Forthcoming, *Journal of Marketing Research*

When Internal Reference Prices And Price Expectations Diverge:

The Role of Confidence

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When do internal reference prices differ from articulated price expectations? The authors propose that the internal reference price depends not only on the magnitude of the expected price, but also on the confidence associated with this expectation. Four experiments delineate the effects of price expectation and confidence on the internal reference price. In experiments 1 and 2 the authors manipulate repetition and examine the effects of repetition-induced confidence on price judgments. In experiments 3 and 4 they manipulate confidence directly to investigate its effects on judgments. Results from all four experiments suggest that consumers with less confidence have higher internal reference prices than more confident consumers, even when they do not differ in their articulated price expectations. The implications of these results for pricing theory are discussed.

A fundamental assumption in most models of price cognition is that consumers evaluate a price by comparing it with a memory-based analog standard, often referred to as the *internal reference price* (Adaval and Monroe 2002; Monroe 2003; Winer 1988). Although there is a large body of empirical evidence to support the concept of the internal reference price, the psychological mechanisms that underlie this comparison process remains unclear (Kalyanram and Winer 1985). In this article, we examine the effects of repetition on the price comparison process with the goal of understanding the underlying the psychological mechanisms that are in play.

Our interest in the effects of repetition on the price comparison process was kindled by an intriguing conundrum reported in the pricing literature: Repetition affects consumers' judgments of offer prices even though it has little or no effect on their articulated price standards. Econometric studies suggest that frequent buyers are more sensitive than infrequent buyers to price increases (e.g., Breisch et al. 1997; Rajendran and Tellis 1994), implying that frequent and infrequent buyers may be using different comparison standards for evaluating offer prices. However, several price knowledge surveys have reported that a frequent buyer's estimates of regular prices or fair prices are no different from that of an infrequent buyer's (Dickson and Sawyer 1990; Gabor 1988; Urbany and Dickson 1991). These findings then beg the following question: If repeated price evaluations have no effect on the magnitude of the articulated price expectation, then why does it affect price magnitude judgments?

In this article, we suggest that the *internal reference price* used in price magnitude judgments may be distinct from the *articulated price expectation*. The literature refers to the internal reference price as that price point on the subjective judgment scale above which all prices are typically judged as high and below which they are judged as low (Winer 1988). The articulated price expectation is the price magnitude articulated by consumers as the regular price or the fair price for the product. Although both these constructs are based on consumers' past experiences, we argue that the internal reference price is more malleable than the articulated price expectation. Consider two consumers: a frequent buyer, Anna, who purchased a product three times during different store visits at \$3.50, and an infrequent buyer, Leo, who has purchased the product just once at \$3.50. Both Anna and Leo would expect the future price of that product to be \$3.50. Although both consumers have the same price expectation, Anna somehow feels much more confident than Leo while evaluating an offer price. The issue under investigation in this article is whether this feeling of confidence can independently affect the internal reference price used for judging offer prices. We suggest that repetition-induced confidence can affect the internal reference price used in magnitude judgments even when it has no effect on the articulated price expectation.

In the following sections, we first discuss the literature pertaining to how consumers make price comparisons with the goal of evaluating prices, and then present four experiments designed to study the effects of repetition on the price comparison process. In experiments 1 and 2 we examine the effects of repetition-induced confidence, and in experiments 3 and 4 we manipulate confidence directly to confirm the construct validity of our results. We conclude this article with a discussion of the theoretical implications of our findings.

THE PRICE COMPARISON PROCESS

Internal Reference Price Versus Articulated Price Expectation

The idea of internal reference price in the marketing literature has been inspired by Rosch's (1975) theorization on cognitive reference points and Helson's (1964) adaptation level theory. In concept, the internal reference price refers to a point on the internal judgment scale that is used as the standard to judge offer prices (Winer 1988). Therefore, by definition, all offer prices above this reference point are perceived as high and all offer prices below this standard are perceived as low.

However, in practice, several different operationalizations have been used to study internal reference prices (see Winer 1988): consumers' self-reports of fair price (e.g., Lichtenstein and Bearden 1989; Thaler 1985), estimates of normal prices charged by the retailer (e.g., Jacobson and Obermiller 1990; Kalwani and Yim 1992; Urbany and Dickson 1991), and recalled magnitude of the past prices (e.g., Gabor 1988; Dickson and Sawyer 1990). Econometricians have operationalized internal reference price as a weighted average of the past prices (e.g., Breisch et al. 1997; Rajendran and Tellis 1994). However, as Kalyanram and Winer (1995) point out, it is not clear whether these self-reported and econometric measures precisely capture the internal reference price that consumers actually use to judge offer prices.

Psychologists studying stimulus discrimination processes have been interested in the distinction between the internal reference point used for judgments and the articulated comparison standard. People's ability to discriminate between stimuli has been conventionally investigated through experiments in which participants are asked to compare a stimulus of variable magnitude with a specified standard and to indicate whether the stimulus is higher or lower than the standard. Findings from these studies suggest that the internal reference point is an implicit construct that is influenced not only by the values of the articulated standard, but also by factors like confidence, fatigue, habituation, attitudes and motivations (Helson 1964; Sherif and Hovland 1961; Woodsworth and Schlosberg 1954). It is widely accepted that the internal reference point used in comparative judgments is seldom identical to the articulated standard (Woodsworth and Schloberg 1954).[1] For example, Festinger (1943) found that the participants' internal reference points shifted even when the comparison standard was explicitly shown on the screen at the time of judgment. He asked participants to compare pairs of vertical lines, presented simultaneously in a tachistoscope, and to

[1] Woodsworth and Schloberg (1954, p. 198) concluded: "Strangely enough, *PSE* is rarely identical with *St*. If it lies above *St*, there is what is called a positive constant error; if below, a negative constant error." *St* refers to the stimulus used as the comparison standard and *PSE* refers to the point of subjective equality. The point of subjective equality is conceptually analogous to the internal reference point.

say "longer" or "shorter," according to whether the line on the right appeared longer or shorter than the one on the left. It was observed that the internal reference point shifted upwards when participants were instructed to guard against making "longer" responses incorrectly. Conversely, when participants were told to be careful not to make "shorter" responses incorrectly, the internal reference point was displaced in the opposite direction. These findings suggest that the internal reference point used in judgments is much more malleable than the articulated comparison standard.

The Effects of Repetition

Since past research has shown that repetition increases consumers' confidence in price knowledge, our interest in this article is in the effects of repetition on the price comparison process. The literature documents that frequent buyers are more confident than infrequent buyers about their estimates of regular prices (Urbany and Dickson 1991) and they take less time than infrequent buyers for price evaluations (Dickson and Sawyer 1990). The proposition that repetition leads to greater confidence has also found empirical support in the psychology literature (Dewhurst and Anderson 1999; Koriat 1993; Zaragosa and Mitchell 1996; also see Menon and Raghubir 2003). Since the internal reference price is a malleable construct that is sensitive to phenomenological experiences, these findings suggest that consumers' internal reference prices would be affected by this repetition-induced confidence. In fact, the notion that confidence affects price expectations is not new. It has been shown that less confident consumers articulate higher price expectations (Mazumdar and Jun 1993; Urbany and Dickson 1991). However, past research has not examined the possibility that confidence can have a direct effect on internal reference price even when it does *not* change the articulated price expectation. Our interest is in testing this dissociation between the articulated price expectation and the internal reference price. More specifically, we hypothesize that *repetition-induced confidence can affect the internal reference price that consumers use for price judgments, even when it* *has no effect on their articulated price expectation*. We began our research investigation with experiment 1 that examines the effect of repeated price evaluations on price judgments and the articulated price expectations.

EXPERIMENT 1

To test the effects of repetition on price judgments, we manipulated two factors in a mixed-factorial design: repetition as a between-subjects factor and the offer price magnitude as a within-subjects factor.

Method

Eighty undergraduate students from a large northeastern university, participating for partial course credit, were randomly assigned to one of the two between-subject conditions (repetition group vs. no-repetition group). The experiment was administered on personal computers. We used fictitious brand names of pens as stimuli to eliminate the effect of strong prior price standards for the stimulus.

Participants were asked to do two temporally separated judgment tasks. The first task, which we refer to as *the repetition manipulation task*, was designed to manipulate participants' prior experience with the prices, and varied across the two groups of participants: repetition group and the no-repetition group. The subsequent task, which we refer to as *the price judgment task*, examined the effect of the repetition manipulation on judgments of new prices. The price judgment task was the same across both the between-subjects conditions and the main dependent measures were recorded during this task. Participants assigned to the repetition group made several price evaluations before the price judgment task, while those in the no-repetition group did not. Since our interest was in delineating the effects of confidence and the articulated price expectation, the experimental procedure was designed to ensure that the repetition and the no-repetition groups did not differ in their price expectations.

Repetition Manipulation Task. This part of the experiment was called "New Product Study". Participants were told that Columbia, an online pen store, was introducing a new pen. All participants saw a picture of a pen along with a short description. We then manipulated the participants' experience with the prices in the product category. Participants, who were randomly assigned to the repetition group*,* were told that the store managers were considering seven different pricing options for the new pen and were interested in evaluations of these test prices. The first test price they saw was $3.00 (the price expectation that was being created in the experiment). They indicated their agreement or disagreement with the statement that the pen is a "good value for money" at that price on an 11-point scale anchored at "Disagree" and "Agree." On the subsequent screens they evaluated six more test prices, one at a time, ostensibly being considered by the store managers for the new pen. These prices were $3.50, $2.50, $2.75, $3.25, $1.75, and $4.25. Note that these prices are uniformly distributed around the mean level of $3.00. Therefore these prices were expected to induce a price expectation around $3.00. Participants assigned to the *no-repetition group* also made similar evaluations. However, instead of evaluating test prices, they evaluated seven potential brand names for a pen. In order to ensure that they also had a the same price expectation, participants in this group were told that that the pen is priced at $3.00 and that the store managers were considering seven brand name options for the new pen. Thus, all participants saw the same pen, and were expected to have the same price expectation of $3.00. But participants in the repetition condition, unlike those in the no-repetition condition, made repeated price evaluations before the final price judgment task.

Price Judgment Task. After completing the first task, participants read that a competing online retailer, Endeavor, was planning to introduce a similar pen. Further, they were told that the store managers were considering 16 different offer prices for the pen. Their task was to judge whether each price was high or low. We employed the swift binary judgment paradigm used in magnitude judgment experiments of similar nature (e.g., Dehaene, Dupoux, and Mehler 1990; Moyer and Landauer 1967). Participants saw several prices one at a time on the computer screen, and were instructed as follows: "Now you will see 16 prices that the online store is considering. After seeing each price you have to click on one of the two buttons that you will see below the price." The order of presentation of these 16 prices was randomized for each participant. Each price remained on the screen till the response was submitted. Participants responded to each price by clicking the mouse on one of the two buttons: High or Low. The two buttons on the computer screen were a centimeter apart from each other. In order to counterbalance the relative positions of the "HIGH" and "LOW" buttons on the response screen, a randomly selected half of the participants had the "HIGH" button on the right and the "LOW" button on the left, while the other half had the "HIGH" button on the left and the "LOW" button on the right. It was emphasized that accuracy and speed are equally important. To facilitate rapid responses, a small clock at the bottom of the screen indicated the number of seconds elapsed. The computer recorded the time the participants took to respond to each price. The 16 different stimuli prices to be evaluated were set at $0.25 intervals: $1.00, $1.25, $1.50, $1.75, $2.00, …$4.25, $4.50, $4.75, $5.00. Eight of these prices ($1.00 to $2.75) were lower than the induced price expectation ($3.00), while the other eight ($3.25 to $5.00) were higher than the price expectation. Thus, for each participant, we had 16 binary price magnitude judgment responses and the response time associated with each of these judgments that served as the primary dependent measures. Next, we measured the magnitude of participants' articulated price expectations by asking them to submit an estimate of the fair price for the pen that was shown at the beginning of the task. These articulated price expectations were measured in an open-ended format.

Results

Price Expectation. In order to rule out the possibility that the effects of repetition on price judgments could be due to differences in the articulated price expectations, we ascertained that the post-judgment price expectations did not differ between the repetition group and the no-repetition group. A one-way ANOVA confirmed that participants assigned to the repetition and no-repetition conditions did not differ in their articulated price expectations ($M_{\text{repetition}}$ = \$2.80 vs. $M_{\text{no-repetition}}$ = \$3.09, $p > 0.22$). The median value of price expectations was \$3.00 for both the groups.

Price Judgments. If participants were using their articulated price expectation as the internal reference price for judgments, then the repetition manipulation should have no effect on their price judgments. To examine the effect of repetition on judgments of offer prices, we analyzed the binary judgments (coded as "high = 1" and "low = -1") using a conditional logit model with offer price magnitude and repetition as the two independent variables. Predictably, the price coefficient was significant and positive ($\beta = 5.94$, $p < .01$) indicating that higher prices were associated with "high" responses rather than "low" responses. The price by repetition interaction term was also significant ($\beta = 2.19$, $p < .01$), with the positive interaction coefficient suggesting that participants assigned to the repetition condition were more likely than those assigned to the no-repetition condition to judge a price as "high."[2] While participants in the repetition condition judged 50% of the offer prices as high, those in the no-repetition condition judged only 44% of the prices as high. Note that the offer prices in this experiment were uniformly distributed around the articulated price expectation; half

[2] In order to control for the individual differences in articulated price expectations, we computed the difference between the offer price and the articulated price expectation for each participant. The results remain unchanged when we used this relative price level as the independent variable instead of absolute prices. The main effect of relative price level ($\beta = 5.91$, $p < .01$), as well as the interaction between repetition and the relative price level ($\beta = 2.21$, $p < .01$) were significant.

the offer prices were higher than the price expectation and the other half was lower than the price expectation. The fact that the proportion of high judgments in the no-repetition condition was significantly lower than 50% ($p < .01$) indicates that the internal reference price in the no-repetition condition was higher than the articulated price expectation. Further analyses revealed that the repetition manipulation affected judgments only for prices that were higher than the articulated price expectation (see figure 1). When the prices were higher than the articulated price expectations (i.e., $3.25 to $5.00), the repetition group judged 85.9% of the prices as "high," while the no-repetition group judged only 75.3% of the prices as high (χ^2 (1) = 12.6, $p < .01$). However, for prices lower than the articulated price expectation (i.e., $1.00 to $2.75), the repetition and no-repetition groups did not differ in their magnitude judgments; both groups judged 85.9% of the prices as "low."

Insert figure 1 about here

A 2 x 16 mixed-factorial ANOVA on response latency, with repetition (repetition group vs. no-repetition group) as the between-subjects factor and offer price level (16 levels) as the within-subject factor, revealed a main effect of repetition ($F(1, 78) = 4.9$, $p < .05$). Participants assigned to the repetition group took less time ($M_{repetition}$ = 1095 milliseconds) to judge the offer prices than those assigned to no-repetition group ($M_{no\text{-}repetition}$ = 1253 milliseconds). In order to ensure that this difference is not on account of the outliers in the distribution, the responses latency data was re-analyzed after trimming the values beyond the 99th and the 1st percentiles. In this trimmed data set also, the mean response time in the no-repetition condition was 102 milliseconds more than that in the repetition condition ($p < .05$).

Discussion

The findings of this experiment support the hypothesis that repetition can influence price judgments even when the articulated price expectation remains unchanged. For participants assigned to the repetition condition, the internal reference price used to judge offer prices were the same as their articulated price standard. However, for participants assigned to the no-repetition condition, the internal reference price was higher than the articulated standard. The fact that participants in the no-repetition condition took more time for their judgments suggests that these participants were less certain about their price knowledge, and this phenomenological experience of uncertainty might have shifted their internal judgment standard upwards. This is consistent with the notion that the internal reference point used in a stimulus discrimination task depends not only on the value of the articulated standard, but also on the phenomenological experience during the task.

EXPERIMENT 2

This experiment was conducted to address some of the limitations of the previous experiment. In the previous experiment, the articulated price expectations were recorded *after* the price judgment task. Therefore, the extent to which the price expectations were influenced by the judgment task itself maybe questioned. To preclude the possibility that the participants might have differed in the pre-judgment price expectations, in this experiment we measured the price expectations immediately after the repetition manipulation. Further, we also directly measured their confidence in price knowledge immediately after the repetition manipulation task. Since the act of measuring confidence could affect the nature of the judgment process in a discrimination task (Baranski and Petrusic 1998; Petrusic and Baranski 2003), the effects of the repetition manipulations on price judgments was tested in a post-test on a separate group of participants.

Pre-Judgment Measures

Forty-eight participants, separate from those that had participated in the previous experiment, were randomly assigned to either the repetition condition or the no-repetition condition as in experiment 1. The repetition manipulation procedure was similar to that used in experiment 1 with one minor change. In the interest of generalizability, we changed the induced price expectation from \$3.00 to \$5.00. All the other aspects of the procedure remained unchanged.

Immediately after the repetition manipulation, participants submitted their estimate of their perceived fair price, and the upper and the lower price thresholds for the product in an open-ended response format. The upper and lower thresholds of participants' price expectation were measured following the standard protocol used in pricing literature (Gabor 1988; Janiszewski and Lichtenstein 1999). The upper threshold was elicited by the question: "If you were to buy the pen from Endeavor, what is the highest price that you would be willing to pay?" We also measured the effect of repetition on participants' confidence in their price expectation. Participants were asked to report how confident they were that their fair price estimate was neither too high nor too low, on an 11-point scale anchored at "not confident" and "quite confident."

Results. Even when the price expectations were measured immediately after the repetition manipulation, one-way ANOVAs revealed that participants assigned to the repetition and no-repetition conditions did not differ in their fair price expectation ($M_{\text{repetition}}$ = \$4.57 vs. $M_{\text{no-repetition}}$ = \$4.87; $F < 1$), the upper threshold ($M_{\text{repetition}}$ = \$5.55 vs. $M_{\text{no-repetition}}$ = \$6.09; $F < 1$) and the lower threshold ($M_{\text{repetition}}$ = \$2.55 vs. $M_{\text{no-repetition}}$ = \$2.80; $F < 1$). Further, participants reported greater confidence in their articulated price expectation in the repetition condition ($M_{\text{repetition}} = 7.77$) than in the no-repetition condition ($M_{\text{no-repetition}} = 6.23$) and this effect reached marginal significance ($F(1, 47) = 3.7$; $p = .06$). Participants in the repeated evaluation condition were also faster in submitting their fair price expectation ($M_{\text{repetition}}$ = 7.7 seconds vs. $M_{\text{no-repetition}}$ = 10.2 seconds; $F(1, 47) = 3.9$; $p < .05$).

Price Judgments

Past research on the effects of confidence in stimulus discrimination tasks suggest that measuring confidence can alter the task itself (Baranski and Petrusic 1998; Petrusic and Baranski 2003). Based on this insight, we recruited a separate group of participants for testing the effects of the repetition manipulation on price judgments. The procedure for repetition manipulation was identical to that in the preceding study. The procedure for the price judgment task was similar to that in experiment 1, with the exception that in this experiment the offer prices were distributed around $5.00. These prices were set at $0.50 intervals: $1.00, $1.50, $2.00, $2.50…$7.50, $8.00, $8.50, $9.00. As in experiment 1, eight of these prices ($1.00 to $4.50) were lower than the induced price expectation of $5.00, while the other eight ($5.50 to $9.00) were higher.

Results. Analyses of binary magnitude judgments and response latency corroborated the findings from experiment 1. A conditional logit model revealed that the main effect of price level ($\beta = 2.10$, $p < .01$) was moderated by repetition ($\beta = .57$, $p < .01$). While participants in the repetition condition judged 45% of the offer prices as high those in the no-repetition condition judged only 39% of the prices as high. These results imply that the internal reference price in the no-repetition condition was higher than that in the repetition condition. The proportion of high judgments in the no-repetition condition was significantly lower than 50% ($p < .01$) suggesting that uncertain consumers' internal reference prices are higher than their articulated price expectations. As in experiment 1, participants assigned to the repetition group took less time ($M_{repetition} = 1123$ milliseconds) to judge the offer prices than those assigned to no-repetition group ($M_{no\text{-}repetition} = 1383$ milliseconds; $F(1, 38) = 4.2$, $p < .05$).

Discussion

The results from this experiment rule out the possibility that participants might have differed in their pre-judgment price expectations. These results thus offer additional support for the proposition that repetition affects price judgments, even when the articulated price expectations remain unchanged. Further, the results of this experiment also partially support our theorization that effects of repetition on price judgments are on account of changes in the confidence associated with price knowledge. Not only were participants in the repetition condition more confident, but also they took less time to report their price expectation.

EXPERIMENT 3

If the results of experiments 1 and 2 are indeed due to changes in confidence as we suggest, then a direct manipulation of confidence should yield similar results. Specifically, participants who have less confidence in their price knowledge should judge price increases less unfavorably. To make conclusive inferences about the role of confidence, in experiment 3, instead of manipulating repetition, we directly manipulated participants' confidence in their price expectations.

Additionally, it could be argued that while our repetition manipulation in the previous experiments emulates how confidence develops in the actual purchase situation, it is confounded with the perceived distribution of prices. That is, before judging the offer prices, participants assigned to the repetition condition in the previous experiments saw a series of prices around the induced price expectation, while those in the no-repetition condition were deprived of this information. Could it be that participants in the repetition condition were aware of the distribution of prices, and therefore, were able to discriminate on both sides of their price expectation? To address these issues, instead of inducing a price expectation in the laboratory, we asked the participants to submit their spontaneous price expectation at the *beginning* of the experiment. The offer prices used in the subsequent judgment task were uniformly distributed around the articulated price expectation submitted by each participant.

Method

Sixty-one students from a large northeastern university (separate from those that participated in previous experiments), participating for partial course credit, were randomly assigned to either the control condition or the low confidence condition. The experiment, titled "Stapler Study," was conducted on personal computers. Participants were told that they have to do two tasks: first guess the price of a stapler and then evaluate several prices that the retailer is considering for that product.

Stimulus and Procedure. Participants saw the picture of a stapler on the computer screen and read the following question: "What do you think would be the price of this stapler at an office supplies store?" They were instructed to enter their price estimate in dollars, in an open-ended format, in the text box provided below the picture. This response served as a measure of each participant's articulated price expectation for the product. Participants assigned to the *control* condition proceeded to the price evaluation task, while those assigned to the *low confidence* condition were presented with the confidence manipulation information. Participants in the low confidence condition were instructed to wait for 30 seconds while the computer compared their price estimate with the actual market price, after which time they were informed: "Sorry, your guess is incorrect. The actual price is quite different from the price that you guessed."

All participants then responded to a series of filler questions about brand name evaluations, which took around five minutes. These brand evaluation questions were inserted to separate the binary magnitude judgment task from the price expectation question. On the following screen, all participants read the instructions for the price evaluation task. Then they saw 12 prices, one price at a time, on the computer screen and judged whether the shown price was "high" or "low." The computer generated these 12 prices for each participant based on their price expectation submitted on the previous screen. Six of the prices were 10%, 20%, 30%, 40%, 50% and 60% lower than the articulated price expectation and other six were 10%, 20%, 30%, 40%, 50% and 60% higher. Thus, although each participant saw a unique set of 12 prices, the relative level of these prices vis-à-vis their price expectation was the same across all the participants. These prices were presented in a completely random order determined by the computer. Participants responded to each price by clicking on one of the two buttons: high or low. This binary judgment, coded as "low = -1" and "high = 1", was the main dependent variable.

To monitor changes in their articulated price expectation, participants made a second estimate of the price in response to the question: "In your opinion, what would be a fair price for this stapler?" As in experiment 2, they also submitted estimates of the maximum and the minimum price expectations.

Results

Price Expectation. One-way ANOVAs revealed that neither the pre-evaluation measure of price expectation (M_{control} = \$7.92 vs. $M_{\text{low confidence}}$ = \$7.67; $F < 1$) nor the post-evaluation measure of price expectation (M_{control} = \$7.60 vs. $M_{\text{low confidence}}$ = \$6.81; $F < 1$) differed across the two conditions. Similarly, the post-evaluation estimates of the maximum price (M_{control} = \$9.23 vs. $M_{\text{low confidence}}$ = \$8.77; $F < 1$) as well as estimates of the minimum price (M_{control} = \$4.25 vs. $M_{\text{low confidence}}$ = \$3.87; $F < 1$) were the same across the two groups.

Price Judgments. The binary judgments were analyzed using a conditional logit model with offer price magnitude and confidence as the two independent variables. The main effect of offer price magnitude ($\beta = 11.58$, $p < .01$) was moderated by the confidence manipulation ($\beta = 3.40$, $p < .01$). While participants in the control condition judged 49% of the offer prices as high those in the low confidence condition judged only 44% of the prices as high. The proportion of "high" judgments in the low confidence condition was significantly lower than 50% ($p < .05$), suggesting that when participants were less confident of their price knowledge the internal reference price used for judgments shifted upwards.

We also analyzed the pattern of "errors" across the two experimental conditions. A judgment can be considered erroneous if a participant categorized a price that is higher than the expectation s/he articulated at the beginning of the task as "low," or if s/he categorized a price that is lower than the expectation s/he articulated as "high." At an aggregate level, 10.1% of the judgments were erroneous. For participants assigned to the low confidence condition, 18.8% of the judgments were erroneous when the offer prices were above their articulated price expectation, while this proportion was only 7.2% for offer prices below their articulated expectation. This finding supports the notion that under condition of uncertainty, the internal reference price (i.e., the point of subjective equality on the psychological scale used for price judgments) is higher than the articulated expectation. In contrast, for participants in the control condition, the error patterns were symmetric around their articulated price expectation ($M_{\text{below expectation}}$= 6.5% vs. $M_{\text{above expectation}}$= 8.1%).[3]

A 2 x 12 mixed-factorial ANOVA on response latency, with confidence (control group vs. low confidence group) as the between-subjects factor and offer price level (12 levels) as the within-subject factor, revealed a main effect of confidence ($F(1, 59) = 4.3, p < .05$). Participants assigned to the low confidence condition took more time ($M_{\text{low confidence}}$ = 1649 milliseconds) than those to evaluate the stimuli than those assigned to control condition (M_{control} = 1467 milliseconds).

[3] The overall pattern of error distribution was similar even when the post-evaluation price expectation was considered as the judgment standard. In the low confidence condition, most of the errors occurred when the offer prices were higher than the articulated expectation ($M_{\text{above expectation}}$ = 24% vs. $M_{\text{below expectation}}$ = 2%). The errors in the control condition were more symmetric ($M_{\text{above expectation}}$ = 10% vs. $M_{\text{below expectation}}$ = 6%).

Discussion

The results of experiment 3 are consistent with the proposition that the internal reference price used by a participant to judge offer prices is quite distinct from the articulated price expectation. Even though the offer prices were uniformly distributed around the price expectations articulated before and after the judgment task, participants in the low confidence condition responded as if there were a larger proportion of the offer prices were lower than their reference point. Consequently, these participants were more likely to commit more “errors” in their judgments. Strikingly similar findings about asymmetric errors have been reported by researchers examining the effects of anchorages on judgments. Volkmann (1951) reports an experiment in which participants had to judge a series of visual inclinations. When a line inclined at 30° was introduced as an explicit comparison standard, participants made more errors for stimuli with inclination higher than 40° than for stimuli in the 5 to 40° range. Reese et al. (1953; cf. Sherif and Hovland 1961) report similar results from an experiment, wherein the task was to estimate the number of dots in the pattern. The stimuli comprised of several randomly arranged dot patterns with dots ranging from one to 210. When a comparison standard stimulus with 49 dots was introduced, as in the previous experiment, the proportion of errors in the segment above the comparison standard was higher than the proportion in the lower segment. Together, these studies suggest while judging the relative magnitude of a series of stimuli, the internal analog standard used by people is often slightly higher than the articulated standard.

More pertinent to this research is the finding that the discrepancy between the internal reference point and the articulated standard depends on the degree of uncertainty associated with the standard. The greater the uncertainty, the larger is the shift in the internal reference point. Interestingly, this shift in the internal reference point did *not* manifest in the articulated standards reported after the judgment task. This suggests that though both, the articulated standard as well as the internal reference points, are based on past information stored in memory, the former is more stable and less susceptible to phenomenological experiences of uncertainty and confidence. This notion is consistent with Helson's (1964) conceptualization that the adaptation level is a region rather than a point on an internal continuum and it changes from moment to moment.

EXPERIMENT 4

Up until now, we have examined the effects of repetition and confidence manipulation on binary judgments only. However, consumers may not only judge whether a price is higher or lower than their reference point, but they also judge *how much* higher or lower the new price is vis-à-vis the reference point. In this experiment, we investigate the effects of confidence on continuous price evaluations by measuring participants' perceptions of price attractiveness on a continuous scale.

Method

In design and procedure, this experiment was similar to experiment 3. Sixty-three students from a large northeastern university, participating for partial course credit, were randomly assigned to either the low confidence condition or the control condition. None of these students had participated in the previous experiments. The offer prices and measures employed in this experiment, however, were different from those in experiment 3. First, instead of high-low binary judgments, the responses to these prices were collected on a 10-point scale. For each stimulus price, participants indicated their disagreement or agreement with the statement: "$xx is an attractive price for this stapler." A high score on this scale indicates that the participant perceived the price to be attractive. Second, instead of 12 offer prices, participants evaluated only six prices. As before, the computer generated these six prices for each participant based on their articulated price expectation submitted at the beginning of the experiment. Three of the prices were 10%, 20%, and 30% lower than the articulated price expectation while the other three were 10%, 20%, and 30% higher.

Results and Discussion

One-way ANOVAs confirmed that the articulated price expectations did not vary across the control and the low confidence conditions. The pre-evaluation price expectation (M_{control} = \$7.37 vs. $M_{\text{low confidence}}$ = \$6.95; $F < 1$) as well as the post-evaluation price expectation did not differ across the two conditions (M_{control} = \$6.46 vs. $M_{\text{low confidence}}$ = \$6.29; $F < 1$). Similarly, the post-evaluation estimates of maximum price (M_{control} = \$7.97 vs. $M_{\text{low confidence}}$ = \$8.20; $F < 1$) as well as estimates of minimum price (M_{control} = \$3.99 vs. $M_{\text{low confidence}}$ = \$3.51; $F < 1$) were the same across the two groups.

The price attractiveness measure was submitted to a 2 (confidence: control vs. low confidence) x 6 (offer price levels: -30%, -20%, -10%, +10%, +20%, and +30%) mixed-factorial ANOVA with confidence as the between-subjects factor and offer price levels as the within-subjects factor. The significant main effect of the offer price level (F (5, 305) = 143.1; $p < .01$) was qualified by a price by confidence interaction (F (5, 305) = 2.7; $p < .05$). A series of planned contrasts confirmed that the participants who were uncertain about the accuracy of their articulated price expectations were less inclined to evaluate price increases unfavorably. The confidence manipulation had no effect when the new prices were 30% lower (M_{control} = 8.25 vs. $M_{\text{low confidence}}$ = 8.21; $F < 1$), 20% lower (M_{control} = 7.87 vs. $M_{\text{low confidence}}$ = 7.56; $F < 1$) and 10% lower than their articulated price expectation (M_{control} = 7.09 vs. $M_{\text{low confidence}}$ = 7.15; $F < 1$). However, the confidence manipulation affected judgments when the offer price was 30% higher (M_{control} = 2.38 vs. $M_{\text{low confidence}}$ = 3.34; F (1, 305) = 6.7; $p < .01$), 20% higher (M_{control} = 3.32 vs. $M_{\text{low confidence}}$ = 4.50; F (1, 305) = 10.2; $p < .01$), as well as 10% higher than the articulated price expectation (M_{control} = 4.67 vs. $M_{\text{low confidence}}$ = 5.37; F (1, 305) = 3.6; $p = .06$). Thus, manipulating confidence not only affects binary judgments of magnitude, but it also influences subjective perceptions of the attractiveness of offer prices. Further, these findings confirm that uncertainty about price knowledge shifts the internal reference point upwards.

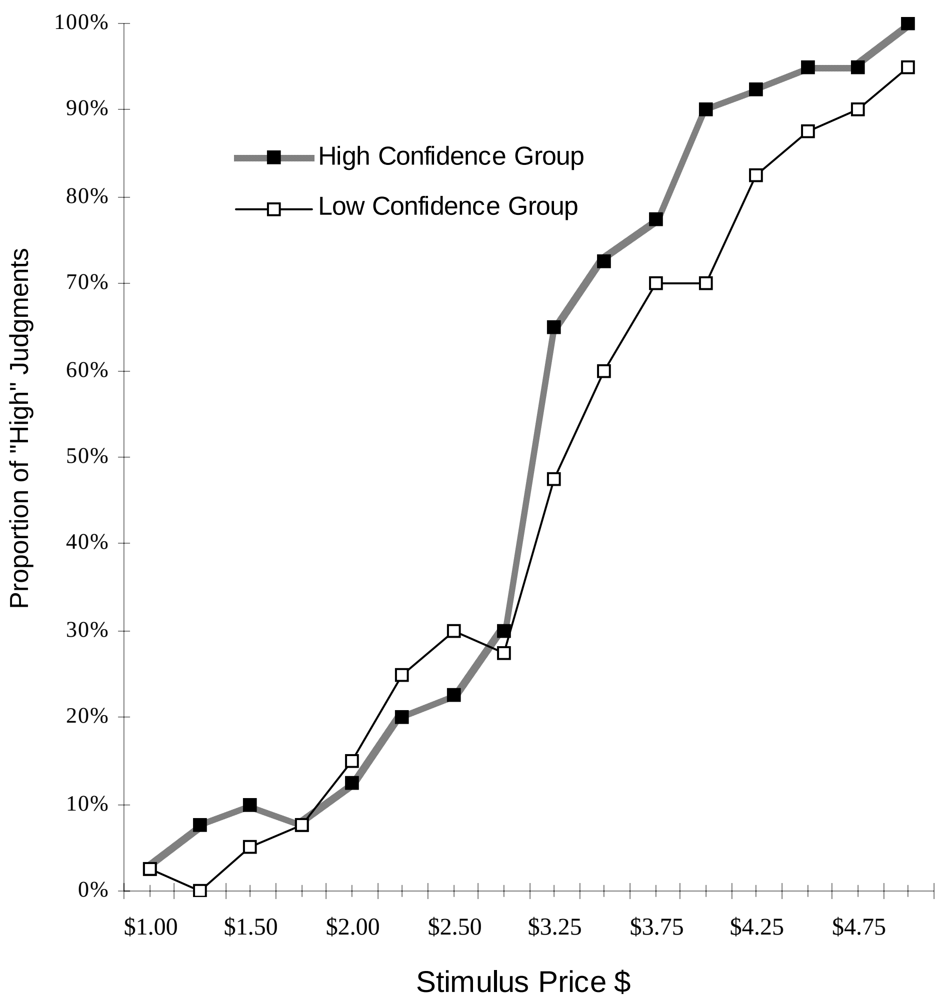
GENERAL DISCUSSION

The notion that experience leads to the internalization of a judgment scale has received empirical support in the context of several psychophysical stimuli like pitch, weight and inclination. Sherif and Hovland (1961, p. 68) conceptualized that after repeated encounters with a range of stimuli, "standards that were originally external become internalized." Several studies have reported evidence for the existence for an internal reference point on the psychological scale used for price judgments. Researchers have tried to measure this internal reference price by asking consumers to articulate the price that would be deemed fair (e.g., Lichtenstein and Bearden 1989; Thaler 1985), or the normal prices charged by the retailer (e.g., Jacobson and Obermiller 1990; Kalwani and Yim 1992; Urbany and Dickson 1991). Others have suggested that the recalled magnitude of the past prices observed might serve as the internal reference (e.g., Gabor 1988; Dickson and Sawyer 1990). Do these articulated price expectations accurately represent the point of subjective equality on the internal judgment scale? In this article, we suggest that the internal reference price used in price judgments is much more malleable than these articulated expectations. Results from four experimental studies suggest that consumers with less confidence have higher internal reference prices than more confident consumers, even when they do not differ in their articulated prices expectations. Thus our research adds to the growing body of literature (e.g., Adaval and Monroe 2002; Monroe and Lee 1999; Thomas and Morwitz 2005; also see Fitzsimons et al 2002) suggesting that the processes that underlie price judgments may not always be accessible to introspection.

The proposition that phenomenological experiences and price expectations could independently influence the internal reference price brings up several issues that merit attention in future research. Both from a substantive as well as theoretic viewpoint, it is worth exploring whether feelings of happiness, sadness or anxiety could also affect the internal reference price that consumers use for judging offer prices. Research on changes in adaptation level (Helson 1964) suggests that even ambient factors like room temperature and color could affect the internal reference that people use to judge offer prices. Our findings suggest that the effects of such phenomenological experiences are more likely to manifest on judgments than on articulated price expectations. Another issue that merits investigation is the size of such effects. In our experiments, though confidence manipulations had a reliable and robust effect on price judgments, the effect size was quite small. Any pricing policy recommendations from this research will have to wait till the impact of this effect on purchase incidence and brand choice is assessed. Finally, the fact that uncertain consumers consistently shift their internal standards upwards and not downwards is intriguing. Although psychologists have reported similar shifts in the point of subjective equality in stimulus discrimination tasks (e.g., Volkmann 1951; Woodsworth and Schlosberg 1954), what drives the direction of this shift is unclear. One plausible account suggests that this phenomenon is caused by an implicit associative relationship between the phenomenological experience of uncertainty and the magnitude representations on the internal analog scale. Due to the logarithmic nature of the internal analog scale, representations on the higher end of the analog scale might be associated with greater uncertainty than those on the lower end of this scale. Further investigation of the psychological factors that affect the internal representations of the reference price might augment our knowledge of the mechanisms in stimulus discrimination processes.

FIGURE 1

EXPERIMENT 1: THE EFFECT OF REPETITION-INDUCED CONFIDENCE ON PRICE MAGNITUDE JUDGMENTS



Note. – The articulated price expectation was around $3.00 and did not vary across the two groups of participants.

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