Discussion

Consistent with the previous experiments, subjective price–quality correlations were greater in rank-ordered than in random format conditions (*M*s = .71 vs. .60), although the difference was nonsignificant, $p > .10$.[2] No other significant effects or interactions were observed for subjective price–quality correlations.

[2]Although comparison of mean raw correlation coefficients was nonsignificant, analysis of *z* scores showed that price–quality correlations were greater in rank-ordered than in random format conditions (*M*s = .83 vs. .68; *z*s = 1.18 vs. .82), $F(1, 56) = 4.95$, $p < .03$.

An ANOVA performed on implicit theories as a function of format, time, and instructions yielded a main effect for time (*M*s = 7.52 vs. 6.14 for before vs. after exposure to the data, respectively), $F(1, 54) = 24.91$, $p < .001$. Implicit theories about the strength of the relation between price and quality were similar under both random and rank-ordered format conditions (7.67 vs. 7.36, *ns,* respectively). However, they decreased to a much greater extent following exposure to the data in random format conditions (from 7.67 to 5.46), $t(29) = 4.73$, $p < .01$ than under the rank-ordered conditions (from 7.36 to 6.96, *ns*). The interaction implied by this difference was quite significant, $F(1, 54) = 11.56$, $p < .001$. These effects did not depend on whether or not participants were explicitly encouraged to focus on the data rather than their preconceptions ($p > .10$). That is, participants spontaneously focused on the data even when explicit instructions were not presented. Moreover, as a result of this focus, their implicit theories about the price–quality relation changed over time.

An ANOVA performed on perceived difficulty as a function of format and instructions indicated that perceived difficulty was greater in random order than in rank-ordered conditions (*M*s = 4.97 vs. 3.57), $F(1, 54) = 6.85$, $p < .01$. Perceived learning was also greater in the former conditions than the latter (3.40 vs. 3.00, respectively). Although this latter difference was not significant ($p > .10$), it suggests that randomly ordered information format was perceived as both more difficult to process and more conducive to learning (Hogarth, 2001). On the other hand, participants learned more in random format conditions even though they were generally unaware of the influence of information format on learning.

EXPERIMENT 5

In Experiment 5, we investigated the behavioral consequences of selective processing and price–quality inferences in a real choice task involving monetary expenditures. In general, consumers who use price as a basis for inferring quality should believe that spending more money on a purchase will result in the acquisition of a higher quality product and accordingly, a more enjoyable consumption experience. Therefore, such consumers should be willing to spend more money on purchases. To evaluate this possibility, we restricted consideration to conditions in which information load was high and the need for cognitive closure was low, which were the conditions in which information format was most likely to affect consumers' judgments (see Experiment 1).

After providing estimates of wine quality for several price points, participants made an actual choice of a bottle of wine to take home. We predicted that the price–quality inference data would replicate the earlier experiments. Moreover, we hypothesized that information formatted in a rank-ordered (vs. random) fashion would result in higher spending for a bottle of wine. It was also expected that participants' price–quality inferences would predict the amount of money they would spend on a bottle of wine.

Participants and Procedure

Participants were 40 staff and 25 PhD students at a mid-sized Northeastern university. Participants were recruited with an offer of $20 in total compensation, which would include a bottle of wine of their choice with the remaining amount in cash. Participants, who took part individually, were instructed that the experiment would involve consumers' perceptions of wine and were reminded of the compensation scheme. They were also informed that if they so chose, they could receive $20 in cash and no wine (none of the staff chose this option; 9 of the PhD students did, leaving 56 individuals who participated fully in the experiment). After receiving these initial instructions, participants were asked to read through an experimental packet that was given to them and to answer the questions.

Low need for cognitive closure was held constant across conditions by providing instructions similar to those used in Experiment 1. As in the previous experiments, participants were asked to review either a random or rank-ordered (by quality) version of the wines list and estimate the quality of the 10 hypothetical test brands. After making the quality judgments, participants were asked to choose a bottle of wine to take home. The choice was of four bottles described only by price ($4.99, $9.99, $14.99, $19.99). After participants indicated how much they wanted to spend on their wine choice, they were asked if they wanted red or white wine. Finally, participants were asked to respond to demographic and expertise questions, as in earlier experiments, and were then debriefed and dismissed.

Results and Discussion

Consistent with expectations and results reported previously, the average price–quality correlation was significantly greater in the rank-ordered list condition than in the random list condition (*M*s = .89 vs. .73), $t(54) = 2.32$, $p < .02$.

To determine whether list format had an impact on choice, the average prices of the wine chosen by participants in the rank-ordered versus random conditions were compared. As predicted, participants who reviewed the rank-ordered list spent more on wine than did those who reviewed the random list (*M*s = $13.74 vs. $11.42), $t(54) = 2.12$, $p < .04$.

We hypothesized that list type would affect willingness to pay because of the difference in perceived strength of the price–quality relation as a function of list type. Thus, the effect of list type on choice should be mediated by participants' perceptions of the strength of the price–quality relation. The first two requirements of mediation were met as noted in the preceding paragraphs. When participants' reported price–quality correlation was included as a covariate in an

analysis of choice as a function of list type, the effect of the covariate was reliable, $F(1, 53) = 3.89$, $p < .05$, but the effect of list type became nonsignificant, $F(1, 53) = 2.14$, *ns*. Thus, as expected, participants who reviewed the ordered versus random list spent more money on their wine purchases because they perceived a stronger relationship between wine price and quality.[3]

Although this experiment replicated the judgmental results reported in the earlier experiments, the larger contribution of this experiment is that perceptions of the size of the price–quality correlation have implications for consumer choice. Participants who reviewed the rank-ordered list perceived a much stronger relation between the price of a wine and its quality than did participants who reviewed the random list, and this difference in perception was borne out in actual choice. Participants who viewed the rank-ordered list were, on average, willing to pay 20% more than participants who viewed the random list.

GENERAL DISCUSSION

In this article, we built on prior investigations into how consumers use price to infer quality and attempted to advance understanding of moderating conditions that govern price–quality judgments and how those judgments translate into choice behaviors. The results show that consumers are unlikely to process information in an even handed or nonselective manner when situational conditions tax cognitive resources or when motivational states discourage careful processing.

Specifically, the results of the five experiments show that the degree to which price is perceived to predict quality is typically and consistently overestimated when information load is high but is reduced when the need for cognitive closure is low and information is presented randomly. This pattern of results generalized across judgment and real choice tasks involving monetary expenditures. Results also show that variables that moderated selective processing and subsequent price–quality predications also influenced price–quality beliefs. Considered together, the results are consistent with a selective information processing analysis of the variables that moderate the use of price as a predictor of quality.

An argument can be made that one limitation of the study is that it examined prediction tasks only rather than direct correlation estimates. Although Broniarczyk and Alba (1994) found that predictions generally result in more biased judgments than correlation estimates, they also pointed out that both methods of research ultimately further the understanding of how people acquire and use covariation knowledge. Other researchers also made the argument that prediction is a superior paradigm for evaluating people's knowledge of covariation (Well, Boyce, Morris, Shinjo, & Chumbley, 1988). Moreover, Kardes, Cronley, et al. (2004) found similar results for predictive judgments and for judgments of covariation.

In this research, we extend previous findings in several other important ways. First, the mediation analyses shows that the effects of information format on price–quality inference were mediated by selective processing. Belief-inconsistent (vs. belief-consistent) information was not as easy to recall when information was presented in a rank-ordered format. This occurred because consumers disregarded information that conflicted with their initial beliefs or implicit theories. A rank-ordered format made it easier to ignore belief-inconsistent cases, thus quickly and easily confirming the select hypothesis. When information was presented in a random format, more balanced processing occurred because consumers were more likely to encounter belief-inconsistent cases unintentionally.

Previous studies on memory for belief-consistent versus belief-inconsistent information have yielded mixed findings: Some studies have shown better memory performance for belief-consistent information (Rothbart, Evans, & Fulero, 1979; Snyder & Swann, 1978), and others have shown better memory for belief-inconsistent information (Hastie & Kumar, 1979; Srull, 1981). This research further helps to resolve these mixed findings: Belief-consistent information has a memory advantage when information load is high, and belief-inconsistent information has a memory advantage when information load is low (see also Stangor & McMillan, 1992; Wyer & Srull, 1989). Attention to belief-consistent information is likely to occur at an earlier and more basic stage of information processing that does not require abundant cognitive resources. By contrast, inconsistency resolution requires effortful elaborative processing that is likely to occur at a later stage of information processing (Sengupta & Johar, 2002; Wyer & Srull, 1989). Effortful processes that occur at a relatively late stage of the judgment process are more often disrupted by cognitive load manipulations than are the less effortful processes that occur at earlier stages (Gilbert, 2002; Johar & Simmons, 2000).

In this research, the need for cognitive closure was situationally manipulated through the use of time pressure. This factor limited individuals' ability to process a large amount of information systematically, resulting in selective processing and a greater overestimation of the price–quality relation. Interestingly, the situational influence of time pressure influenced price–quality inferences even for participants with a low measured need for cognitive closure. In general, people with a high need for closure neglected belief-inconsistent information (Kruglanski & Webster, 1996). When their need for cognitive closure was low, however, they

[3]These data should be interpreted cautiously because the reported analyses are based on mean raw correlation coefficients, but when transformed to *z* scores, the effect of list type on price–quality correlation inferences becomes only marginally significant.

were apparently more likely to consider the judgmental implications of such information and consequently formed less extreme inferences based on price. The beneficial effects of low need for cognitive closure on inferences are particularly evident when a large amount of information is presented in a random format.

This research also helps to explain the role of information format on price inferences. Easy-to-process formats, such as rank-ordered lists, have no effect on price–quality inference when information load is low because selective information processing is unlikely under these conditions. A different pattern of results emerges under high information load, which encourages consumers to simplify the judgment task by selectively considering belief-consistent information. Selective information processing is particularly likely when information load is high, information is presented in a rank-ordered format, and the need for cognitive closure is high. These findings are particularly relevant given the frequency with which large amounts of information are reported in a rank-order format in everyday settings (e.g., *Consumer Reports* product ratings, Billboard Top 40 music charts, *New York Times* bestseller lists, Gorman report graduate school rankings).

Finally, this research goes beyond judgment by examining the behavioral consequences of price–quality inferences on a real choice task involving monetary transactions. The processes by which consumers infer quality on the basis of price have received a great deal of attention over the years because researchers have assumed that judgments of quality based on price are consequential because they should influence choice. The results of Experiment 5 provide strong support for this assumption. As the degree to which consumers rely on price as a predictor of quality increases, spending also increases.

It is important to note that our data provide strong evidence that consumers' price–quality inferences reflect their processing of brand level price and quality data and that consumers do not simply apply an existing implicit theory when inferring quality from price. This finding strengthens the conclusions drawn from Kardes, Cronley, et al.'s (2004) research in which implicit theories were neither measured nor ruled out as a potential alternate explanation. Specifically, if participants in Experiment 4 had exclusively employed the theory that price is highly predictive of quality, information format would have had no effect on their price–quality inferences, and there would have been no difference in price–quality relation beliefs between preexposure and postexposure ratings in the random condition. Moreover, in Experiment 5, consumers differentially spent money as a function of information format—an effect that would only obtain if their inferences and choices were sensitive to the data. Together, the results suggest that inferences and choices are heavily influenced by contextual variables that influence processing ease, selective thinking, and the information value of the learning environment.

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