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Previous research has explored how both internal and external references prices affect consumer perceptions and consequently the price that consumers are willing to pay for a product or service. Historically, researchers have examined the effects of exposure to prices for the same product, the same brand, or products in the same category. This research explores the effect of *incidental prices* on the consumer's willingness to pay. The authors define incidental prices as prices advertised, offered, or paid for unrelated products or goods that neither sellers nor buyers regard as relevant to the price of an item that they are engaged in selling or buying. More specifically, the authors examine how prices for products that buyers encounter unintentionally can serve as anchors, thus affecting willingness to pay for the product that they intend to buy. The findings have important implications for auction houses and online vendors as well as for conventional retailers.

Incidental Prices and Their Effect on Willingness to Pay

> A good decision is based on knowledge and not on numbers.
>
> —Plato, Laches or Courage (380 B.C.)

Each day consumers encounter myriad prices for goods and services that they have no interest in buying. The numbers are everywhere, from gas station signs and billboards that drivers pass on their daily commute, to the newspaper, television, and Internet advertisements that flood their homes and workplaces. Prices figure prominently on household products that are already on people's shelves and on merchandise displayed in the shops they visit. Given the ubiquity of prices, consumers might be expected to become oblivious to the omnipresent pairing of numerals with dollar signs, except when attached to the specific items they consider purchasing. However, extraneous price information may have a much more profound impact on shoppers than has been previously suspected. By serving as anchors, such "incidental" prices may inadvertently alter a consumer's willingness to pay for an item that he or she intends to buy.

In this research, we define "incidental prices" as prices advertised, offered, or paid for goods that neither sellers nor buyers regard as relevant to the price of the item that they are engaged in selling or buying. They are the prices of unrelated products that the buyer has no interest in purchasing. Any exposure to and knowledge of such prices is *incidental* to the transaction at hand. As such, incidental prices offer no meaningful information about market prices and are encountered coincidentally. This research explores how a consumer's willingness to pay can vary systematically with the price of unrelated products that are present in the shopping environment. We expect willingness to pay to vary systematically with the prices of related products in the marketplace. Not only do prices of close substitutes affect demand for a good, but previous and present prices affect internal reference prices, or customers' expectation of a reasonable price level (Monroe 1990). The reference price literature has explored how market prices affect willingness to pay in depth, yet that literature has been limited to investigations of prices of closely related or identical goods. We focus on prices for unrelated products, which should be immaterial.

The psychology literature has demonstrated how unrelated numbers can influence decision making. The mechanism known as anchoring describes how random starting points systematically influence people's estimations. More specifically, people often form estimates based on an initial anchor, which may be irrelevant to the decision, and they adjust from there to yield their final answer. In an early study to demonstrate the effect, Tversky and Kahneman (1974) spun a wheel with numbers ranging from 0 to 100. They asked subjects whether the percentage of African countries in the United Nations was greater or less than that

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number. They then asked participants to estimate the actual percentage and found a significant relationship between the number spun and people's responses, though it was obvious to everyone involved that the anchor was generated by chance.

A few recent studies have demonstrated the effect of irrelevant numbers on willingness to pay. Ariely, Loewenstein, and Prelec (2003) asked participants whether they would pay an amount equal to the last two digits of their social security number for various products, including wine, chocolates, and books. Respondents subsequently reported their maximum willingness to pay. The impact of the social security number on stated willingness to pay was significant in every product category. Similarly, economists studying the "starting point bias" have shown that the maximum amount people say they would pay and still vote for a referendum depends on the dollar amount specified in a preceding yes/no question about whether they would favor the same referendum requiring them to pay a specific annual fee (Green et al. 1998). Without exception, the effects documented in these studies occur after respondents are instructed to focus their attention on the anchor and after they decline to pay an amount equivalent to the anchor. The findings are reminiscent of work by Cialdini and colleagues (1975) that documents reciprocal concessions. The "door-in-the-face" phenomenon suggests that respondents are compelled to offer more when they are faced with the larger request as a way to "match" the concession made by being allowed to make an offer.

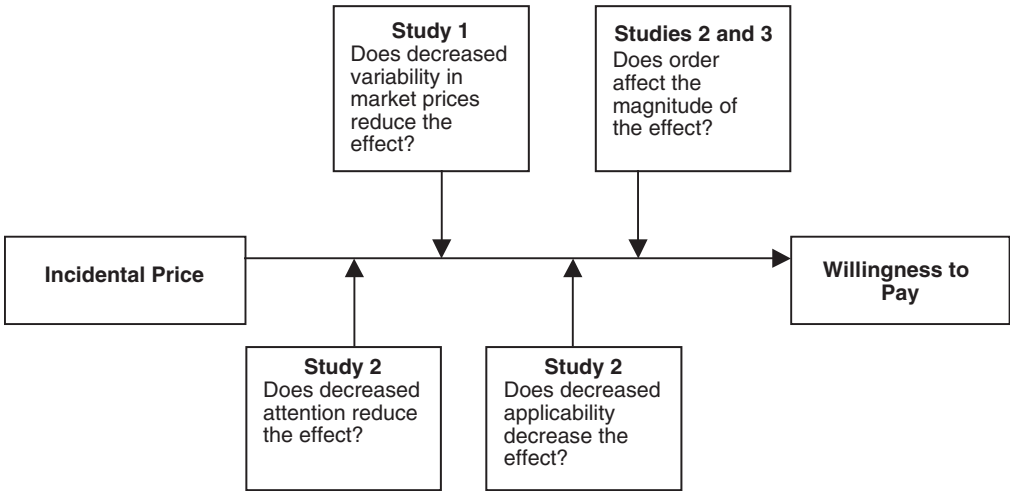
This research documents how willingness to pay can vary systematically with the prices of unrelated goods present in the real marketplace; accordingly, we integrate several key aspects of the marketplace into our work. First, any anchoring effect in the marketplace is likely to be a passive process. We show that consumers need not focus their attention on incidental prices nor make a conscious comparison for incidental prices to have an effect. Second, consumers typically are exposed to many prices in the shopping environment, any or all of which may have an effect. We show that extreme values are most likely to serve as anchors when encountered immediately before the willingness-to-pay decision.[1] Third, real purchase environments often contain relevant information that indicates what is commonly paid, such as prices at competitors or prices of similar goods. We document how buyers can be influenced by incidental prices despite easy access to this type of detailed and pertinent information. Fourth, in the real world, there are usually costs to making mistakes. In each of our three studies, the dependent variable is the amount of their own money that respondents commit to spending.

We use a combination of laboratory and empirical studies in our research, because the different approaches offer their own advantages. A controlled experiment enables us to narrow the scope of our work, thus isolating the effect and defining pertinent boundaries to understand key aspects of anchors in the real world. The empirical data enable us to assess whether the effect is measurable beyond the noise of conflicting and complicating factors. We offer evidence that the effect of incidental prices exists, and we show that the strength of the effect depends on factors that are often within the control of the firm. Our work also counsels consumers on the possible detrimental influences of extraneous information while deliberating willingness to pay.

The remainder of this article is organized as follows: First, we review the relevant psychological literature that explores the underlying mechanism for anchor effects. We then demonstrate the incidental price effect and test several possible moderating variables (see Figure 1) in a series of three studies: a natural experiment, a controlled laboratory

[1]In a study by Ariel, Loewenstein, and Prelec (2003), participants were presented with a series of anchors ($.10, $.50, $.90, or vice versa). For each number, they were asked whether they would listen to a painful sound for the amount specified and then the smallest amount they would accept to listen to the sound. The authors report that willingness to accept in the increasing condition was significantly higher than in the decreasing condition, yet willingness to accept was an average for each condition. In our work, we explore the combined effect of a series of anchors on one willingness-to-pay measure for an unrelated item.

Figure 1
A FRAMEWORK OF THE EFFECT OF INCIDENTAL PRICES ON WILLINGNESS TO PAY



experiment, and an analysis of third-party auction data. More specifically, in Study 1, we demonstrate how people's willingness to pay for a good can be systematically affected by the advertised price of an entirely unrelated product. The results suggest that consumers are not cognizant of the effect and that it can occur for goods with well-established market prices. In Study 2, we replicate the results in the laboratory using irrelevant anchors, and we simultaneously vary three key factors: (1) whether the anchor accompanies a similar or different good (applicability), (2) how *actively* respondents process the anchor (attention), and (3) the anchor's place in a sequence of numbers (order). In Study 3, we document the influence of incidental prices empirically in an auction setting, using a real-world data set provided by a premier U.S. classic automobile auction house. Finally, we discuss some of the limitations of this work before we propose additional potential marketing applications and opportunities for further research.

ANCHORING AND ADJUSTMENT

Anchoring effects are remarkably robust, occurring even when anchor values are uninformative (Tversky and Kahneman 1974). The effects appear neither to depend on the judge's motivation or expertise (Joyce and Biddle 1981; Northcraft and Neale 1987) nor to be hindered by a forewarning to consider and correct for the effect (Wilson et al. 1996). Despite having been studied extensively, the underlying mechanism remains somewhat of an enigma (Jacowitz and Kahneman 1995; Strack and Mussweiler 1997; Wilson et al. 1996).

A widely adopted framework that describes the mechanism proposes that people first perform a comparative judgment between the anchor and the target estimation, during which a temporary representation of the anchor is constructed in short-term memory. This representation is believed to influence subsequent estimates (Chapman and Johnson 1994; Strack and Mussweiler 1997). Because people are subject to a confirmation bias (Klayman and Ha 1987), they tend to focus on semantic information that is consistent with the anchor, which results in estimations being assimilated toward the anchor. Mussweiler, Strack, and Pfeiffer (2000) offer the following example: Judges, asked whether the average price of a German car is higher or lower than 40,000 marks, are assumed to test the possibility that the average price is actually 40,000 marks. To do so, they selectively retrieve knowledge from memory that is consistent (Mercedes is a German-made car and can cost 40,000 marks). When they are asked to generate an estimate for the average price of a German car, the accessibility of anchor-consistent information has increased, which leads judges to rely more heavily on that information and to offer estimations closer to 40,000 marks.

However, other researchers have shown that anchors can be effective even when the comparison task and estimation task are intentionally designed to be semantically unrelated (Wilson et al. 1996). Demonstration of an anchoring effect in the absence of semantic coherence suggests a more superficial and purely numeric anchoring effect (Wong and Kwong 2000), in which the anchor value itself rather than information about the target is activated in short-term memory. Mussweiler and Strack (2001) attempt to reconcile their selective accessibility hypothesis with the numeric priming hypothesis. They propose an integrative model in which numeric effects operate only if semantic knowledge is inapplicable. They argue that a purely numeric anchoring effect is one of several anchoring phenomena that operate at the stage of standard selection.

Adaval and Monroe (2002) show that numbers, even subliminally primed numbers, can affect the standards selected for comparative judgments. By exposing subjects to high (low) numbers, including ones below the consumer's threshold of perception, the authors made products judged later seem less (more) expensive. The results suggest that numerical information can be perceived implicitly and translated into magnitude representation regardless of the associated attribute dimension (e.g., grams, dollars). If numbers that consumers are not even aware they have seen can affect future evaluative judgment, and given that consumers may look at a specific product (and thus its price) on the shelf for 1/25 to 1/50 of a second, an investigation of other such nonconscious effects is warranted (Adaval and Monroe 2002). To this end, we extend the work of Adaval and Monroe as well as that on anchoring and standard selection in several important ways.

Whereas Adaval and Monroe (2002) explore the effect of subliminally primed numbers on subsequent categorical evaluations, we examine how numbers affect internal notions of value as manifest in willingness to pay. In addition, whereas the numbers in Adaval and Monroe's experiments were below the threshold of perception, their respondents' attention nonetheless was focused on the visual priming task. In our studies, we document how a more passive encounter (one in which the anchors are present in the environment but are not part of the focal transaction itself) is as effective as an active encounter (i.e., one in which a comparison is required). Historically, almost all the studies that involve anchors have included an explicit comparative task. An exception is that of Wansink, Kent, and Hoch (1998), who document how quantity limits can serve as anchors. Even in their studies, consumers perceive the anchor as relevant to their decision of how many to buy. Finally, as we mentioned previously, whereas a large body of research has shown that exposure to normatively irrelevant information can influence estimates of unknown quantities, we are the first to examine the different effects of individual values in a sequence of potential anchors. Research on the effects of anchors has typically examined how a single value can influence subsequent judgments. Our results suggest that the final, or most recent, number in a series that a consumer comes upon is the most influential of the sequence.

In Study 1, we sought to demonstrate the effect of incidental prices in a real-world shopping setting. Our principal hypothesis is that a relatively high price advertised for an unrelated good encountered in the same shopping environment can elevate the maximum price that a person will be willing to pay for the product that he or she desires.

STUDY 1

In Study 1, we document the impact of incidental prices, demonstrating their relevance to retailers that entertain negotiated prices. In this field study, we use a music CD as the focal good because of its relatively well-known market value, low price dispersion, and almost no uncertainty about

quality.[2] For the incidental price, we rely on signage that advertises an unrelated product (sweatshirt) at a neighboring, confederate vendor. Exposure to the anchor is passive because the vendor never instructed or encouraged shoppers to view or consider the price of the sweatshirt. The central question is whether the price of the sweatshirt affects shoppers' willingness to pay for the CD.

Participants

Participants were 60 visitors to a popular West Coast beach. The experimenter posed as one of many vendors along the boardwalk. Each participant was debriefed after his or her encounter with the experimenter.

Design

A sign posted at a makeshift stand on the boardwalk indicated that a popular CD was offered for sale as a result of an unexpected surplus. In this way, only parties interested in that specific CD were solicited. Simultaneously, a confederate operated an adjacent sales stand and advertised sweatshirts for sale. The only sweatshirt on display was positioned on top of a box that appeared to contain additional stock. The garment was plain (no university insignia or other markings), and its price was prominently posted as either $80 or $10. This price was alternated in 30-minute intervals during the testing period, which lasted one Saturday for approximately eight hours. The two stands remained situated among several other vendors (e.g. psychics, masseurs), none of whom offered CDs or clothing for sale and whose prices and services did not change.

We chose these products so that the focal and incidental goods were not functionally complementary, because they are not typically consumed together (Gaeth et al. 1990). A pilot study conducted among the same target population found that participants deemed the two products to be unrelated ($\mu = 6.43$ on a seven-point scale, where 7 = "entirely unrelated"). To ensure that the anchor was indeed incidental, we excluded any shopper who showed interest in the sweatshirt (by approaching the sweatshirt stand or addressing the confederate before or after shopping for the CD) from the study.

We used Becker, DeGroot, and Marschak's (1964) incentive-compatible procedure for assessing willingness to pay to reduce overbidding and to elicit more reliable valuations at the point of purchase (Wertenbroch and Skiera 2002). The experimenter explained to people who approached the CD sales stand that he would sell the product in a somewhat unorthodox fashion by which customers could "name their own price." Potential buyers would make a single offer (i.e., their highest bid), after which a number would be drawn from a jar on display. If the bid exceeded the number drawn, the customer was obligated to buy the CD at the price he or she had specified. Otherwise, the CD would not be sold to that customer. The vendor explained that there would be no further negotiation. The jar contained a uniformly distributed set of numbers in $.25 increments, though this was not revealed to shoppers. Each bid was recorded, a number was drawn, and the deal was either transacted or not in accordance with the previously agreed to terms. The primary goal of Study 1 was to determine whether people exposed to the high sweatshirt price ($80) would be willing to pay more for the CD than would people exposed to the low sweatshirt price ($10).

During their debriefing, participants were asked whether they believed that the asking price of the sweatshirt affected their willingness to pay for the CD both before and after being told the purpose of the study. This exploratory question investigated whether consumers would acknowledge the role that irrelevant information plays in decision making. We expected that most buyers would deny that an irrelevant price had any effect on their decision, even after being told the design of the experiment.

Results

The presence of an incidental price elevated the average bid among shoppers from $7.29 (median = $7.50, standard error = $.54) when the sweatshirt was priced low ($10) up to $9.00 (median = $10.00, standard error = $.64) when the sweatshirt was priced high ($80). The difference ($1.71) was statistically significant ($t_{56} = -2.03$, $p < .05$). It is important to point out that few people were likely to visit the boardwalk with the intention of buying a CD, much less this particular CD. Therefore, people who valued it at its market price probably had already bought it at a CD store for market price. Consequently, it was no surprise that average willingness to pay fell below the market price (an informal survey of 20 resellers placed market price at approximately $16). Although we were the only vendor selling CDs, we did not elicit consumers' expectations of CD prices on the boardwalk, and we do not know how the bids collected relate to what consumers are willing to pay in general. In Study 2, we correct for this by demonstrating how irrelevant anchors elevate willingness to pay relative to a control group. However, consumers may still believe that they are receiving a good deal compared with prevailing market prices. The results of Study 3 show how incidental prices elevate willingness to pay even when bids are above blue-book prices for collector cars, prices that were formulated from recent sales data.

As we expected, the debriefing questions revealed that not a single participant believed the price of the sweatshirt affected his or her bid before learning the purpose of the sale, and only four participants (7%) indicated that it might have had an effect after learning the purpose of the study. Although consumers neither recognized nor acknowledged that the incidental price affected their decision, it clearly did. Recall that the sweatshirt was for sale from a different vendor at a separate stall, and thus its price was not related to, reflective of, or informative in any way toward how much customers should have been willing to pay for the CD.

Discussion

The results show how the price of an unrelated good can affect people's willingness to pay for a commodity (music CD). The incidental price was the price advertised for a product in which the shopper had no interest (sweatshirt) but that bore a price either much higher than the market price of the focal good ($80) or somewhat lower ($10). We also find that people are either unable or unwilling to

[2]The music CD sold for between $13.99 and $15.99 at several local retail vendors at the time of the experiment. It was "on sale" for $14.99, with a list price of $17.98, at Amazon.com.

acknowledge the effect of such irrelevant information: They simply do not believe that it affects them personally.

STUDY 2

In Study 1, we demonstrated the effect of an incidental price and documented consumers' inability or reluctance to acknowledge its impact. In Study 2, we replicate the phenomenon in a controlled environment while investigating the moderating effects of several variables, including the degree to which consumers focus their attention on the anchor, the applicability of the anchor in determining their willingness to pay, and the order in which consumers are exposed to a series of numbers including the anchor.

Participants

Participants were 567 students enrolled at a major West Coast university. The study was computerized, and respondents participated in groups of 40 or less. Participants were randomly assigned to 1 of 13 conditions that appeared on their screen automatically. Of the participants, 7 did not complete the study, so our analysis uses the remaining 560 observations.

Design

The study used a 2 (applicability: "same" good or "different" good) × 2 (attention: active, passive) × 3 (order: high, low, low; low, high, low; low, low, high) full-factorial design with an additional control condition. In order, high (H) signifies a high anchor (987), and low (L) signifies a low anchor (23). The cover story told students that they were about to participate in a few auctions in which the product for sale in the first auction would be dinner for two at a well-known local restaurant. Pretests indicated that students were familiar with and positively disposed to the restaurant (a national chain). The purpose of the second auction was to give participants an additional reason not to overbid in the first auction, to help ensure that participants bid rationally, because the first auction was the focal auction for the experiment.

Participants were told that they were participating in a real auction and that each could submit one bid. It was explained that at the end of the day, the person running the experiment would compare all the bids to determine whose bid was the highest. It was also explained that the highest bid would win, but the winner would pay only the amount of the second-highest bid. The method and purpose of using the Vickrey auction format (Vickrey 1961; Hoffman et al. 1993) was described in detail. Participants were subsequently told that the next few screens would show the outcomes of a few previous auctions. Each of the following (three) screens led with the words "Example of a Recent Auction" and a product description. The anchors were presented as the identification numbers for winning bidders in each auction. This was to prevent respondents from regarding the anchors as reference prices, especially when the items presented were identical products.

We varied applicability by changing whether the sample auctions included the same product on which participants would later bid (dinner for two at a local restaurant) or a different item (a pair of tickets for a National Basketball Association game). By using a different product, we incapacitated the semantic influences, using comparative and estimation tasks that pertain to unrelated objects (Wong and Kwong 2000). A priori, we expected the anchor to have a greater effect when the auction results displayed were for the same item (according to the selective accessibility hypothesis), though we still expected an anchoring effect when the products were different (according to the numeric priming hypothesis). We predicted effects in both conditions compared with the control but a larger effect when the products were the same, according to Mussweiler and Strack's (2001) integrative model. Their model posits an increased effect of selective accessibility over the basic numeric effect when semantic knowledge is applicable.

In the real world, consumers are persistently exposed to prices in their daily routines. In an attempt to simulate this in the lab, we twice exposed respondents to a sequence of three numbers that were low (23) and once to high numbers (987). We varied the order such that the high number preceded the low number (HLL), was in the middle (LHL), or was the last number (LLH). In this way, we could test whether a previously seen extreme value, between or after other prices, has a different effect. We expected that the more recent the exposure to the extreme value, the more profound its effect would be. At the same time, we manipulated whether the encounter with the anchor was active or passive. In the active conditions, we asked participants: "If you were to bid on this auction, would you bid MORE or LESS than \$X?" where X was either \$23 or \$987. Participants were required to type in M for more or L for less to advance to the next screen. In the passive condition, participants never received the comparative question. Participants in the control condition did not view any previous auction results and thus were not exposed to any possible anchors. They formed the baseline for all our comparisons.

Respondents then participated in the focal auction, in which they entered their bid for dinner for two (including appetizer, entrée, dessert, and a soft drink). They had the opportunity to review and confirm their bid. At the end of the survey, they were asked to enter a code that comprised ten or fewer characters that would be used to identify the winner. Participants decided how much time they would spend on each screen in the study and advanced at their own pace.

Results

We analyzed the data by running a regression on dummy variables that specified the test conditions. Results for this regression are shown in Table 1.[3] The average bid for the dinner in the control group was \$39.88. A discussion of bids under test conditions follows.

First and foremost, the order of the number sequence affected the amount of the bid. On average, respondents who encountered the extreme anchor most recently before the real auction, the LLH condition, bid \$7.86 more than did control group members ($p < .05$). Bids for the LHL condition were \$4.58 higher on average than control group bids, though this difference is not statistically significant. It

[3]Although we only present a model of main effects, we also test first-order interactions. In doing so, we use orthogonal variable coding rather than dummy coding, so that main effects would be independent of first-order interactions. Such a coding is only orthogonal for balanced experiments. Although our cell counts slightly deviate from a balanced design, correlations among the coded variables are small; all are less than .10 in magnitude. None of the interactions were significant.

Table 1
STUDY 2: REGRESSION ESTIMATES

Parameter	*Estimate (Standard Error)*
Intercept	39.88 (2.61)*
Applicable	3.65 (1.67)*
Active	–.33 (1.67)
HLL	1.49 (3.22)
LHL	4.58 (3.23)
LLH	7.86 (3.20)*

*$p < .05$.

would appear that whether the anchoring effect is the result of numeric or semantic causes, the effect is short lived when respondents encountered other numbers subsequently. Whereas Adaval and Monroe (2002) emphasize that their subliminal primes persisted for 48 hours, our effect diminished almost immediately. A potential explanation for the divergent results is that the standard formed in memory is replaced only when another number in the same context supplants it. It also appears that Adaval and Monroe (2002) exposed their participants to only one number, albeit subliminally, in the context of their study.

Second, when the products shown in the sample auction were the same (the applicable condition), the average bid increased an incremental \$3.65 ($p < .05$). This result is consistent with previous work in the anchoring literature that demonstrates that the magnitude of an anchor's effect increases with the similarity between the focal object of the comparison task and the estimation task. It also supports the integrative model of anchoring effects that Mussweiler and Strack (2001) propose. Note also that the ordering of the sequence of numbers had a significant effect on bids, regardless of whether the potential anchors were applicable.[4]

The response between the respondents who actively attended to the anchors and the respondents who viewed them passively did not differ significantly. This result is consistent with the notion that people spontaneously perform comparative evaluations. We believe that it is reasonable to expect that the absence of a deliberative comparison would not hinder the effect, particularly given that human judgment is often considered comparative in nature, even if a comparison is not explicitly asked for (Kahneman and Miller 1986).

Discussion

In Study 2, we tested the effect of an extreme anchor (987) on consumers' willingness to pay for an unrelated product. We find no difference in the effect whether consumers are steered toward actively processing the number or are simply exposed to the number for the duration of their choosing. We also find that though numbers associated with the same product magnify the effect (à la the traditional reference-price literature), numbers associated with entirely unrelated products also have a significant effect. Finally, we find that order moderates the effect in that an extreme anchor is strongest when it is viewed most recently.

[4]To determine this, we tested whether the LLH bids were the same as the control bids (1) using only applicable LLH bids and (2) using only inapplicable LLH bids. The null was rejected in both cases at $p < .05$.

In Study 3, taking what we have learned through Studies 1 and 2, we investigate the influence of incidental prices empirically in a real-world auction setting. Therefore, we should clarify an important distinction among auctions that is relevant to this research. This distinction is whether the items sold assume independent private values (IPVs; Vickrey 1961) or common values (Rothkopf 1969; Wilson 1969). In an IPV setting, bidders know the value of the item to themselves with certainty, and this value may differ widely across bidders. They gain no information about their personal valuation by observing the bids of others. Classic automobiles most frequently fall into this category: Two different aficionados may value a burgundy 1967 Plymouth Barracuda convertible differently. Conversely, with common value models, the "true" value of the item is the same for all bidders after the auction because its value is determined through resale or exploitation, such as cutting of timber or drilling for oil.

Study 3 examines how the sale price for one item sold at auction (i.e., the incidental price) can affect the highest bid secured for the next successive item brought up for sale. In other words, if Item A sells immediately before Item B at a relatively high price, bidders elevate their willingness to pay (IPVs) for Item B. This occurs even if (1) the two items are not closely related; (2) the price of Item A provides no market information that is useful in valuing Item B; (3) Item B bidders presumably have no interest in Item A, as is shown in Study 1; and (4) the potential buyers have easy access to market prices based on recent sales. We test the four propositions as best we can given the nature of the data provided.

STUDY 3

We hypothesize an anchor effect for incidental prices in English auctions, in which large price differentials between successive items put up for sale systematically affect the maximum bid for the latter item. The essential feature of the English auction, in which bidders successively raise an item's selling price until only one buyer remains, is that all bidders know the level of the highest bid at any given point. The English auction is probably the most recognized form of auction and is the model for online sellers such as eBay and Yahoo. It is also the form of auction most commonly used for selling goods such as automobiles. Our data derive from one of the largest and best-known automobile auctioneers in the United States, whose annual Classic Car Auction attracts some 125,000 car enthusiasts and more than 2000 bidders from around the world. The company's auction in 2000 resulted in the sale of 538 consigned cars, for a total sales figure that exceeded \$23 million.

Two features of English automobile auctions make them especially relevant for an anchoring study. First, the automobiles are considered classic cars; they vary from one another considerably. Bids on previous cars offer relatively little information content for bidders on future, dissimilar cars. In addition, collectors tend to be extremely particular in their preferences for years of production, automobile make, and model. The bidders are not typical car buyers, such as those at a police auction, who want a good deal on a daily driver. Instead, this auctioneer claims that it "specializes in providing products and services to classic and collector car owners, astute collectors, and automotive enthusiasts around the world."

Second, information about the cars is readily available to bidders. Detailed price guides that offer precise information to bidders about each specific car are widely available, and several are sold on site. In addition, several annual publications list the market value for specific cars based on previous sales of similar autos (e.g., make, model, year, condition). Thus, we suspect that the bidders in our auction data have a reasonable sense of the market price based on the blue-book price of a particular automobile.[5] Furthermore, automobiles sold at the auction can be inspected before they are put up for sale, which enables bidders to refine their bid further in accordance with pricing guide values. Thus, although there is high variance of car values across cars, our bidders have readily available, precise information to enable them to make informed bids.

The company provided us sales records for 3378 automobiles that had been auctioned off from 1995 through 2000. Of these, 33 records were missing final prices (either sales prices or highest bids), and we were unable to obtain reliable independent blue-book values for 1130 additional cars. The remaining 2215 records contain 1477 sales for which the record for the previous car on the block selling was complete, which provides us with a large sample. Because we needed contiguous records, we considered the first record of days and time periods (prime time) incomplete, and thus they are not among the 1477 records analyzed.

Each automobile's individual record contained the auction year (AUCTION), lot number (i.e., the order in which the cars come up on the docket), make (e.g., Ford), model (e.g., Thunderbird), and year of production (e.g., 1955). Each record also included the highest bid for the car (HIGH) and whether that bid resulted in the sale of the car (SOLD). For cars that sold, the high bid was greater than the seller's reservation price, if a reservation price existed (the seller may impose a reservation price, thus discarding all bids if they are less than this amount).

For the six years in question, the auction always began on a Thursday and ended on a Sunday, and each record indicated the day of the week the car came up for auction. We defined a set of indicator variables to account for differences in the days: FRIDAY, SATURDAY, and SUNDAY. The data also show whether the car was sold during that day's prime time (PRIME), the hours in the middle of the day when the greatest number of bidders were likely to be present. In addition, we supplemented the data provided with independent blue-book data on the value of the car (BLUE), taken from the *Old Car Pricing Guide* published in the year of the auction. It was important to use a blue-book value published in the year of the auction because the value of many classic automobiles fluctuates year to year, and informed bidders would rely on the most up-to-date blue-book prices. For the units of measurement, AUCTION is in years and HIGH is in dollars. The other variables are indicator variables, where PRIME is defined as 1 if the car was sold during prime time and as 0 otherwise, and SOLD as 1 if the car was sold and 0 otherwise. YEAR was coded as 1 for 1997, 2 for 1998, and so on.

From the available data, we constructed additional variables of interest. Because our analysis is across cars of widely different values, we used the blue-book data to standardize bids.[6] Our dependent measure is the percentage difference between the high bid and the blue-book price (PREMIUM), which we calculated as (HIGH – BLUE)/BLUE. Table 2 provides summary statistics on PREMIUM by auction year (mean, median, standard deviation, and 5% and 95% quantiles).[7] The statistics in Table 2 indicate that most of the cars sold for more than the blue-book value for all years. For example, in 1995, on average, the automobiles sold at 88% greater than the blue-book value, half the cars sold for at least 62% greater than the blue-book value, and 5% sold for more than 314% greater than the blue-book value. This disparity is likely due to the high quality of cars brought to this particular auction (the auction fee served as a selection constraint), but the competitive nature of the auction may serve to elevate prices as well. The higher prices do not pose a problem for our analysis, because we have no reason, a priori, to expect that the difference between SOLD and BLUE differs systematically for different cars. Finally, to measure the effect of an anchor, we defined ANCHOR as the ratio of the high bid (HIGH) for the previous car to the blue-book (BLUE) value of the focal car.[8] Our analysis model is as follows:

$$\text{PREMIUM} = \beta_0 + \beta_1\text{YEAR} + \beta_2\text{FRIDAY} + \beta_3\text{SATURDAY} + \beta_4\text{SUNDAY} + \beta_5\text{PRIME} + \beta_6\text{SOLD} + \beta_7\text{ANCHOR} + \varepsilon. \quad (1)$$

Results

The results of this model are given in Table 3. The estimates include standard errors that we estimated using

[5]Evidence that bidders are enthusiasts and are likely to be well informed about market prices is the following: In 2003, the combined lines of credit for bidders registered one month before the auction date was $150 million. At the same time, 750 cars were in line to be auctioned (an average of $200,000 in credit per car). The amount of money at stake combined with the effort and cost necessary to enter the marketplace suggest that bidders would be well informed about their intended purchases and the prevailing prices. In addition, the auctioneer's Web site advises registering bidders to "the comparative sales of similar vehicles through magazines, value guides, the (auctioneer's) Web site results, and other sources. Owners Clubs are also a valuable source of information." When one of the authors attended the auction, several appraisal guides were widely available for sale at a nominal cost, including those from the National Automobile Dealers' Association and the *Old Cars Price Guide* from Krause Publications.

[6]The correlation of blue-book prices with the actual bids is .79.

[7]Data for 2000 is incomplete because the company was still processing data when the records were delivered to us.

[8]We also have used a set of dummy variables to create a nonparametric specification of this model. Because the results from the nonparametric model did not substantively differ from the ones we present here, we have not included the nonparametric results in this article.

Table 2
STUDY 3: SUMMARY OF PREMIUM BY AUCTION YEAR

		Premium				
				Quantiles		
Auction	*N*	*Mean*	*Standard Deviation*	*5%*	*Median*	*95%*
1995	239	.88	1.29	–.38	.62	3.14
1996	278	1.10	1.51	–.31	.68	3.63
1997	240	1.15	1.30	–.29	.92	3.58
1998	363	1.13	1.34	–.20	.79	3.66
1999	316	1.10	1.24	–.32	.88	3.48
2000	41	.97	1.19	–.46	.59	2.94

Table 3
STUDY 3: REGRESSION ESTIMATES

Parameter	*Estimate (Standard Error)*
INTERCEPT	.57 (.10)*
AUCTION YEAR	.06 (.02)*
FRIDAY	.30 (.08)*
SATURDAY	.41 (.10)*
SUNDAY	.21 (.10)*
PRIME	.25 (.08)*
SOLD	–.35 (.08)*
ANCHOR	.15 (.04)*

*$p < .05$.

White's (1980) correction for heteroskedasticity. The estimate for the coefficient of auction year (YEAR) is .06, which means that the premium at this auction increased by an average of six percentage points per year. Because we calculated PREMIUM using period blue-book values, PREMIUM is already adjusted for inflation. However, the United States exhibited an extraordinary economic boom during the period of the data, and this result may be due to the positive income elasticity for luxury items. The coefficient for Thursdays is lower than that for other days. A Wald test of coefficient restrictions on the day indicator variables fails to reject that premiums on Friday, Saturday, and Sunday are all equal (p-value = .25). The premium shift for the weekend is most likely a mixture of supply and demand effects: Sellers can choose among available days, and auction attendance is typically higher on these days.

Similarly, sellers have the option of paying an additional fee to sell their car during prime time on the weekend days. Sellers that anticipate higher margins are more likely to pay the additional fees. Therefore, it comes as no surprise that we find that prime-time cars have bids that are 25 percentage points higher than non-prime-time bids. We also tested interactions of PRIME with individual days and did not find any interactions to be significant.[9] Somewhat less intuitive is the finding that the premium for cars that sold was 35% less than for cars that did not sell (the high bid failed to meet the seller's reservation price). If we consider the high bid to be a random variable, the probability that a high bid exceeds a reservation price decreases as the reservation price increases (i.e., cars with low reservation prices outsell cars with high reservation prices, all else being equal). We believe that this logic explains the negative sign on SOLD.

More pertinent to our study is that we find substantial evidence of an anchoring effect across auctions, where the high bid for the previous automobile, on average, influences the premium on the current or focal car. For example, if the highest bid on the previous car was three times the blue-book value of the current car, the premium on the current car averages $3 \times 15\% = 45\%$ greater than the unanchored premium. In other words, if the car that sold before the 1967 Plymouth Barracuda convertible was a classic Mercedes that sold for three times the blue-book value of the Barracuda, we would expect a 45% ($3 \times .15$ [in Table 3]) increase in premium.

[9]In testing the prime × day interactions, we recoded the variables such that main effects and interactions were close to orthogonal, as in Study 2. Even so, interactions were individually insignificant when they were added to the model in Equation 1.

DISCUSSION

Alternative Explanations

Because we obtained the results using empirical data, we investigated several alternative explanations for the observed anchoring effect. First, similar cars perhaps were sold in sequence, as is often the case at art and furniture auctions. If similar items are sold in sequence, the previous car's bid would offer more information than other prior bids and should be significant in our model.[10] Sequences of similar cars could also lead to an additional cause for autocorrelation of bids. Imagine that a bidder on an extremely costly car may have lost the item to a more aggressive bidder and consequently elevated his or her budget constraint for a subsequent similar car, which had a lower blue-book value.

Sequences of similar cars do not appear to be the cause of our results; the same make, model, and year car appeared in succession only 13 times. However, we reestimated our model on a reduced set of data. We deleted all observations for which the current car and the previous car were of the same make (e.g., Ford, Porsche). We view this selection procedure as conservative, in that different models, even of the same make, may differ dramatically. The regression results are much like those in Table 3 (the anchor coefficient is .13, which is significant with a p-value of .0003), which shows that sequences of similar cars do not cause the result reported previously.

The second competing explanation is that buyers attend to margins on previous cars to get a feel for the current market, thereby determining what the current markup above blue book should be and adjusting their willingness to pay accordingly. If so, bids on the focal car would be affected by the premium of the preceding cars or, better yet, by the mean premium of preceding cars. To test this hypothesis, we constructed the variable MEANPREM, the average margin for cars preceding the focal car, not including preceding cars that were on the docket in previous days or time periods (prime/nonprime). We replaced ANCHOR with MEANPREM and found that the margin measure is not significant ($p > .56$). We also included MEANPREM along with ANCHOR and found that ANCHOR remained significant ($p = .0002$), whereas MEANPREM was not significant ($p > .84$). The results show that nominal preceding bids, not preceding margins, affect bidders. In addition, we tested for the interaction of MEANPREM and ANCHOR to test for magnitude changes in ANCHOR, but the interaction term was not significant.

The third possibility is that actual prices, not margins, influence buyers such that inflated bids on previous cars may induce a "big-spender" type of social effect. Imagine that after a buyer is willing to shell out hundreds of thousands of dollars for a single car, it may be socially unappealing to show reticence toward spending an additional $500 or $1,000 for a subsequent car. This social argument regards the bidding atmosphere, which means that we would like some measure of not just a recent car, but of the bidding environment. To test for this big-spender social effect, we constructed a variable called BIGSPEND. It is

[10]We thank an anonymous reviewer for pointing out this alternative explanation.

the average HIGH bid for cars that precede the focal car, not including preceding cars on the docket in previous days or time periods (prime/nonprime). It also is calculated excluding the HIGH bid for the car immediately preceding the focal car, because that value is already used in ANCHOR. The results of the model with BIGSPEND are similar to those for MEANPREM. When BIGSPEND replaces ANCHOR in the model, it is not significant ($p > .20$). If BIGSPEND is included with ANCHOR, ANCHOR is significant ($p < .01$), but BIGSPEND is not ($p > .95$). Therefore, the anchor effect appears to be something separate and different from a social big-spending effect. However, we find that a big-spending social effect affects the magnitude of the anchor's effect, because the interaction of BIGSPEND and ANCHOR is significant and negative ($p < .05$). Thus, a large ANCHOR is large not only relative to the car on the docket but also relative to the bids and values of previous sets of cars. As for the magnitude of the interaction effect, for each $10,000 increase in BIGSPEND, the ANCHOR coefficient would be lower by .128.

A fourth explanation for the significant coefficient on ANCHOR is that it is an artifact of our model specification. Because our dependent variable (PREMIUM) and our main predictor (ANCHOR) both have the same denominator (BLUE), it is plausible that the significant coefficient on ANCHOR is due to this common component. However, a model in which we eliminate this common component (dependent variable as $HIGH_t - BLUE_t$, main predictor as $HIGH_{t-1}$) has a significant coefficient on $HIGH_{t-1}$.[11] The correlation is not due to the common component because the significance holds when the common component is eliminated.

To summarize, in Study 3, we find evidence in the actual marketplace that incidental prices affect willingness to pay. In the auction data, the highest bid on the prior car influenced bids on the subsequent focal car. An economically rational agent would be interested in information from previous bids, but this agent would focus on margins rather than on nominal bids. We find no evidence that bids are affected by previous margins, only by previous nominal values, a result that suggests that seemingly innocuous recently viewed numbers (incidental prices) can affect a buyer's willingness to pay.

CONCLUSION

This research has demonstrated how incidental prices can affect people's willingness to pay. In Study 1, we show how the price of a sweatshirt on display at an adjacent seller affects shoppers' willingness to pay for a commodity: a music CD. In Study 2, we find that irrelevant anchors influence willingness to pay in a controlled experiment, and we investigate potential moderators (applicability, order, attention) of the effect. When the numbers are associated with similar or identical products, the effect was larger, and the order in which bidders encountered the anchors affected the bid, such that the final number had a disproportionate effect. In addition, we find that attempts to reduce the attention paid to potential anchors (refraining from prompting people to process the anchor) did not diminish the effect. In Study 3, real-world auction data reveal that the price tag on a relatively expensive car can affect bidders' willingness to pay for a lower-priced car that subsequently hits the auction block, and this effect increases as the price of the anchor automobile increases.

Although we have shown that incidental prices can act as anchors when the focal products have less (music CD) and more (classic cars) ambiguous market prices, it would be worthwhile to test the relationship between incidental prices and internal reference prices or valuations. We would expect an incidental price to affect willingness to pay for a can of Coke, with its extremely well-known common value, much less than it might affect items for which consumer valuations differ widely (e.g., collectibles) or for which they may have more difficulty assessing value, such as wines and gourmet meals or used goods. We find effects for items at both extremes, from commodities (music CDs) to IPV items (classic cars), but we do not compare the magnitude of the effect across types of goods.

In addition, the types of numbers that people spontaneously anchor on may differ. Recall that our results differ from previous studies of anchoring (Adaval and Monroe 2002) in which the effect of anchor persists for days. We would expect respondents in these studies to have come across other numbers in that time period. In our experiments, the effect of a recently viewed, extreme number diminishes quickly if another number is presented in the same context. More work could be done to examine exactly what makes the effects of some numeric anchors persist and others diminish over time.

Further research might also examine the different effects, if any, between low and high anchors on willingness to pay. Typically, researchers have investigated how high anchors serve to elevate judgments or factors in marketing, such as willingness to pay (Northcraft and Neale 1987) and purchase quantities (Wansink, Kent, and Hoch 1998). Researchers who investigate anchoring effects have documented the effect of negative anchors (e.g., Green et al. 1998), yet the results have been mixed as to whether the effects are symmetrical (Mussweiler and Strack 1999) or asymmetrical (Jacowitz and Kahneman 1995). Many high-priced items (e.g., automobiles, vacation packages) may be negatively affected by low incidental prices, and this effect may not be identical to the effect of high anchors. In the domain of pricing, any asymmetrical effect of high and low anchors "may arise from an asymmetry of uncertainty," as Jacowitz and Kahneman (1995, p. 1164) suggest, in which there is a definite lower bound ($0) but no definite upper bound. Although we do not report them here, we investigated negative anchors using the automobile auction data. Because of large standard errors on negative anchors, we could rule out neither symmetry (negative anchors have an equal and opposite effect of positive anchors) nor asymmetry (negative anchors have no effect at all). Our statistically insignificant results for negative anchors prevent us from drawing any substantial conclusions about the relative effectiveness of high versus low incidental prices. However, it would be interesting to explore whether any asymmetries exist in how incidental prices affect willingness to pay.

From a practical perspective, the present research on the determinants of an incidental price's effect on willingness to pay offers guidance to marketers who should be aware of the environmental factors that influence consumers' spend-

[11] $HIGH_t$ refers to the final bid on the focal car, whereas $HIGH_{t-1}$ refers to that for the previous car.

ing limits. The effect of incidental prices may be far reaching and may have profound implications for sellers. As Study 3 illustrates, our results have clear and direct implications for all parties involved in an auction. The prescription for sellers is clear: Attempt to have your belongings follow costlier items onto the selling block; the more expensive the better. Auctioneers, who derive their profits not from the sale of one item, but from maximizing total sales, might develop an algorithm that optimizes the order in which lots come up to maximize price differentials based on expected selling price. At the least, rather than follow a clear progression from inexpensive to expensive items, they may want to intermingle the two types of goods.[12] In addition, bidders must be cognizant of the undue influence that high bids or selling prices for preceding items may have on their willingness to pay to correct for it.

We believe that the marketing implications extend beyond auctions, to online vendors and conventional retailers alike. Virtual resellers may want to consider our results when programming which pop-up advertisements appear when surfers visit their site. While opening a browser with the intention of buying a book at Amazon.com, an author noted a pop-up advertisement that touted flights at Orbitz.com "starting at $124," which is not expensive for airline travel but is quite costly for a book. Could exposure to that advertisement have made him less price sensitive, allowing him to pay more than $60 for a pricing text without thinking twice? Similarly, imagine the consumer who spots a Mercedes billboard that makes it clear that the C-class model can be purchased for less than $37,000 while turning into a fast-food drive-through. Does the consumer's $6.95 value meal suddenly seem to be a better deal? Given our results, we suspect that this is often the case.

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[12]If negative and positive anchors are symmetrical, and if the anchor effect is linear, the auctioneer's profits will be the same regardless of the order. The data show that the anchor effect is close to linear, but the data is inconclusive on the symmetry of negative and positive anchors.