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Overestimating Others' Willingness to Pay

SHANE FREDERICK

This article documents a widespread bias: a tendency to overestimate how much others will pay for goods. The effect may influence pricing and negotiations, which depend on accurate assessments of others' valuations. It is also shown to underlie or interact with several widely researched behavioral phenomena, including egocentric empathy gaps, the endowment effect, and the false-consensus effect.

After purchasing a box of Teuscher chocolate truffles for $104, I invited Armin (the shop's proprietor) to guess how much the typical student in my class would be willing to pay for it. After asking what I taught, where I taught, and the average age of my students, he paused and conjectured, "Around $65." In fact, my students were willing to pay just under $11. When those students were asked the same question, they made a similar error—overestimating how much their classmates would pay.

In this article, I investigate the overestimation of willingness to pay and the widespread belief that others will pay more than oneself. This effect occurs not just for chocolate truffles but also for books, teddy bears, smoked salmon, sporting equipment, iPhones, artwork, gift certificates, gambles, a trip to the moon, and a magic pill that confers the ability to speak French. Indeed, the effect appears to hold for every good when judgments are averaged across people (and for most people when judgments are averaged across goods).

Study 1 illustrates the basic effect. Study 2 reveals that the effect persists for hypothetical goods that have no associated market price on which to anchor judgments of others' values. Study 3 suggests that self-other differences in the enjoyment of goods do not explain the effect and suggests instead that it could be driven by an empathic failure to appreciate how others react to monetary payments. Studies 4 and 5 support this account—they show that the effect is eliminated when valuations are measured by selling prices rather than buying prices. The remainder of the article examines evidence for and against other accounts of this effect, possible implications for pricing and negotiations, and its relevance for interpreting other widely researched behavioral phenomena, including the endowment effect, egocentric empathy gaps, and the so-called false consensus effect.

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STUDY 1: OVERESTIMATING OTHERS' WILLINGNESS TO PAY

Participants and Procedure

In an introductory marketing class at the Massachusetts Institute of Technology (MIT), 35 undergraduates participated in a second-price auction (Vickrey 1961) for 10 goods displayed on a table at the front of the class. They privately specified their own bids and guessed the median bid. Afterward, the highest bidders for each good paid the second-highest bid and received their respective goods. Before guessing the median bid for each good, participants were told, truthfully, that the most accurate guesser for each good would earn up to $5 (up to $50 in total).

Results and Discussion

Respondents overestimated the median bid by an average of 43% (see table 1). Here, distributions were compared using a paired *t*-test. Similar results were obtained in three other studies involving different goods in which respondents estimated the mean valuation of a specified population (see app. A).

This study (and those reported in app. A) used a within-

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TABLE 1

ACTUAL AND ESTIMATED MEDIAN BIDS FOR 10 GOODS ($)

Good	Median bid	
	Actual	Estimate
Teddy bear	1.00	4.90****
Music CD	1.25	4.53**
Red velvet sachet	2.70	5.44***
Soma wooden puzzle	3.00	5.17**
8 oz smoked salmon	3.00	6.67****
1 pound Jelly Bellies	4.00	7.30****
Handblown glass art	5.00	13.52****
Finding Nemo DVD	15.00	14.44
$20 California Pizza Kitchen card	15.00	15.30
Pair of marketing textbooks	19.00	24.99
Average	7.15	10.23**

**$p < .01$.
***$p < .001$.
****$p < .0001$.

subjects design: respondents specified their own valuations and then predicted others' willingness to pay. In a follow-up study, conducted with 57 undergraduates at the University of Michigan, the effect was estimated between subjects as well as within subjects. As part of a 45-minute survey that paid $8 for completion, respondents were randomly assigned to one of two groups and shown nine goods. One group was first told, "For each of the products below, we'd like you to indicate the most that you, personally, would be willing to pay for it." On the subsequent page, after they had entered their private values, they received the unanticipated subsequent request to "go back to the previous page and try to predict the median response of all of the other students being surveyed today." For the other group, the tasks were reversed: respondents predicted the median valuations before reporting their own valuations. The data from that study are reported in appendix B. A within-subject analysis reveals that respondents considerably overestimated median valuations. The bias was comparable whether estimates preceded or followed statements about their own valuations. A between-subjects analysis revealed an even larger overestimation bias.

In a follow-up study, 300 picnickers on the Charles River esplanade in Boston agreed to participate in a short survey in exchange for an ice cream bar. For each of six goods, participants indicated how their willingness to pay would rank relative to others taking the survey that day. Instead of reporting their own and other's valuations, participants were asked to estimate either "the percentage of other respondents on the esplanade today who would pay more than you would" or "the percentage of other respondents on the esplanade today who would pay less than you would." Consistent with the prior findings, respondents thought that most others would pay more, regardless of whether the question directed them to estimate the percentage below them or the percentage above them. The data from this study are summarized in appendix C. Further support can be drawn from two other studies in which respondents first indicated whether they would pay some specified price and then estimated the fraction of others who would (see apps. D and E).

Do Respondents Distinguish Market Prices from Typical Valuations?

Although Armin's prices kept my students out of his store, someone must shop there. His business appeared to be thriving, and he was nearly sold out of Teuscher's signature champagne truffles. This anecdote illustrates the "obvious" point that businesses can succeed by selling their product to a small minority with atypically high valuations for the product in question. However, a test of economic literacy administered to 902 picnickers on the Charles River esplanade (see app. F) suggests that this point may not be so obvious after all. On that survey, respondents rated the accuracy of eight economic statements on an 11-point scale ranging from 0 (completely wrong) to 10 (perfectly accurate), with 5 labeled "roughly right." Two statements were pertinent to the effect explored here: "The market price for a product is how much a typical person is willing to pay," and "A company cannot be profitable unless a majority of the population is willing to pay more for its goods than it costs to manufacture them."

Most respondents (67% and 72%, respectively) rated these statements as accurate (as 5 or higher). The widespread avowal of these statements suggests that respondents believe market price to be a good proxy of typical willingness to pay, providing a potential account of the bias—respondents overestimate others' valuations by erroneously assuming that others will typically pay something close to the market price. This account suggests that the bias might be eliminated if the focal goods lacked an associated market price. I test this next.

STUDY 2: VALUING IMAGINARY GOODS

Participants and Procedure

As part of a longer questionnaire that respondents were paid $8 to complete, a total of 308 undergraduates from Harvard and the University of Michigan indicated the most they would pay for eight imaginary goods and predicted the responses of the person who handed the survey in immediately before (or after) them. Since surveys were numbered sequentially, the accuracy of these estimates could, in principle, be assessed, although this was just used as a device for getting respondents to consider the "typical," or randomly selected, respondent.

Results and Discussion

For all eight imaginary goods (see table 2), predictions exceeded respondents' own valuations. Due to a modest number of extreme outliers and the absence of a clear basis for exclusion, the data reported in table 2 are geometric means, and a Wilcoxon signed rank test (Wilcoxon 1945) was used to compare respondents' own valuations with pre-

TABLE 2

ACTUAL AND ESTIMATED BIDS FOR EIGHT HYPOTHETICAL GOODS

	% estimating others' valuation		Willingness to pay ($)	
Good	<Self	>Self	Self	Other
Safe pill that would make you 2 inches taller	23	63	191	895****
Safe pill that would protect you from every cold	22	55	377	658****
"Eagle eye" vision (20:8, rather than 20:20)	32	47	608	842
Flawless teeth (color, shape, etc.)	18	62	692	1,349****
Ability to instantly speak French fluently	35	40	732	941
Completely comprehensive English vocabulary	38	41	812	1,048
Safe pill that would cut your sleep requirements by half	35	44	846	1,276
Trip to the moon	14	66	2,410	10,912****

****$p < .0001$.

dictions. Other tests (such as a paired sign test or two sample *t*-tests on logged data) yield the same inference and higher degrees of statistical significance.

The persistence of the bias for imaginary goods weighs against accounts that explain it in terms of a reliance on market prices when estimating others' valuations. This observation does not, however, rule out all variants of such accounts: respondents' repeated observation that the market price of most goods exceeds their own willingness to pay could lead them to erroneously conclude that others are typically willing to pay more, even when the focal good has no market price.

A variant of the market-price story is that respondents overestimate others' willingness to pay by misinterpreting the request to estimate the average valuation among some specified reference group as a request to estimate the average valuation among those interested in buying the depicted product. Interpreted strictly, this bias suggests that respondents effectively estimate the market price. Yet in studies that ask for both, estimates of average valuations are markedly lower than estimates of market price (see app. G). Moreover, a considerable bias persists even when respondents were explicitly instructed to predict valuations only for those who would not purchase the good at its market price (see app. G).

The "misinterpretation" account also seems less applicable when the target of the judgment is a specific individual. Yet the bias occurs here too. Study 2 is one such example. Another is a study involving seven real goods, contingently real payments, and a $25 reward for accurate estimates (see yoked study in app. H). In that study, 21 MBA students who all knew one another by name indicated their maximum willingness to pay and estimated the bid of a randomly assigned target student whose name was written on their response sheet. For 17 of the 21 students, their estimates exceeded their own willingness to pay ($\chi^2 = 8.05, p < .01$). Similar effects were later found in a larger study in a different class in which the judgmental targets were six randomly chosen but named students. It is unclear why respondents would interpret the specified individuals as being the prototypical purchasers of the listed products.

STUDY 3: LIKING VERSUS PAYING

Overestimating others' willingness to pay could be attributed to two quite different beliefs: a belief that others will enjoy the good more or a belief that others are less averse to spending money. To help separate these two possible inputs to the bias, respondents in this study were asked about either enjoyment or paying, as described next.

Participants and Procedure

As part of a larger survey that respondents were paid $8 to complete, 77 undergraduates at the University of Michigan were shown color photographs of the eight goods listed in table 3. By random assignment, they evaluated relative degree of enjoyment or relative willingness to pay. The exact wording follows, with the manipulation in brackets: "For each product shown below, indicate whether you'd [enjoy it/be willing to pay] more or less than the typical person taking this survey today."

Results and Discussion

As shown in table 3, when products were evaluated in terms of how much one expected to enjoy the product relative to

TABLE 3

PROPORTION BELIEVING THAT MOST OTHERS ENJOYED (VALUED) GOODS MORE

	% predicting that most others would	
Good	Enjoy it more	Pay more
Glass of freshly squeezed orange juice	28	50
1 week of the *New York Times*	41	66
Spicy tuna roll	44	55
Two Rollerball pens	46	76
Five songs from iTunes	50	74
Card for any two drinks at Starbucks	58	87
4.5 oz can of macadamia nuts	64	61
Finding Nemo DVD	69	74
Average	50	68

others, there was no net bias. Judgments varied considerably across goods (respondents thought they would enjoy freshly squeezed orange juice more than others and macadamia nuts less than others), but, overall, respondents thought they would enjoy these goods about as much as the typical respondent. By contrast, when participants expressed valuations in terms of willingness to pay, the bias reemerged. Respondents predicted that most others would pay more for the good than they would. Estimates equaled or exceeded 50% in every case, and they averaged 68% across goods ($t = 5.39$; $p < .0001$).

By differentiating predicted enjoyment (which shows no self-other difference) from predicted willingness to pay (which replicates the effects shown above), study 3 provides evidence against one possible account—a belief that others enjoy goods more. If the effect is instead driven by perceived self-other differences in reaction to monetary losses, then it should be weaker or absent for selling prices, which involve monetary gains. I test this next.

STUDY 4: BUYING VERSUS SELLING

Participants and Procedure

As part of a survey preceding a lecture on decision making, 65 MBA students at MIT indicated both maximum buying prices and minimum selling prices for four goods: a box of 48 Teuscher chocolate truffles, DVDs of the first four seasons of *The Sopranos*, a polished ammonite fossil, and a "care package" consisting of Tide liquid laundry detergent, Charmin toilet paper, and Crest toothpaste. Two of each good were displayed on a table at the front of the classroom, and the fossils were passed around the room for inspection. Participants were told, truthfully, that for each good, one person would be randomly selected as a buyer (and have the opportunity to purchase the good), and one would be selected as a seller (to receive the good and have the opportunity to exchange it for money). Transaction prices were determined randomly using the BDM procedure (Becker, DeGroot, and Marschak 1964) as specified in the following instructions. "If you are selected as a **buyer**, we will randomly generate a 'BDM price.' If you are willing to pay the BDM price *or more*, you can purchase it at the BDM price. If not, we will keep the good." "If you are selected as a **seller**, we will randomly generate a 'BDM price.' If you are willing to sell the good for the BDM price *or less*, you will receive the BDM price. If not, you will keep the good."

After a tutorial explaining the logic of the BDM procedure, respondents indicated both maximum buying and minimum selling prices. Then, for each good, they estimated the average (arithmetic mean) response, with $100 awarded to the student with the most accurate estimates. Finally, buyers and sellers were selected, the procedure conducted, and the transactions executed (or not) according to the specified rule.

Results and Discussion

The results are shown in table 4. Selling prices significantly exceeded buying prices, as is typically found (Horowitz and McConnell 2002). More importantly, whereas estimated buying prices significantly exceeded actual buying prices for every good, estimates of selling prices were unbiased. Indeed, for the four products combined, the estimated selling price ($104) coincided almost perfectly with the actual selling price ($102). The interaction between valuation method (buying vs. selling) and target of response (self vs. other) that is apparent in table 4 is confirmed in a 4 (good) × 2 (measure) × 2 (target) repeated-measures ANOVA ($F = 12.89$, $p < .001$). Viewed differently, these data also show that the endowment effect (Kahneman, Knetsch, and Thaler 1990) expressed in participants' own judgments is somewhat attenuated in judgments about others—the ratio of selling to buying prices averaged 2.2 for self but 1.5 for estimates of others.

TABLE 4

ACTUAL AND ESTIMATED BUYING AND SELLING PRICES ($)

Good	Market price	Actual mean	Estimate of others
Polished ammonite fossil	43		
Buy for		5.93	10.53**
Sell for		22.72	18.13
Care package of detergent, toothpaste, and toilet paper	16		
Buy for		7.56	9.06*
Sell for		11.62	11.99
48 Teuscher truffles	104		
Buy for		10.82	13.12**
Sell for		18.51	18.78
DVDs of seasons 1–4 of *The Sopranos*	252		
Buy for		27.22	40.23***
Sell for		49.33	54.97

*$p < .05$.
**$p < .01$.
***$p < .001$.

The following study, conducted at a neighboring university with different goods, reexamines self-other discrepancies (or the lack thereof) using a design in which the valuation measure was manipulated between subjects. Furthermore, in addition to examining *buying prices* (respondents state their maximum willingness to pay for each good, in dollars) and *selling prices* (respondents indicate, for each good, the minimum amount they would demand to relinquish it), the study examines *choosing prices* (respondents stated, for each good, the minimum number of dollars that would make them indifferent between the good and the money) and *working prices* (respondents indicate the maximum number of pencils they would be willing to sharpen to obtain each good). Working prices could be regarded as a nonmonetary payment metric.

STUDY 5: BUYING, CHOOSING, SELLING, AND WORKING PRICES

Participants and Procedure

Across four lab sessions conducted over a month at Harvard's Computer Lab for Experimental Research (CLER),

a total of 161 respondents completed a 45-minute survey in exchange for $10. Within each session, participants were randomly assigned to the roles of buyers, sellers, choosers, or workers, as described above. For all valuation metrics, respondents first indicated their own valuation for several products on the first page. On page 2, respondents received the unanticipated request to return to the first page and estimate the average (mean) response among others being surveyed that day.

Results and Discussion

Table 5 reports the actual mean response and estimated mean response for each of the four valuation metrics, rounded to the nearest dollar (or pencil). For the pencils condition, two outliers were excluded. Significance levels reflect the application of a Wilcoxon signed rank test. As usual, respondents predicted that others would pay significantly more for the listed goods than they, themselves, would pay. Choice prices show a smaller effect in the same direction. As in study 4, there was no effect for selling prices (actual values and estimates corresponded almost perfectly, and the two significant differences went in opposite directions). Finally, there appears to be no net bias for the number of pencils sharpened (none of the differences were significant).

EVALUATING ALTERNATE ACCOUNTS OF THE EFFECT

The preceding studies weigh against anchoring on market prices, confusing the typical respondent with the typical buyer, a belief that others will derive greater enjoyment from the chosen products, and a belief that others are wealthier. These mechanisms may sometimes contribute to the effect but do not appear adequate to account for all the data. Alternative accounts remain, of course, including the aforementioned possibility of an empathy gap in assessments of others' reactions to monetary losses (or possibly to any form of losses). I discuss some alternate accounts next.

Empathy Gaps?

In a *Callahan* cartoon, a patient hands his doctor money while announcing, "It hurts when I go like this." The joke is funny in part because it suggests that the man may believe his pain is unique. Motivated by this cartoon, I added two questions to the end of a longer survey distributed to 264 respondents during several lab sessions at Harvard's CLER. Respondents were asked to rank (1) "How much 'pain' do *you* feel when you spend money?" and (2) "How much 'pain' do *others* feel when they spend money?" on a scale ranging from 0 (none) to 10 (intense "pain").

On average, respondents endorsed the notion that spending money was more painful for themselves than for others (4.27 vs. 3.85; $t(267) = 2.83$, $p < .01$). However, neither of these measures—nor their difference—was appreciably related with the bias (see app. I). Thus, while some form of "empathy gap" appears consistent with much of the data presented thus far, it cannot be the sole culprit.

If the concept of an empathy gap is broadened to include any sort of losses (monetary or otherwise), additional evidence becomes relevant. Appendix J reports the details of a study in which participants specified the minimum compensation they would demand for performing various boring, embarrassing, or unpleasant tasks and then predicted the average response among other survey respondents. Respondents generally believed others would do it for less than they, themselves, would demand—for example, they wanted $766 to shave their head but believed that others would do it for $222. This is consistent with a more general empathy gap for losses, as demanding lower compensation suggests the expectation of less pain. But a broad notion of empathy gaps that extends to all types of losses is contradicted by other evidence. For example, the convergence between one's own selling price and estimates of others' selling prices in

TABLE 5

BUYING, CHOOSING, SELLING, AND WORKING PRICES

	Buying (n = 39)		Choosing (n = 38)		Selling (n = 44)		Pencils sharpened (n = 40)	
	Actual ($)	Estimate ($)	Actual ($)	Estimate ($)	Actual ($)	Estimate ($)	Actual	Estimate
Good:								
Frozen pizza	6	8*	5	6*	6	7	59	74
Candles	12	22****	14	17*	26	26	187	122
Chocolates	15	21**	17	19	23	21	158	156
Bonsai tree	18	23*	17	20	33	25	162	130
Minicycle	47	90****	44	54**	106	102	209	225
Pizza Hut	59	73***	59	72**	79	85*	428	270
Headphones	61	72	76	79	102	93*	680	455
iPhone	186	270****	240	290***	296	309	1,729	1,538
Bias (%)	45		18		−2		−13	

*$p < .05$.
**$p < .01$.
***$p < .001$.
****$p < .0001$.

studies 4 and 5 seems inconsistent with a more general notion that losses (of any form) hurt oneself more than they hurt others. Although it seems reasonable to assume that buying produces a feeling of monetary loss (even though one is compensated by the receipt of the valued good), this assumption would seem to entail the corresponding assumption that selling an item would also produce a feeling of loss (even though one is compensated by the receipt of money). Yet no bias is found. The pencils condition from study 5 reveals no such difference either. Although performing menial labor is surely a form of loss, respondents were willing to sharpen as many pencils as the next person. Moreover, in later sessions, a question was added to the end of the survey, asking how many pencils respondents would be willing to sharpen for $5 and their best estimate of the average response to this question. For this cash prize, respondents believed they would be willing to sharpen significantly more pencils than others (68 vs. 43; $Z(120) = 4.83$, $p < .0001$, by a Wilcoxon signed rank test). A final piece of evidence contradicting the sufficiency of an empathy gap account is derived from a large study (see app. F) in which 891 respondents read the following statement —"I cannot easily empathize with others even when I try to put myself in their shoes"—and indicated their degree of avowal, on a scale ranging from −5 (strongly disagree) to +5 (strongly agree). That self-reported measure of empathic ability was uncorrelated with the bias ($r = .007$, $p > .83$).

Better-than-Average Effect?

A vast literature finds that people generally rate themselves as above average on desirable traits and below average on undesirable traits. If willingness to pay is an undesirable trait, the effects documented here could be regarded as the $n + 1$ demonstration of a better-than-average effect. However, the following thought experiment should give pause to anyone inclined to embrace this account. Suppose that A and B both enter bids in a second-price auction for some good: A bids $7, and B bids $5. Does this scenario carry any suggestion that B (who neither receives the good nor pays money) is somehow better than A (who receives a product he wants for $2 less than he would be willing to pay)? The better-than-average interpretation is further undermined by the finding that predictions of others' selling prices or working prices do not systematically deviate from one's own since it is clearly better to receive more money for a good and to sharpen fewer pencils.

Several other pieces of evidence also seem inconsistent. First, an analysis of extensive written and verbal protocols provides little suggestion that respondents are motivated to report low values: that they are proud of (or embarrassed by) their perceived position along the willingness-to-pay dimension. Nor do the highest bidders in second-price auctions appear disappointed by their subsequent discovery that they valued a good more than average. Instead, one's preference for how much wealth to allocate to any particular product appears to be an evaluatively neutral trait, analogous to one's preferences regarding the ideal shower temperature or how darkly one likes coffee roasted.

In a study not previously discussed (see app. K), there was no suggestion that frugality was regarded as an unambiguously positive trait. On an 11-point bipolar scale ranging from −5 (spendthrift) to +5 (tightwad), respondents placed themselves almost exactly in the middle of the scale. Moreover, individuals' perceived position on this scale (which was akin to an item used by Rick, Cryder, and Loewenstein [2008]) did not correlate strongly with the size of the effect. Although (self-reported) tightwads showed larger effects than (self-reported) spendthrifts, the correlation was small.

Other relevant findings include those from a study requesting judgments about depicted but unfamiliar students. Those students were judged to be more intelligent than their equally unfamiliar but amorphous peers, replicating analogous findings by Klar and Giladi (1999) and Sears (1983). Those same students were also predicted to be willing to pay somewhat more than the average student for goods auctioned in psychology experiments—contradicting the assumption that high valuations are somehow unwise or undesirable. Furthermore, if concerns about self-presentation motivate respondents to report lower values than others, one would expect the observed bias to be greater in within-subjects designs, which emphasize self-other comparisons. Instead, the effect is actually stronger in between-subjects designs (see app. B). Although none of these facts alone are dispositive, all collectively weigh against the better-than-average account.

Experimental Artifact due to Nonrandom Stimulus Selection?

Regressive predictions in judgments under uncertainty explain many below-average effects (Burson, Larrick, and Klayman 2006; Krueger and Mueller 2002; Moore 2007; Moore and Cain 2007). For example, if respondents are given an atypically difficult test on which they fail to answer most or all items, they will (reasonably) conclude that they did worse than average—since most tests are designed to yield intermediate scores and since they know they performed poorly but are less certain how others did.

The same logic may appear to apply to the effect documented in this article. Much as below-average effects in judgments of relative performance on a trivia test can be generated by selecting atypically difficult items, below-average effects in valuations could be generated by selecting products that have little value to the tested population—such as turtle food or sheet metal. Respondents would know they do not value the product but be less certain about others and, thus, conclude that they value that product less than average.

This explanation could be countered by randomly selecting experimental stimuli. But such a procedure would be difficult to devise, given the large undefined universe of goods. In lieu of this, one must consider how the goods were selected. Importantly, they were not selected to have

low value. Indeed, many of them (e.g., premium chocolates, gift certificates for pizza, DVDs of popular shows) were included precisely because they are widely coveted. Moreover, all goods can be seen as lying along a continuum between turtle food (which few value) and cash (which everyone values), and the effect appears to occur everywhere along this continuum. The bias is somewhat larger for esoteric goods (fossilized ammonites) than for cashlike goods (gift certificates for pizza) and, of course, disappears for cash (since everyone would pay exactly $20 for $20 and appreciates that others will too). But the effect never reverses. Thus, unlike many other biases in comparative judgments (such as relative performance on tests) in which below-average effects become above-average effects as one moves from difficult to easy tasks, there is no such reversal here as one moves from esoteric goods to widely coveted goods. Thus, the documented bias cannot be an experimental artifact driven by a nonrandom selection of experimental stimuli.

Asymmetric Salience of Expressions of Liking and Disliking?

Purchasing and consumption are more conspicuous than forbearance and thrift. Customers in the queue at Starbucks are more visible than those hidden away in their offices unwilling to spend $4 on coffee. We are repeatedly exposed to commercials of people enthusiastically gulping soda and gyrating to their iPods, but the large segment of nonusers is not so memorably depicted. Since people tend to overestimate elements that are disproportionately visible, memorable, or easily retrieved (Kahneman and Tversky 1973), the greater salience of cues of interest may lead people to overestimate the level of others' interest.

This "availability" story could account for the overestimate of others' buying prices but would predict, contrary to findings, a similar bias for all other indices of valuation, including choosing prices, selling prices, and predicted enjoyment. Possibly, a lifetime of selective exposure to paying customers engenders the idea that others are freer with money—an inference that percipients do not extend to the other measures of valuation.

Differential Construal of Self and Others?

Others are—almost necessarily—represented at a higher level of construal than oneself (Trope and Liberman 2003). These high-level mental representations likely exclude some of the lower-level features that depress one's own willingness to pay (e.g., limited budget, limited storage space, limited opportunities for use), suggesting a possible account of this effect. But the current evidence is mixed. An analysis of verbal protocols supports the claim, as people mention such factors to explain why their valuation falls below their prediction, without apparently recognizing that similar reasons could apply to others. However, a "construal-level" account implies that experimental features that close the representational gap between self and other should reduce the effect. This has not yet been found. First, the bias is not just observed when others are represented vaguely (e.g., the median judgment); it remains large when the target is very specific (e.g., the person sitting next to you, a named known individual in the classroom). Second, in an unreported study, the target good was a gift certificate for Crate & Barrel, eligible to be used immediately (or in 1 year). To the extent that temporal distance makes one's future self more like another, increasing the temporal distance of the evaluated good should diminish the bias. It did not.

IMPLICATIONS

Businesses and individuals need to accurately predict the economic valuations of others. Firms must decide how to price new products, the host of a yard sale must determine how much to mark down a used product, parties negotiating the terms of an offer must guess the other side's reservation price, and so on. Thus, whatever its basis, the bias explored here may be pertinent to real-world decision making.

Pricing

A tendency to overestimate others' willingness to pay implies an exaggeration of the area beneath the demand curve. This may lead to prices being set too high. Both implications were experimentally supported. In one study, 33 students in an introductory marketing class were shown *The Complete Cartoons of the New Yorker* (a large hardcover book) and told, truthfully, that it retailed for $72. They indicated whether they would pay various prices ranging from $2 to $50 in $2 increments and estimated the proportion of students in the class who would. Demand was overestimated at all prices above $10 (see app. E). For example, at a price of $26, the average estimate was that 50% of the class would pay it, but less than 25% actually would. Notably, the average respondent predicted that 64% of the class would pay a price exceeding what they, themselves, were willing to pay—a result that largely replicates study 3 and the study summarized in appendix C.

In another study, 55 undergraduates with a prior course in microeconomics bid on six goods (listed in the last study in table H1). After the forms containing their bids had been collected, they were told that their collective responses would serve as the target for their subsequent predictions and were given another form on which to record their estimate of the revenue-maximizing price for each good. As predicted, respondents markedly overestimated the revenue-maximizing prices (by almost 60%, on average).

Negotiations

Negotiations may be impeded if people feel that another is understating her true valuation. To illustrate, suppose Adam values an object at $10 and would sell it at any higher price, provided the transaction was perceived to be fair. Suppose further that Beth values said object at $12 and offers Adam $11. If Adam had accurately estimated Beth's

value, he would accept the offer since the $2 "bargaining zone" is being evenly split. However, if he believes Beth's true valuation is $14, he may reject her offer, rather than permitting what he falsely believes is an unfair division of her surplus.

The Endowment Effect

Weaver and Frederick (2011) propose that the *endowment effect*—the disparity between buying and selling prices—is driven predominantly by sellers' reluctance to accept an offer below their adopted "reference price." As noted above, the bias documented here may contribute to this because exaggerating demand will increase reluctance to sell. It is also noteworthy, as shown in studies 4 and 5, that respondents predict a much smaller endowment effect for others than they exhibit themselves.

Egocentric Gaps

Van Boven, Dunning, and Loewenstein (2000) found that Cornell students endowed with a plastic Cornell coffee mug overestimated how much those without would pay to get one. They attributed this bias to respondents' inability to mentally undo the impact of endowment. However, the research presented here suggests a different interpretation. Students at MIT overestimated their peers' valuation of a coffee mug by a nearly identical margin, although nobody was so endowed (see app. A).

Separating the general tendency to overestimate others' willingness to pay (as documented here) from the effects of ownership, per se, requires a comparison of the predictions of owners and nonowners. The extant research on empathy gaps in valuation (Loewenstein and Adler 1995; Van Boven, Loewenstein, and Dunning 2003; Van Boven et al. 2000) has not made this comparison. However, toward this end, I conducted two small follow-up studies. In the first, I found that those who had not been endowed overestimated mean buying price to the same degree as those who had been endowed. In a second study involving a ceramic coffee mug, both groups overestimated the average willingness to pay, although the endowed group overestimated it more, as Van Boven and colleagues predict. Thus, although the general tendency to overestimate buying prices may be amplified by ownership, further research is needed to better assess the relative contribution of these separate effects.

Projection/False Consensus

Estimates of others' willingness to pay simultaneously manifest two distinct effects: (1) they are highly correlated with the respondents' own response, and (2) they are biased upward. The first effect ("projection") is a nearly universal finding in studies involving comparative judgments (Krueger 1998). By contrast, general overestimates of a target quantity are less commonly reported. For example, although judgments of average height are correlated with own height, the mean of these judgments shows no bias (Ward 1967). Projection is a correlational effect, whereas this effect is a mean-level effect. Although the two effects can co-occur, and do here, they are conceptually independent (see Krueger and Funder 2004).

For those with above-average valuations, both effects work to inflate estimates. For those valuing a good less than average, the effects oppose each other. Overestimation can overpower projection. For a specific example involving a piece of handblown glass artwork, the equation below reports the ordinary least squares results from regressing predicted willingness to pay against own willingness to pay:

$$\text{predicted median WTP} = \$10.27 + 0.40(\text{own WTP}).$$

Here, the intercept of the regression equation ($10.27) is over twice the actual median valuation ($5). Thus, even those who placed no value on this good would tend to overestimate its average value. This result was not uncommon (see app. H).

Except for these extreme cases, in which the unnamed effect explored here (the "X effect") completely overwhelms projection, the opposing effects will cancel one another at some point between the 0th and the 50th percentile. Correspondingly—and somewhat surprisingly—the most accurate predictions of average valuation are generally rendered by those with atypically low valuations. When averaging across the studies included in appendix H, the most accurate predictions were rendered by respondents whose own valuation was around the 25th percentile. This may be considered the point at which projection is offset by the X effect. An analogous result can be seen in appendix D—those who would not purchase the product at the specified price give unbiased estimates of the percentage who would.

CONCLUDING COMMENTS

This article documents a form of "pluralistic ignorance" (Allport 1924) in judgments of public opinion: a widespread tendency to overestimate how much money others are willing to pay for goods. This bias persists whether the target judgment is a specific identified other, a specific anonymous other, the mean or median of a specified reference group, or some function of the population's distribution, such as the revenue-maximizing price. It is not restricted to procedures involving judgments of willingness to pay but also occurs when respondents estimate the fraction of the population who will pay a specified price or estimate their location in the distribution of valuations.

The effect's persistence across a wide variety of designs intended to control for specific possible causes suggests multiple determination. For an illustrative analogy, consider the "Flynn Effect"—the finding that performance on IQ tests has increased markedly around the world during the last century (Flynn 1994). There is now little disagreement that this effect, as an empirical phenomenon, is real, although much contention remains about its causes and interpretation. Jensen (1998) suggests the simultaneous interplay of several distinct mechanisms, including better maternal nutrition,

better infant nutrition, reduction in lead levels, more caesarian births, less inbreeding, smaller families, greater access to information, greater exposure to symbols, improved teaching techniques, leakage of historical test items, and changes in the norms for guessing on multiple-item tests.

Although the X effect may also be overdetermined, it remains an attractive target for additional research. It is robust, easy to study, and relevant to other widely researched topics. Moreover, the studies presented here provide considerable guidance toward a theory. Most of the discussed accounts, as I construe them, seem inconsistent with at least some of the data, although a more nuanced version of one of these "discredited" accounts may yet provide a satisfactory explanation.

To help inspire continued research, I will conclude with a novel and promising speculation offered by a reviewer: that the X effect may stem from underestimating others' ability to exert self-control. This explains why people overestimate how much others will spend for goods (others cannot control their spending), while remaining consistent with the lack of a self-other difference in selling prices (as it is unclear what exerting self-control would mean in the context of selling). The account is also consistent with the absence of a self-other difference in expenditures of other resources, such as time or effort (as it is unclear whether a high willingness to work for a pair of Bose headphones implies high or low self-control.) It is even plausibly consistent with the data reported in appendix J, showing that people tend to underestimate how much others demand to perform aversive or degrading acts. (Although this is less clear, as doing unpleasant things for money may be considered a failure of self-control or the exertion of self-control, depending on the context.) This example illustrates the sorts of additional studies that might yield further insight regarding the X effect, while also revealing the challenges even faced by hypotheses formed around the corpus of existing data. Further investigation is clearly warranted, although I predict that those determined to explain all the results with a single mechanism will pay a high price.

APPENDIX A

ACTUAL VERSUS ESTIMATED BUYING PRICES

Table A1 reports the results of a hypothetical study conducted at Yale University.

TABLE A1

ACTUAL VERSUS ESTIMATED BUYING PRICES: UNDERGRADUATES HYPOTHETICAL STUDY ($)

	Mean value	
Good	Actual	Estimated
8 oz of chocolate-covered blueberries	3.58	4.67****
8-inch miniature cedar bonsai tree	16.36	19.18
Bottle of 1998 *Arrowood* merlot	22.07	27.96**
$50 *Starbucks* credit card	34.92	40.07****
HP Photosmart digital camera	122.80	139.99*
Total	199.73	231.87****

NOTE.—$N = 76$.
*$p < .05$.
**$p < .01$.
****$p < .0001$.

TABLE A2

ACTUAL VERSUS ESTIMATED BUYING PRICES: TWO REAL STUDIES ($)

	Undergraduates ($N = 28$) real		Executive education class ($N = 34$) real	
Good	Actual mean value	Estimated mean value	Actual mean value	Estimated mean value
Isoflex squeeze ball	1.00	1.87*	2.04	2.79*
Magnetic sculpture	2.06	2.98*	3.56	4.37
Chocolate blueberries	2.45	3.60**	3.73	4.15
Bonsai kit	2.57	3.95*	. . .	. . .
Soma wooden puzzle	3.04	4.34*	4.71	5.29
Red velvet sachet	3.15	4.89*	3.02	5.21**
Coffee mug	3.25	4.78***	4.35	5.58*
Marketing book	4.85	5.83	6.71	8.43
$10 Starbucks card	5.92	7.60***	. . .	. . .
$20 Starbucks card	. . .	. . .	14.26	16.48*
Jelly Belly machine	7.81	9.58	. . .	. . .
Total	36.10	49.42***	42.38	52.30**

*$p < .05$.
**$p < .01$.
***$p < .001$.

Table A2 reports the results of two studies conducted in two different classes at MIT. Responses were (probabilistically) real, as respondents were randomly selected for each good, and transactions were executed or not, using the incentive-compatible procedure explained in study 4. Respondents were incentivized to give accurate predictions by offering, for each good, a $5 reward to the student with the most accurate estimate.

This is a common incentive that is easy to communicate, but it has the theoretical shortcoming that highly sophisticated respondents might not report their true beliefs if they think others against whom they are competing will also be entering values in that region. I thank Barry Nalebuff, Drazen Prelec, and Robert Schiller for calling my attention to this issue. For reasons that are apparent to nongeniuses, I initially chose to disregard this critique and retained the simpler and more common procedure. However, I eventually succumbed and conducted a large ($N = 902$) between-subjects study on the Charles River esplanade that was intended to compare this incentive scheme with another that is less theoretically flawed. All respondents saw six goods and were told, "First, state the most that you would be willing to pay for it. Second, estimate the average (mean) response among everyone being surveyed today on the esplanade." Half were told (truthfully) that, for each good, the person with the most accurate estimate would earn $50. The rest were told (truthfully) that one person would be randomly selected and paid according to the accuracy of his or her estimate. The payoffs reflected a quadratic loss function in which

the penalty was the square of the respondent's absolute error, subtracted from $100. However, to aid comprehension, the payoff scheme was simply presented as a table of values, which revealed to respondents that prizes ranged from $99 (if their estimate was within $1 of the true mean) to $5 (if their estimate was within $10 of the true mean). The alternate payoff schemes yielded essentially identical estimates.

APPENDIX B

ACTUAL VERSUS ESTIMATED MEDIAN BUYING PRICES

Table B1 reports the results of a hypothetical study conducted at the University of Michigan. Respondents were randomly assigned to conditions in which they either first indicated their own valuation and then indicated their best estimate of the median valuation of others or first estimated their best estimate of the median valuation of others before reporting their own valuation. Since the second task occurred on the second page of the survey and was unanticipated, this design permits a comparison of between-subjects and within-subjects effects. The bias was larger between subjects, but it was large irrespective of the exact design.

TABLE B1

ACTUAL VERSUS ESTIMATED MEDIAN BUYING PRICES: UNDERGRADUATES HYPOTHETICAL STUDY ($)

			Split by question order			
	Median willingness to pay		Own first, median second (n = 26)		Median first, own second (n = 31)	
Good	Actual	Predicted	Actual	Predicted	Actual	Predicted
Body Shop aroma jar and oil	10	13**	5	11****	10	14**
13.4 oz Ghirardelli chocolates	10	17****	10	14*	15	19*
Spalding basketball	10	24***	10	22*	10	25*
Bose headphones	15	49****	15	38**	25	59**
Seasons 1–4 of *The Sopranos*	20	63****	10	43****	25	79****
Portable minicycle	20	105****	20	80**	50	126***
Ionic Breeze air purifier	30	66****	23	66*	35	66*
$100 California Pizza Kitchen card	70	77*	55	68*	80	84
60 GB iPod	200	232*	200	239	200	227
Total	385	646****	348	581****	450	699****

NOTE.—The comparisons involved a paired t-test. N = 57.
*$p < .05$.
**$p < .01$.
***$p < .001$.
****$p < .0001$.

APPENDIX C

PREDICTED LOCATION WITHIN DISTRIBUTION OF VALUATIONS

A large study was conducted on July 4 along the Charles River esplanade in Boston. Respondents were picnickers who completed a survey in exchange for an ice cream bar. Table C1 reports two of the conditions from that study in which respondents estimated their location in the distribution of valuations among others being surveyed that day. Appendix F references the same data.

TABLE C1

PREDICTED LOCATION WITHIN DISTRIBUTION OF VALUATIONS: PICNICKERS HYPOTHETICAL STUDY

	% who would pay	
Good	Less	More
Ionic Breeze Quadra Silent Air Purifier	27	60
Apple iPad 32 GB WiFi	29	57
One bottle of Dom Perignon (2000)	29	63
DVDs of seasons 1–5 of *The Office*	32	64
1 year subscription to the *New York Times*	30	55
Kindle wireless reading device	31	54

NOTE.—The two percentiles need not sum to exactly 100%. First, this was a between-subjects design. Second, the two categories are not quite logically complementary since participants might rightly believe that some respondents will give exactly the same response as they did. This small "tied" group would be excluded from the estimate in both columns. $N = 300$.

APPENDIX D

PREDICTED DEMAND AT A SPECIFIED PRICE

In this study, a specific price was posted for a product, accompanied by a small color photo. For each product, respondents indicated whether they would buy it at the listed price and estimated the percentage of other respondents who would.

TABLE D1

ACTUAL VERSUS PREDICTED PERCENTAGE OF RESPONDENTS WILLING TO PAY SPECIFIED PRICE, OVERALL, AND CONDITIONED ON OWN WILLINGNESS: ONLINE DATA HYPOTHETICAL STUDY

				Noes		Yeses	
	Price ($)	Actual % willing	Predicted % willing	Predicted %	Total no. participants	Predicted %	Total no. participants
Good:							
6 oz of Crave Brothers mascarpone cheese	2	33	44	36	128	60	63
Miniature bonsai kit	3	58	52	37	81	62	110
1 pound box of assorted Jelly Belly jelly beans	5	30	47	40	134	64	57
1 pound of smoked Alaskan sockeye salmon	5	56	57	41	85	71	106
Hardcover book *Guns, Germs, and Steel*	10	20	34	29	153	55	38
$50 worth of products at California Pizza Kitchen	10	61	67	49	74	81	117
Spalding NBA basketball	15	22	49	45	149	63	42
Card good for $50 worth of products at Starbucks	20	69	75	66	59	79	132
Ionic Breeze Quadra Silent Air Purifier	40	48	50	36	100	67	91
First four seasons of *The Sopranos* on DVD	50	22	47	43	160	64	42
Average	. . .	42	52	42	. . .	67	. . .

NOTE.—Noes and yeses are participants who said no or yes, respectively. $N = 191$.

APPENDIX E

PREDICTED DEMAND AT SPECIFIED PRICES

In this study, 33 undergraduate students at MIT indicated their willingness to pay for a new hardcover book containing all of the cartoons ever published in the *New Yorker*. (I purchased the book for $72 from Amazon.) In this study, respondents indicated maximum willingness to pay by circling yes or no for each of 25 selected prices. For each of those prices, respondents also estimated the fraction of their classmates who circled yes on each line (i.e., the percentage who would be willing to pay that price), and $25 was awarded to the person with the most accurate estimates (as evaluated by subtracting the true percentage from the estimated percentage on each of the 25 lines). The numbers in the "Estimate" column in table E1 are the means of those judgments. Notably, on the price at which respondents "crossed over" from yes to no (i.e., a price that exceeds their own willingness to pay by up to $2), the mean estimate was 64%. This provides another way of viewing the effect, along with the separation in the demand curves plotted in figure E1.

TABLE E1

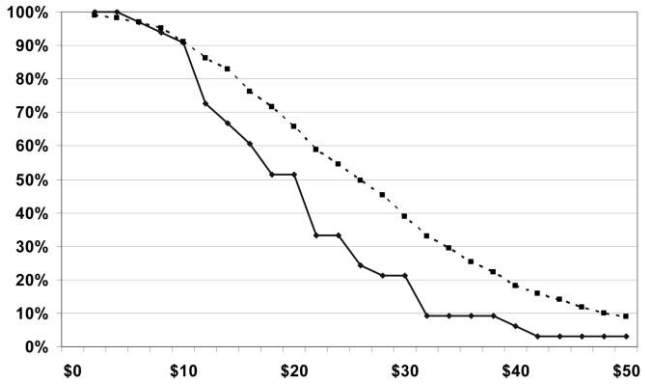
ACTUAL VERSUS ESTIMATED FRACTION OF CLASS WILLING TO PURCHASE BOOK AT VARIOUS PRICES: UNDERGRADUATES REAL STUDY

	% willing			% willing	
Price ($)	Actual	Estimate	Price ($)	Actual	Estimate
2	100	99	28	21	45
4	100	98	30	21	39
6	97	97	32	9	33
8	94	95	34	9	29
10	91	91	36	9	25
12	73	86	38	9	22
14	67	83	40	6	18
16	61	76	42	3	16
18	52	72	44	3	14
20	52	66	46	3	12
22	33	59	48	3	10
24	33	54	50	3	9
26	24	50			

NOTE.—$N = 33$.

FIGURE E1

ACTUAL (*SOLID*) VERSUS ESTIMATED (*DOTTED*) FRACTION OF CLASS WILLING TO PURCHASE BOOK AT VARIOUS PRICES



APPENDIX F

ECONOMIC LITERACY AND ITS RELATION TO OVERESTIMATES

The 12 goods used in this study were the six shown in appendix C, five goods from study 5, and the Roomba vacuum cleaner, which was an item used only in this study.

TABLE F1

AVOWAL OF EIGHT ECONOMIC STATEMENTS AND THEIR CORRELATION WITH THE X EFFECT

	Average degree of avowal	% who agree	r[a]
Based on your understanding of economics, rate the accuracy of the statements below using numbers between 0 and 10, as defined by the scale			
0 . . . 1 . . . 2 . . . 3 . . . 4 . . . 5 . . . 6 . . . 7 . . . 8 . . . 9 . . . 10			
completely wrong roughly right perfectly accurate			
The market price for a product is how much a typical person is willing to pay.	5.5	67	.00
For a company to be profitable, its revenues must exceed its production costs.	8.2	92	−.01
If the supply of a product goes up, prices usually rise accordingly.	2.7	26	−.06
Willingness to pay for a product depends on the price of substitutes.	6.4	85	.02
For the average U.S. corporation, revenues are nearly as high as profits.	3.7	41	−.10
Unless regulated, monopolies can always increase profits by raising prices.	6.6	78	−.03
Free trade is a zero sum game. What one country gains, another loses.	3.8	43	.06
A company cannot be profitable unless a majority of the population is willing to pay more for its goods than it costs to manufacture them.	6.1	72	−.08

NOTE.—Percentage who agreed with a statement is defined as those who rated it 5 or higher. $N = 897$. Although the survey was administered to 902 respondents, due to omitted responses, sample sizes for the reported statistics vary between 875 and 897.

[a]Correlation between the degree of avowal to a statement and the bias, measured on a scale between −1 (thought others would pay less for every item) and +1 (thought others would pay more for every item).

APPENDIX G

EXPLICITLY DISTINGUISHING BUYERS FROM RESPONDENTS

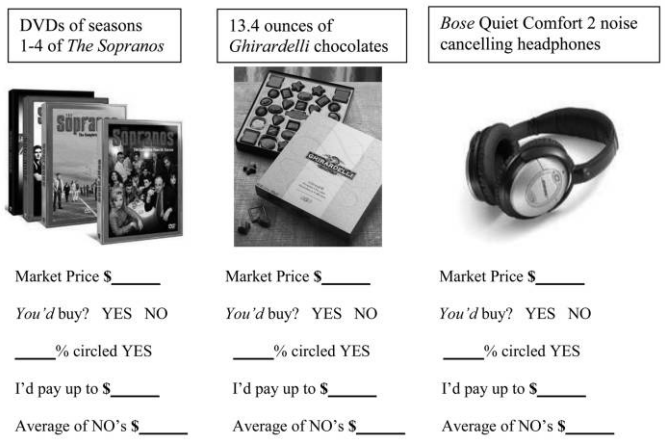
TABLE G1

ACTUAL VALUATIONS AND ESTIMATES OF MARKET PRICE, AVERAGE VALUATION, AND AVERAGE VALUATION CONDITIONAL ON BEING UNWILLING TO PAY MARKET PRICE: PICNICKERS HYPOTHETICAL STUDY

	Question order			
	Market $, yes or no?, % yes, WTP mean no	Market $, WTP median	WTP median, market $	WTP average, market $
	Condition A	Condition B	Condition C	Condition D
Estimates of market price ($)	902	960	854	834
Actual valuations ($)	449	516	462	441
Estimated valuations ($)	631	730	624	626
Estimated valuations of noes ($)	431	. . .	. . .	. . .
Bias (%)	41	41	35	42

NOTE.—Market $ = "Estimate the market price"; yes or no? = "Indicate whether you would buy it at this price if shipping were free"; % yes = "Estimate the proportion of other respondents who would—the proportion who circled 'YES'"; WTP mean no = "Estimate the average willingness to pay among all respondents who circled 'NO'"; WTP median = "Estimate the *median* answer among those surveyed today. (That is, predict the value that exactly half of the respondents would be willing to pay.)"; WTP average = "Estimate the average answer among those surveyed today"; $N = 242$.

Instructions (from condition A): "For each of the six products shown below, we'd like you to do 5 things: (1) Estimate the market price. (2) Indicate whether you would buy it at this price if shipping were free. (3) Estimate the proportion of other respondents who would—the proportion who circled 'YES.' (4) Indicate the most that you, personally, would be willing to pay for it. (5) Estimate the average willingness to pay among all respondents who circled 'NO.' [three examples below]"



The analysis in table G2 restricts comparisons to condition A ($n = 42$). It shows that the bias persists even among nonbuyers asked to estimate the average willingness to pay among other nonbuyers.

TABLE G2

ACTUAL VALUATIONS OF THOSE WHO WOULD NOT PURCHASE THE GOOD AT MARKET PRICE AND ESTIMATES OF SIMILAR OTHERS

Good	Actual WTP among noes ($)	Estimated WTP among noes by noes ($)	Bias (%)
Chocolates	12	15	25
The Sopranos DVDs	33	62	88
Portable minicycle	36	66	83
Air filter	49	59	20
Bose headphones	54	68	26
iPod	150	167	11

NOTE.—WTP = willingness to pay.

For the purposes of the analyses presented above, 25 of 67 respondents were removed from condition A for giving responses that implied a failure to comprehend the task. The most common example would be something like as follows: respondents estimate a market price for Bose headphones as $129. By circling no, they indicate that they would not pay this much. Later, on line four, they indicate a maximum willingness to pay exceeding $129. Conversely, respondents may indicate that they would be willing to pay the market price they estimate, but then later indicate a lower price.

The population tested was not a student sample, and condition A was the most complicated condition of those used since it required five judgments, including an estimate of a conditional mean. As evidence that the requested task was simply too complex for some portion of the respondents, those removed for the reasons stated above were found to score less than half as high (1.28 vs. 2.57; $t(69) = 2.96$, $p < .01$) on a five-item test of reasoning ability that included the three items from the Cognitive Reflection Test (Frederick 2005).

APPENDIX H

DEGREE OF BIAS AND DEGREE OF PROJECTION FOR NINE STUDIES

In table H1, projection is evidenced by positive correlations and positive coefficients. There is a lot of projection. The average correlation between respondents' own valuation and predictions of others' valuation was 0.65, and the average regression coefficient (excluding study 2) was 0.7. In other words, for every additional dollar a respondent would be willing to pay for a good, his or her best estimate increased by 70¢.

TABLE H1

DEGREE OF BIAS AND DEGREE OF PROJECTION FOR NINE STUDIES

	Bias[a] (%)	Own ($)	Mean prediction[b] ($)	r(o,p)[c]	Prediction equation[d] ($)
Study 1 (N = 35):					
Red velvet sachet	101	2.70	5.44	.57	3.34 + .58 (own)
$20 California Pizza Kitchen card	2	15.00	15.30	.59	10.40 + .38 (own)
8 oz smoked salmon	122	3.00	6.67	.57	4.24 + .51 (own)
Soma wooden puzzle	72	3.00	5.17	.80	2.14 + .81 (own)
Pair of marketing textbooks	32	19.00	24.99	.88	4.11 + .98 (own)
Finding Nemo DVD	−4	15.00	14.44	.44	11.02 + .27 (own)
1 pound Jelly Bellies	83	4.00	7.30	.63	4.26 + .63 (own)
Teddy bear	390	1.00	4.90	.63	3.22 + .73 (own)
Music CD	262	1.25	4.53	.50	1.53 + 1.29 (own)
Handblown glass art	170	5.00	13.52	.38	10.27 + .40 (own)
Appendix A undergraduate real study (N = 76):					
Chocolate-covered blueberries	30	3.58	4.67	.71	2.64 + .57 (own)
$50 Starbucks credit card	15	34.92	40.07	.66	20.36 + .56 (own)
8-inch cedar bonsai tree	17	16.36	19.18	.60	10.48 + .53 (own)
Three bottles of 1998 Arrowood merlot	27	22.07	27.96	.73	10.39 + .79 (own)
HP Photosmart digital camera	14	122.80	139.99	.73	53.32 + .71 (own)
Appendix A undergraduate hypothetical study (N = 28):					
Chocolate-covered blueberries	47	2.45	3.60	.55	1.88 + .71 (own)
Jelly Belly machine	23	7.81	9.58	.88	4.81 + .61 (own)
$10 Starbucks credit card	28	5.92	7.60	.57	5.42 + .37 (own)
Marketing book	20	4.85	5.83	.73	2.64 + .66 (own)
Coffee mug	47	3.25	4.78	.61	2.82 + .60 (own)
Miniature bonsai kit	54	2.57	3.95	.76	1.98 + .77 (own)
Red velvet sachet	55	3.15	4.89	.60	2.66 + .71 (own)
Soma wooden puzzle	43	3.04	4.34	.75	2.12 + .73 (own)
Isoflex squeeze ball	87	1.00	1.87	.85	.71 + 1.16 (own)
Magnetic sculpture	45	2.06	2.98	.72	1.45 + .74 (own)
Appendix A executive education study (N = 34):					
Chocolate-covered blueberries	11	3.73	4.15	.76	.90 + .87 (own)
$20 Starbucks credit card	16	14.26	16.48	.61	9.55 + .49 (own)
Marketing book	26	6.71	8.43	.90	1.90 + .97 (own)
Coffee mug	28	4.35	5.58	.77	1.14 + 1.02 (own)
Red velvet sachet	73	3.02	5.21	.66	2.02 + 1.06 (own)
Soma wooden puzzle	12	4.71	5.29	.88	1.89 + .72 (own)
Isoflex squeeze ball	37	2.04	2.79	.89	.24 + 1.25 (own)
Magnetic sculpture	23	3.56	4.37	.75	1.33 + .85 (own)
Appendix B me → other study (N = 26):					
Ionic Breeze air purifier	224	20.00	64.71	.93	6.00 + 1.20 (own)
60 GB iPod	22	200.00	243.04	.83	53.95 + .96 (own)
Portable minicycle	300	20.00	80.00	.75	35.06 + .77 (own)
$100 California Pizza Kitchen card	25	55.00	68.52	.49	43.98 + .42 (own)
13.4 oz Ghirardelli chocolates	49	10.00	14.89	.62	5.33 + .78 (own)
Bose Quiet Comfort headphones	161	15.00	39.21	.82	1.83 + 1.42 (own)
Seasons 1–4 of *The Sopranos*	394	10.00	49.36	.45	31.29 + .69 (own)
Spalding official NBA basketball	125	10.00	22.54	.22	15.99 + .57 (own)
Body Shop aroma jar and scented oil	−14	10.00	8.64	.42	7.80 + .47 (own)
Appendix B other → me study (N = 31):					
Ionic Breeze air purifier	100	32.50	64.84	.79	6.15 + 1.13 (own)
60 GB iPod	13	200.00	225.94	.68	111.90 + .57 (own)
Portable minicycle	147	50.00	123.41	.58	66.90 + .80 (own)
$100 California Pizza Kitchen card	6	80.00	84.44	.36	66.34 + .24 (own)
13.4 oz Ghirardelli chocolates	27	15.00	19.00	.62	9.06 + .59 (own)
Bose Quiet Comfort headphones	81	32.50	58.69	.82	19.01 + .77 (own)
Seasons 1–4 of *The Sopranos*	213	25.00	78.13	.85	37.03 + .80 (own)
Spalding official NBA basketball	148	10.00	24.81	.19	18.07 + .46 (own)
Body Shop aroma jar and scented oil	44	10.00	14.41	.58	8.86 + .59 (own)

TABLE H1 (*Continued*)

	Bias[a] (%)	Own ($)	Mean prediction[b] ($)	r(o,p)[c]	Prediction equation[d] ($)
Study 2 (N = 307):					
2 inches taller	75	191	895	.53	.34 + 2.18 (own)
Protection from colds	369	377	658	.86	.76 + .86 (own)
"Eagle eye" vision	95	608	842	.77	1.18 + .63 (own)
Flawless teeth	51	692	1,349	.65	.51 + 1.69 (own)
Speak French fluently	29	732	941	.74	.57 + 1.35 (own)
Comprehensive vocabulary	29	812	1,048	.76	.61 + 1.26 (own)
Sleep requirements cut by half	38	846	1,276	.84	.66 + 1.87 (own)
Trip to the moon	353	2,410	10,912	.65	.43 + 2.57 (own)
Master of Business Administration yoked study (N = 21):					
24 Teuscher truffles	40	11.75	16.50	.80	4.58 + 1.02 (own)
14 used CDs	36	7.48	10.19	.55	3.62 + .88 (own)
Three Touch of Ivy sachets	3	4.64	4.79	.48	3.25 + .33 (own)
Coffee mug	14	2.73	3.12	.55	1.69 + .52 (own)
Dome Lightning Lamp	14	7.23	8.24	.64	4.58 + .50 (own)
Spalding basketball	30	10.19	13.29	.57	9.03 + .42 (own)
Kitchen science explained	16	6.91	8.05	.73	1.59 + .94 (own)
Undergraduate revenue-maximizing study (N = 55):					
Teuscher champagne truffles	23	5.00	6.17	.65	2.60 + .68 (own)
Sachet trio	200	2.00	5.99	.42	4.23 + .50 (own)
4 GB Nano iPod	2	160.24	163.89	.72	87.82 + .46 (own)
Microlight	63	3.00	4.89	.59	3.25 + .46 (own)
Electronic ice bucket	57	10.00	15.73	.36	11.90 + .33 (own)
Football	90	5.00	9.48	.57	7.11 + .36 (own)

NOTE.—For study 2, there were some very large outliers; log(valuation) was regressed against log(predictions). To avoid negative values, $1 was added to zero valuations.

[a]Percentage difference between estimated valuations and actual valuations.

[b]Arithmetic mean of the estimates of the statistic respondents were asked to predict.

[c]Correlation between respondents' own valuation and predicted mean (or median) valuations.

[d]Ordinary least squares estimates from regressing respondents' predictions against own willingness to pay. Study 2 results are the log of willingness to pay (in dollars).

APPENDIX I

CORRELATION OF ATTITUDINAL ITEMS WITH X EFFECT (A METRIC FROM −1 TO +1)

TABLE I1

CORRELATION OF ATTITUDINAL ITEMS WITH X EFFECT

	Mean response	*r*	*n*
How much "pain" do *you* feel when you spend money?			
0 . . . 1 . . . 2 . . . 3 . . . 4 . . . 5 . . . 6 . . . 7 . . . 8 . . . 9 . . . 10			
none a small amount a moderate amount intense "pain"	4.27	.01	267
How much "pain" do *others* feel when they spend money?	3.85	−.04	267
Own pain − others' pain	.42	.04	267
Compared to others taking this survey in [this] lab . . . :			
−5 . . . −4 . . . −3 . . . −2 . . . −1 . . . 0 . . . +1 . . . +2 . . . +3 . . . +4 . . . +5			
much less than average about average much more than average			
How reluctant are you to spend money, in general?	.53	.11	104
How excited would you be if you found a $20 bill?	2.60	.00	104
How upset would you be if you lost a $20 bill?	1.47	.07	104
How worried are you that you will be very poor when you are older?	−.98	−.07	104
How willing would you be to work longer hours for a higher salary?	1.35	−.15	104
How often do you delay purchasing something you really need?	1.31	.03	104
How much hassle would you be willing to endure to save $20?	1.84	.08	104
How wealthy are you?	−.98	−.09	104
How often do you fantasize about being wealthier?	1.36	−.18	104
How likely are you to go on a spending spree if you are feeling happy?	−.74	−.32***	104
How likely are you to go on a spending spree if you are feeling depressed?	−1.89	−.02	44
How much do you agree with the following statement? "Money is like oxygen: you need it to live, but you should just let it flow in and out of you, and not worry about it."	−.18	.09	44
To what extent does the cost of dining at a fancy restaurant prevent you from enjoying the experience?			
0 . . . 1 . . . 2 . . . 3 . . . 4 . . . 5 . . . 6 . . . 7 . . . 8 . . . 9 . . . 10			
not at all a small amount a moderate amount a large amount	4.14	−.07	104
If you were out with a group of people and someone didn't pay their fair share of the bill, how would you feel?			
0 . . . 1 . . . 2 . . . 3 . . . 4 . . . 5 . . . 6 . . . 7 . . . 8 . . . 9 . . . 10			
it wouldn't bother me it would upset me a little I'd be quite angry I'd be furious	5.54	−.15	104
What is the most you've ever spent on a bottle of wine?			
<$10 . . . $10 . . . $20 . . . $30 . . . $40 . . . $50 . . . $75 . . . $100 . . . $150 . . . $200 . . . $250+	$24	−.21*	103
What is the typical answer to the question above?			
<$10 . . . $10 . . . $20 . . . $30 . . . $40 . . . $50 . . . $75 . . . $100 . . . $150 . . . $200 . . . $250+	$50	.09	104
What is the most you've ever spent on dinner (your share of the bill)?			
<$10 . . . $10 . . . $20 . . . $30 . . . $40 . . . $50 . . . $75 . . . $100 . . . $150 . . . $200 . . . $250+	$58	−.18	104
What is the typical answer to the question above?			
<$10 . . . $10 . . . $20 . . . $30 . . . $40 . . . $50 . . . $75 . . . $100 . . . $150 . . . $200 . . . $250+	$60	.11	61
How frugal is your father?			
0 . . . 1 . . . 2 . . . 3 . . . 4 . . . 5 . . . 6 . . . 7 . . . 8 . . . 9 . . . 10			
not at all somewhat extremely	5.48	−.06	104
How frugal is your mother?			
0 . . . 1 . . . 2 . . . 3 . . . 4 . . . 5 . . . 6 . . . 7 . . . 8 . . . 9 . . . 10			
not at all somewhat extremely	5.74	.17	104
How frugal is your boyfriend/girlfriend/husband/wife?			
0 . . . 1 . . . 2 . . . 3 . . . 4 . . . 5 . . . 6 . . . 7 . . . 8 . . . 9 . . . 10			
not at all somewhat extremely	4.75	−.09	92

*$p < .05$.
***$p < .001$.

APPENDIX J

ACTUAL AND PREDICTED COMPENSATION DEMANDED TO ENDURE AVERSIVE EXPERIENCES

These data ($n = 268$) were collected over five survey sessions at the University of Michigan, as part of a larger survey that respondents were paid $8 to complete. The exact instructions varied between sessions, and are shown below. They yielded very similar results and were pooled for the purpose of the analyses reported in table J1.

The current results are consistent with prior results from McFarland and Miller (1990), who found that undergraduates at Simon Fraser University predicted that they would incur greater discomfort from panhandling than their fellow students and would be more disturbed by a movie depicting gruesome surgical procedures. However, since a student's own rating was near the ceiling of a 9-point scale in that study, those results can be interpreted as regression effects (Erev, Wallsten, and Budescu 1994; Krueger and Mueller 2002; Moore 2007; Moore and Cain 2007). The current study's results cannot be so readily explained since the response scale was unbounded for both reports and predictions.

TABLE J1

ACTUAL AND PREDICTED COMPENSATION DEMANDED TO ENDURE AVERSIVE EXPERIENCES ($)

	Compensation demanded	
Aversive experience	Actual	Predicted
Eat four hardboiled eggs over 15 minutes	12	10****
Sharpen 100 pencils using a mechanical sharpener	13	12*
Eat five hardboiled eggs over 15 minutes	16	13****
Walk around campus with a shirt that says "Repent!"	22	20**
Compose and recite a poem about love in class	28	25***
Go without sleep tonight	43	34****
Eat three large jalapeno peppers with no drinks	49	37****
Fast for 4 consecutive days (drinking only water)	166	135****
Shave your head completely	766	222****

NOTE.—Data are geometric means, and significance values were computed using a Wilcoxon signed rank test.
*$p < .05$.
**$p < .01$.
***$p < .001$.
****$p < .0001$.

Instructions:

Below, we will describe some things that most people find either boring, embarrassing, unpleasant, or even disgusting; things that people would generally have to be paid to do.

For each thing we list, we want to know your "minimum compensation demanded" (MCD)—the ***smallest*** amount of money for which you would agree to do it. Please report your ***minimum*** compensation demanded. Obviously, you would probably be willing to do any of these things if you were paid enough, but we want to know the *least* you would do each of these things for.

[$N = 162$]

After you have decided the amount that **you** would be willing to do it for, we would like you to guess the **average** amount that **other** students who were completing this survey reported.

Eat 4 hard boiled eggs over a period of 15 minutes. My MCD = $_____ Average MCD = $_____
Eat 5 hard boiled eggs over a period of 15 minutes. My MCD = $_____ Average MCD = $_____
Walk around campus with a shirt that says "Repent!" My MCD = $_____ Average MCD = $_____
Sharpen 100 pencils using a mechanical sharpener. My MCD = $_____ Average MCD = $_____
Go without sleep tonight. My MCD = $_____ Average MCD = $_____
Fast for 4 consecutive days (drinking only water). My MCD = $_____ Average MCD = $_____
Compose and recite a poem about love in class. My MCD = $_____ Average MCD = $_____
Eat 3 large jalapeno peppers with no drinks. My MCD = $_____ Average MCD = $_____
Shave your head completely. My MCD = $_____ Average MCD = $_____

[$N = 106$]

After you have decided the amount that **you** would be willing to do it for, we would like you to guess the MCD reported by the student who completed the survey just before you.

Eat 4 hard boiled eggs over a period of 15 minutes. My MCD = $_____ Their MCD = $_____
Eat 5 hard boiled eggs over a period of 15 minutes. My MCD = $_____ Their MCD = $_____
Walk around campus with a shirt that says "Repent!" My MCD = $_____ Their MCD = $_____
Sharpen 100 pencils using a mechanical sharpener. My MCD = $_____ Their MCD = $_____
Go without sleep tonight. My MCD = $_____ Their MCD = $_____
Fast for 4 consecutive days (drinking only water). My MCD = $_____ Their MCD = $_____
Compose and recite a poem about love in class. My MCD = $_____ Their MCD = $_____
Eat 3 large jalapeno peppers with no drinks. My MCD = $_____ Their MCD = $_____
Shave your head completely. My MCD = $_____ Their MCD = $_____

APPENDIX K

CORRELATION OF ATTITUDINAL ITEMS WITH AGGREGATE MEASURE OF EFFECT

This analysis is based on results of the study already summarized in appendix G. For the purposes of this analysis, I pooled across the four conditions reported there.

TABLE K1

CORRELATION OF ATTITUDINAL ITEMS WITH AGGREGATE MEASURE OF EFFECT

	Mean response	*r*
Compared to others taking the survey here today		
−5 . . . −4 . . . −3 . . . −2 . . . −1 . . . 0 . . . +1 . . . +2 . . . +3 . . . +4 . . . +5		
much less than average / about average / much more than average		
How much do you like going shopping?	.32	−.14*
How intelligent are you?	2.09	−.04
How wealthy are you?	−.21	−.11
How far would you be willing to drive to save $15 on a purchase?	.13	.03
In terms of your attitude toward spending money, how would you describe yourself?		
−5 . . . −4 . . . −3 . . . −2 . . . −1 . . . 0 . . . +1 . . . +2 . . . +3 . . . +4 . . . +5		
spendthrift / neither / tightwad	.14	.13*
How seriously did you take this survey?		
0 . . . 1 . . . 2 . . . 3 . . . 4 . . . 5 . . . 6 . . . 7 . . . 8 . . . 9 . . . 10		
not at all / somewhat / very	6.5	.00

NOTE.—$N = 240$.
*$p < .05$.

Here, the index of bias was the reciprocal of the average ratio of respondents' own valuation to estimates for each of good:

$$\frac{n}{\sum_{i=1}^{i=n}\left[\text{own}\frac{\text{WTP}_i}{\text{estimate}}\text{of average WTP}_i\right]}.$$

Respondents with indices >1 are classified as exhibiting the bias. By this metric, 87% of respondents in this study exhibited the X effect. This is a conservative classification. To see why, suppose someone believes he values apples twice as much as others but values oranges only half as much as others. On the whole, these two beliefs suggest that his overall valuation of fruit is typical. Yet this metric would classify such a person as showing the opposite bias as that identified here (i.e., the average of 2 + 1/2 is 1.25, and the reciprocal of that is 0.8). Classification is secondary here, however. The main purpose of creating a summary index was to examine relations between a belief that others will pay more and various psychographic items occurring later in the survey. In any case, this continuous measure typically correlates quite highly with simpler ordinal measures (such as that used in app. I), which merely record the fraction of goods for which respondents' estimates exceed their own valuation.

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