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Mispredicting the endowment effect: underestimation of owners' selling prices by buyer's agents

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Abstract

People tend to value objects more simply because they own them. Prior research indicates that people underestimate the impact of this *endowment effect* on both their own and other people's preferences. We show that underestimating the endowment effect and hence owners' selling prices can lead to suboptimal behavior in settings with economic consequences. Subjects acting as "buyer's agents" made suboptimally low offers for an owner's commodity. Although buyer's agents learned to make increasingly optimal (i.e., higher) offers over repeated interactions with an initial commodity, this learning did not generalize to interactions with a new commodity.

JEL classification: C91; D83

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1. Introduction

The *endowment effect* (Knetch, 1989; Thaler, 1980) is among the most robust phenomena in the emerging field of behavioral economics. Contrary to the traditional assumption in economics that preferences are fixed in the short-term, the endowment effect indicates that preferences can change rapidly and systematically because of changes in an individual's transient asset position. Specifically, people become attached to objects that are in their

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possession and are reluctant to part with them, even if they would not have particularly desired the objects had they not been endowed with them. The endowment effect has been demonstrated in numerous studies, both in the lab (Kahneman et al., 1990, 1991; Knetch and Sinden, 1984) and in the field (Johnson et al., 1992).

Given the importance of the endowment effect for everyday economic behavior, people's *perceptions* of the endowment effect may be similarly important. If people were aware of the endowment effect—if they were aware that they would quickly become attached to objects in their possession—they could at least take these shifting preferences into account when making decisions. For example, when deciding what price they should be willing to pay for an automobile, consumers could properly weigh how much merely owning the vehicle would increase their valuation of it. Prior research, however, indicates that people underestimate the magnitude of the endowment effect. Specifically, individuals underestimate how much they will become attached to objects once those objects become part of their endowment (Loewenstein and Adler, 1995; Van Boven et al., 2000). In this paper, we review evidence indicating that people also underestimate the endowment effect when it comes to predicting other people's preferences. We report a study examining whether this underestimation can lead to suboptimal behavior in settings with economic consequences, and, if so, whether people learn from experience.

1.1. Underestimating the endowment effect

Loewenstein and Adler conducted a series of studies in which individuals predicted their own lowest selling price for an object they did not yet possess. In one study, subjects were shown a coffee mug, told that it would be given to them 1 week later, and asked to predict the minimum price for which they would be willing to sell the mug. The mug was subsequently given to them and they stated actual minimum selling prices. Subjects significantly underestimated what their own selling prices would be. In another study, some subjects (potential owners) were told that there was a 50 percent chance that they would receive a coffee mug, and stated the minimum price for which they would sell the mug if they were to receive it (s'). Other subjects (actual owners) were given a mug, and stated their minimum selling price for the mug (s). Potential owners stated much lower selling prices than actual owners ($s' < s$), even though in both cases their stated selling prices determined whether they actually sold their mugs. A third group of subjects (choosers) who did not have mugs were asked to state a "choice price": the lowest price at which they would choose to receive the mug rather than the money (c). Consistent with the endowment effect, choice prices were lower than owners' selling prices ($c < s$).

Loewenstein and Adler constructed an index of non-owners' underestimation of the endowment effect:

$$\beta = \frac{s - s'}{s - c}.$$

If potential owners correctly anticipate the endowment effect and predict their selling prices perfectly (i.e., if $s' = s$), β equals 0. If potential owners anticipate no endowment effect and predict that their selling price will equal the choice price (i.e., if $s' = c$), β equals 1. In

fact, β was 0.84; potential owners underestimated the true impact of the endowment effect on their own preferences by approximately 85 percent.

In studies reported elsewhere, we examined owners' and buyers' predictions of one another's reservation prices (Van Boven et al., 2000). We endowed owners with mugs and asked them to state their lowest selling price (s). We asked buyers to state the maximum price they would be willing to pay to buy a mug (b). We also asked owners to estimate the average buyer's maximum purchase price (b') and we asked buyers to estimate the average owner's minimum selling price (s'). There was, of course, an endowment effect: owners' minimum selling prices were higher than buyers' maximum purchase prices ($s > b$). More important for the present research, both owners and buyers underestimated the endowment effect: owners overestimated buyers' maximum purchase price ($b' > b$) and buyers underestimated owners' minimum selling price ($s' < s$). Thus, people also underestimate the impact of the endowment effect on *other people's* preferences.

We constructed indices of the gap between owners' and buyers' estimates of the endowment effect and the actual endowment effect, γ_o and γ_b, respectively, analogous to Loewenstein and Adler:

$$\gamma_o = \frac{b' - b}{s - b}, \qquad \gamma_b = \frac{s - s'}{s - b}.$$

If owners and buyers estimate the other role's valuation accurately (i.e., if $b' = b$ and $s' = s$), then γ_o and γ_b equal 0, reflecting perfectly accurate perceptions of the magnitude of the endowment effect. If owners and buyers are completely unaware of the endowment effect and estimate the other role's reservation price to be equal to their own reservation price (i.e., if $b' = s$ and $s' = b$), then γ_o and γ_b equal 1.

Across two studies, both γ_o and γ_b equaled 0.39; both owners and buyers underestimated the magnitude of the endowment effect by approximately 40 percent.[1] This underestimation was not significantly reduced when people had recently attended lectures about the endowment effect in one of their psychology classes, when they estimated the valuations of people in the other role (buyer or seller) before they stated their own valuation, or when they were offered a monetary incentive ($2) for estimating the other role's valuation accurately (within ±5 percent). In sum, people underestimate the impact of the endowment effect on both their own and other people's preferences.

1.2. Our study

We conducted a study patterned on a study we report elsewhere (Van Boven, Dunning, and Loewenstein) in which the profits earned by "buyer's agents" were contingent on their ability to accurately estimate owners' selling prices. Buyer's agents offered a portion of money they had received from the experimenter to purchase an owner's commodity. If the

[1] Notice that γ_b from Van Boven, Dunning, and Loewenstein (0.39) was less than β from Loewenstein and Adler (0.84). The discrepancy is probably because Loewenstein and Adler examined the ratio $\beta = (s-s')/(s-c)$, whereas Van Boven, Dunning, and Loewenstein examined the ratio $\gamma_b = (s - s')/(s - b)$. Because the buying price (b) is naturally lower than the choice price (c) due to loss aversion for money, γ_b will generally be smaller than β.

offer was accepted, the agent received the difference between the amount received from the experimenter and the amount offered; otherwise, the agent received nothing. Buyer's agents thus had an incentive to make an offer that was equal to or slightly higher than the owner's selling price. This procedure was repeated for five rounds; owners and buyer's agents were randomly paired with each other in each round.

We predicted that because non-owners tend to underestimate the endowment effect (and thus owners' selling prices), buyer's agents would initially make suboptimal offers—offers that were substantially lower than the expected-value maximizing offer. We also predicted that buyer's agents would learn to make increasingly optimal (i.e., higher) offers over time, as they gained information about owners' lowest selling prices. Previous research has found that the magnitude of some anomalous phenomena declines with stationary replication in a market setting (e.g., Camerer, 1987). The critical features of repetition that produce this effect appear to be experience and feedback (see Cox and Grether, 1996, for a general discussion and specific findings involving preference reversals). In the present study, buyer's agents would have learned of four different selling prices by the time they made an offer in the fifth round. We therefore expected agents' offers in round 5 to be significantly more optimal than their offers were in round 1.

After five rounds of buying and selling with the first commodity, we endowed the same owners with a second commodity and repeated the buying and selling procedure. If buyer's agents make increasingly optimal offers during the first five rounds because they learn about the underlying cause of owners' relatively high selling prices (the endowment effect) then agents' learning should generalize to the new commodity. We did not expect that to be the case. Rather, we expected agents' initial offers for the second commodity to once again be too low, corresponding more to their initial, rather than their final, offers for the first commodity.

We based this prediction on psychological research indicating that learning through repetition is often superficial. People learn to adjust their behavior to produce desired outcomes in specific situations, but have difficulty in understanding the psychological processes or the abstract structure of the situation that produce the desired outcomes (Bassok et al., 1995). Such failures of learning to transfer to novel situations have also been observed in experimental economics. In one study, Kagel and Levin (1986) found that subjects who bid on an asset in a 3-person auction initially overbid, exhibiting the winner's curse (Bazerman and Samuelson, 1983). After several rounds, subjects learned to decrease their bids such that they no longer lost money and no longer exhibited the winner's curse. However, when subjects were introduced to a 6-person auction—a novel task with the same underlying structure—instead of decreasing their bids further, as would have been normative given an understanding of the winner's curse, they increased their bids because they thought it was necessary to bid more aggressively in the new situation. Although subjects learned to avoid losses in the first situation, they did not learn about the abstract structure of the winner's curse in a way that they could immediately apply to the new situation. In our study, by analogy, we did not expect agents' learning with the first commodity to transfer immediately to the second commodity. When the new commodity was introduced, we therefore expected buyer's agents' behavior to resemble their initial behavior with the first commodity more than their final behavior with that commodity.

2. Method

Students at Cornell University and Carnegie Mellon University ($N = 302$) enrolled in introductory psychology and economics courses participated in one of nine sessions in exchange for the opportunity to earn either goods or cash, depending on what role they were assigned to. After briefly describing the roles, the experimenter randomly assigned subjects within each session to equal numbers of owners and buyer's agents.

Depending on the session, owners were given a mug, pen, poster, or shot glass, all priced at about $6 at the campus store (see Table 1). Owners within a particular session were all given the same commodity.

All subjects were then given packets containing questionnaires and instructions that were identical for subjects in both roles and that described the general procedure. The experimenter read all three sets of instructions aloud to all subjects while they read along:

General instructions

In this exercise, you have been assigned either to the role of "owner" or "buyer's agent". Please read the instructions for both roles, regardless of which role you will play.

The first part of this exercise consists of five rounds. In each round, a buyer's agent will be randomly paired with an owner. The owner will specify the lowest price he/she will sell his/her [commodity] for and the buyer's agent will specify an offer. At the end of the experiment, one of the five rounds will be randomly selected to count. If the owner ends up keeping the [commodity] in that round, then he/she will keep the [commodity]. If the owner has sold the [commodity] in that round then he/she will return the [commodity] to the experimenter and receive the amount offered by the buyer's agent in that round.

Instructions for owners

You now own a [commodity] that is yours to keep and take home. You will specify the lowest price you will sell your [commodity] for. In each round, you will be randomly

Table 1
Number of subjects in each session, order in which commodities were traded in each session, and the ratio of agents' average offer to the optimal offer in the first and final rounds of trading for each commodity in each session

N	First commodity	Ratio of average offer to optimal offer		Second commodity	Ratio of average offer to optimal offer	
		Round 1	Round 5		Round 6	Round 10
12	Mug	0.71	0.86	Shot glass	0.77	1.03
24	Mug	0.62	0.85	Shot glass	0.76	0.82
34	Shot glass	0.71	0.85	Mug	0.76	0.89
34	Mug	0.67	0.90	Pen	0.71	1.03
34	Mug	0.84	1.00	Poster	0.68	0.96
34	Poster	0.89	0.75	Mug	0.89	0.88
36	Pen	0.82	0.84	Mug	0.77	0.93
46	Mug	0.78	1.01	Shot glass	0.77	1.05
48	Mug	0.71	0.87	Pen	0.66	0.76
Average		0.75	0.88		0.75	0.93

paired with one of the other students acting as a "buyer's agent". The buyer's agent will make an offer to purchase your [commodity]. If the offer is higher than or equal to your lowest selling price, then you will return the [commodity] to the experimenter and be paid the price of the offer. If the offer is lower than your lowest selling price, you will keep your [commodity] and get no money.

Instructions for buyer's agents

You now do not own a [commodity] that is yours to keep and take home. You will act on behalf of a buyer (the experimenter) who has given you $10 to purchase a [commodity] for him/her. In each round, you will be randomly paired with one of the owners who has been given a [commodity] to keep and take home. You will make an offer for that person's [commodity]. The owner will specify a minimum selling price. If the amount that you offer is equal to or higher than the owner's minimum selling price, then your offer is accepted: the owner will be paid the price of the offer and will return the [commodity] to the experimenter, and you will keep whatever is left of the $10—that is, $10 minus the amount of the offer. If the offer is less than the owner's minimum selling price, then your offer is not accepted in which case the owner will keep his or her [commodity] and you will get no money.

The instructions varied slightly from one session to another, depending primarily on the commodity given to owners.

Subjects' packets also contained instructions and questionnaires for each round. In round 1, owners stated their lowest selling price by indicating for every price on a list of prices that increased in 50¢ intervals from $0 to $10 whether they would sell their mug for that price or not. Also for round 1, buyer's agents stated their offer on a list of prices that increased in 50¢ intervals from $0 to $10. Owners wrote their lowest selling prices and agents wrote their offers on slips of paper, which the experimenter collected and randomly distributed to one member of the other group. After buyer's agents received a lowest selling price and owners received an offer, subjects recorded in their packets whether the offer was accepted, and, if so, how much money they would receive or keep. Buyer's agents thus received information about the lowest selling price of one owner after each round of the experiment. This process repeated until round 5 was finished, by which time buyer's agents had learned of five different selling prices.

The market for the first commodity was then declared closed. Owners were immediately given a different commodity that sold for a similar price at the campus store (see Table 1). The item was also shown to buyer's agents, who were asked to examine it. The experimenter explained that subjects would complete five additional rounds that would be identical to the first five rounds, except that owners would state lowest selling prices and buyer's agents would make offers for the new commodity.[2] Subjects were given the following written instructions, which the experimenter read aloud:

The second part of this exercise consists of five additional rounds (rounds 6 through 10). Everything will be exactly the same as in the first five rounds, except that the owners

[2] Because of time constraints, one group did not complete rounds 9 and 10.

have been given a [commodity] for which they will state their lowest selling price and for which the buyer's agents will make offers. In each round, a buyer's agent will be randomly paired with an owner. At the end of the experiment, one of the five rounds from the second set of rounds will be randomly selected to "count". If the owner ends up keeping the [commodity] in that round, then he or she will keep the [commodity]. If the owner has sold the [commodity] in that round then he or she will return the [commodity] to the experimenter and receive the amount offered by the buyer's agent in that round.

After completing the final round, the experimenter randomly selected one of the first five rounds and one of the second five rounds and honored all transactions in those two rounds.

3. Results

Because the behavior of buyer's agents and owners within a particular session are not statistically independent, we either used the nine sessions as the unit of analysis or statistically controlled for the fixed effects of experimental session.

To examine the optimality of buyer's agents' behavior, we computed the ratio of the average actual offer to the expected-profit maximizing offer for each round of each session. A ratio of 1 would indicate the actual offers were exactly optimal. If the offers were too high, the ratio would be greater than 1; if they were too low, as we expected them to be, the ratio would be less than 1. Note that the ratio of actual to optimal offers is standardized across sessions and commodities.

3.1. Trading the first commodity

The average ratio of actual offers to the optimal offer for each round averaged across the nine sessions is displayed in Fig. 1. The ratios of average to optimal offers for the first and final rounds of trading with the first and second commodity for each session are displayed in Table 1. As anticipated, the average ratio in round 1 (0.75) was significantly less than 1 (one-sample $t(8) = 8.53$, $p < 0.01$) indicating that buyer's agents' initial offers were too low.

Buyer's agents also exhibited the anticipated learning (see Fig. 1). In all but one session, the ratio increased by round 5, to an average of 0.88 (see Table 1). To examine the statistical significance of this increase, we conducted two regressions: the first regression predicted the ratio of actual to optimal offers from a variable representing ROUND (coded 1–5); the second regression predicted the ratio from ROUND and ROUND SQUARED.[3] (Both regressions controlled for fixed effects of experimental session.) In the first regression, as predicted, the coefficient associated with ROUND was positive and significant ($\beta = 0.027$, $t(35) = 3.29$, $p < 0.005$). Agents' offers became more optimal as they gathered more information about owners' selling prices. In the second regression, the linear term was significant ($\beta = 0.094$, $t(34) = 2.33$, $p < 0.05$) and the quadratic term was marginally significant ($\beta = -0.011$, $t(34) = 1.71$, $p < 0.10$), reflecting that agents' offers increased at a somewhat declining rate over time.

[3] All linear regressions reported in this paper contain a constant.

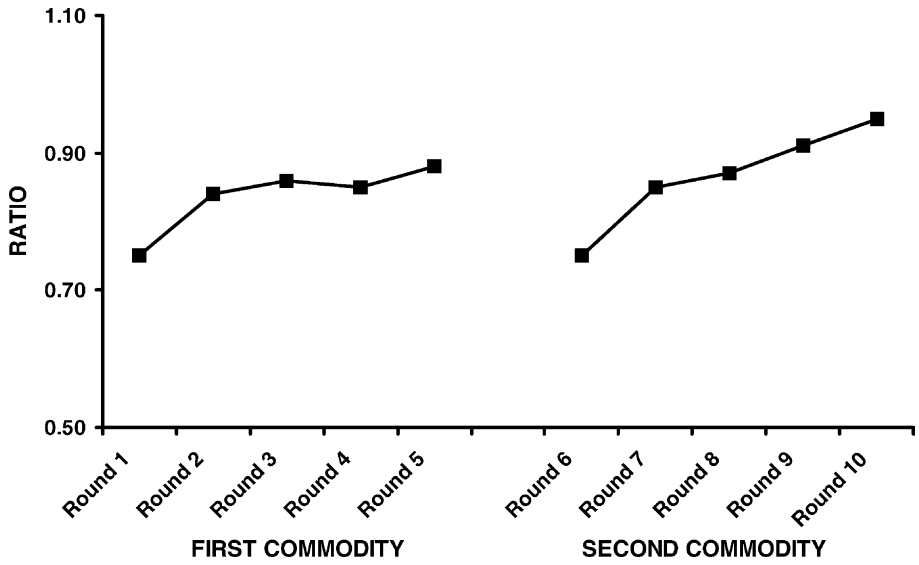

Fig. 1. Ratio of average actual offers to optimal offers for each round of interactions with the first and second commodities, averaged across nine sessions.

3.2. *Trading the second commodity*

What happened in round 6, the first round of trading with the second commodity? It is clear in Fig. 1 and Table 1 that the average ratio of actual to optimal offers in round 6 was less than the ratio in round 5 (paired $t(8) = 2.86$, $p < 0.025$). In fact, the average ratio of actual to optimal offers in round 6 (0.75) was the same as in round 1. Indeed, in all but one session, the ratio decreased from rounds 5 to 6. The one exception was the same session in which the ratio in round 5 was less than in round 1. In other words, in all the sessions in which agents learned from rounds 1 to 5 that learning did not transfer to a new commodity. The probability of this pattern occurring by chance is less than 0.0001 (binomial $z = 4.43$).[4] There was thus no observable transfer of learning from rounds 5 to 6.

Over rounds 6–10, as trading with the second commodity progressed, buyer's agents once again increased their offers relative to the optimal offers (see Fig. 1). To examine the statistical significance of this increase, we conducted two regressions: the first regression predicted the ratio of actual to optimal offers from ROUND (coded 1–5 for rounds 6–10, respectively); the second regression predicted the ratio from ROUND and ROUND SQUARED.[5]

[4] The null probability is 0.25, assuming a null 0.50 probability for each of the two inequalities, i.e., that the ratio in round 5 was higher than in round 1, and that the ratio in round 6 was lower than in round 5.

[5] Because one session did not complete rounds 9 and 10, we used the average ratio of actual to optimal offers from the other eight sessions as an estimate of the shorter session's ratio for those rounds.

In the first regression, as predicted, the coefficient associated with ROUND was positive and significant ($\beta = 0.045$, $t(35) = 5.76$, $p < 0.001$). Agents' offers became more optimal as they (once again) gathered more information about owners' selling prices for the second commodity. In the second regression, the linear term was marginally significant ($\beta = 0.074$, $t(34) = 1.80$, $p = 0.08$) and the quadratic term was not significant ($\beta = -0.0047$, $t < 1$). There was no reliable change in the rate at which relatively optimal offers increased over time. These results indicate that even though buyer's agents' learning with the first commodity did not transfer to the second commodity, agents' did once again learn as they gained experience buying and selling the second commodity.

3.3. Trading the first versus second commodity

Was the rate at which the ratio of actual to optimal offers increased during interactions with the second commodity faster than it was during interactions with the first commodity? We examined the possibility of such a "savings in learning" by regressing the ratio of actual to optimal offers on COMMODITY (with 1 representing the second commodity and 0 representing the first commodity), ROUND (coded 1–5 for both rounds 1–5 and for rounds 6–10), and the interaction of ROUND and COMMODITY, again controlling for the fixed effects of session. Our primary interest was in the interaction, which tests whether the linear increase in the ratio over interactions with the second commodity is greater than the linear increase in the ratio over interactions with the first commodity. The coefficient associated with this interaction, although positive ($\beta = 0.019$), was only marginally significant ($t(78) = 1.60$, $p = 0.11$).[6] There was thus no reliable evidence for a savings in learning in interactions with the second commodity relative to the first commodity.

3.4. Alternative interpretations

The foregoing analyses indicate that agents' offers are initially too low relative to the expected-payoff maximizing offer and then become increasingly optimal over repeated interactions with an initial commodity. When trading for a novel commodity begins, however, agents' offers are again too low relative to the expected-payoff maximizing offer before increasing over repeated interactions with the second commodity. Our hypothesis is that this pattern stems from agents' underestimation of the endowment effect, their resulting underestimation of selling prices, and their failure to learn about the endowment effect from feedback about owners' selling prices. There are, however, several alternative interpretations for various portions of our results. We consider four alternative interpretations and describe evidence contradicting each.

[6] We also conducted a regression to compare the quadratic increase in ratios over interactions with the first commodity versus interactions with the second commodity. We estimated the ratio of actual to optimal offers from COMMODITY, ROUND (as defined earlier), ROUND SQUARED, and the product of COMMODITY and ROUND SQUARED, all while controlling for the fixed session effects. This interaction term was not significant ($\beta = 0.0066$, $t < 1$).

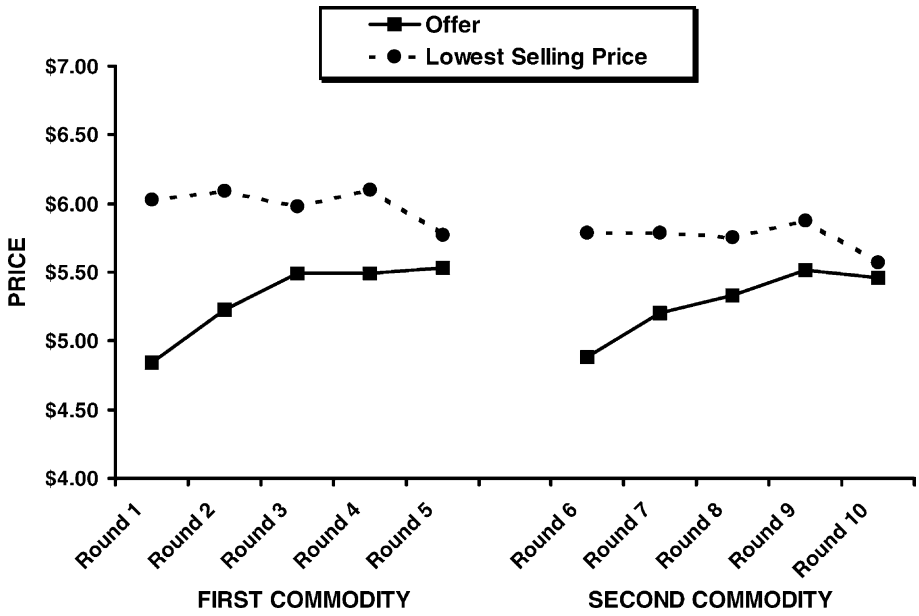

Fig. 2. Average offer and lowest selling price for each round of interactions with the first and second commodities, averaged across nine sessions.

3.4.1. Changing selling prices?

The first possible alternative is that diminishing selling prices over time caused the offers to be increasingly optimal (see Fig. 2). We examined this possibility by conducting four regressions parallel to those reported earlier, but using offers and selling prices as dependent variables rather than the ratio of actual to optimal offers. For each commodity, we conducted two regressions, one predicting offers and the other predicting selling prices from ROUND (coded 1–5 for both rounds 1–5 and for rounds 6–10).[7] For offers, the coefficient associated with ROUND was significant for both the first and second commodities (β's $= 0.154$ and 0.164, respectively, both p's < 0.01). As we suggested, agents' offers increased over repeated interactions with each commodity. For selling prices, in contrast, the coefficients associated with ROUND, although negative, were not significant for either the first or the second commodity (β's $= -0.019$ and -0.057, p's > 0.6 and 0.13, respectively). These results indicate that the increasingly optimal offers within each set of rounds were caused more by increases in buyer's agents' offers than by decreases in owners' selling prices.

3.4.2. Signaling

Another alternative interpretation is that agents made low offers and owners stated high selling prices in early rounds in an effort to signal or "teach" subjects in the other role

[7] To estimate the offers and selling prices for the session that did not complete rounds 9 and 10, we conducted regressions predicting offers and selling prices in round 8 from offers and selling prices, respectively, in rounds 6 and 7. We used the resulting regression equations to estimate what the offers and selling prices would have been if that session had completed all 10 rounds.

to change their behavior. That is, agents may have made especially low offers to entice sellers state lower selling prices while sellers may have stated especially high selling prices to make agents to make higher offers. Such a strategy could make sense if the number of subjects were few enough so that the probability of being paired again with a particular owner in later rounds was relatively high. On this analysis, we would expect the ratio of actual to optimal offers in the initial round of trading with a particular commodity to be negatively correlated with the number of subjects in that session. To the contrary, the coefficients associated with number of subjects in a session were not significant in regressions predicting the ratio of actual to optimal offers for either the first or the second commodity (β's $= -0.002$ and 0.002, respectively, both t's < 1).

3.4.3. Fairness

One reason buyer's agents might have made low offers is that they may have felt that dividing $10 roughly in half was only fair (Kahneman et al., 1986). But such an interpretation neither accounts for the increase in relatively optimal offers from rounds 1 to 5, nor the relative decrease from rounds 5 to 6, nor the subsequent increase from rounds 6 to 10. Concerns about fairness thus do not offer a viable alternative interpretation of our overall pattern of results.

3.4.4. Risky preferences

A final alternative interpretation of our results concerns a potential preference by buyer's agents for risky offers. Given the relatively small amounts of money at stake, buyer's agents may have preferred a low probability of a large cash payoff to a high probability of a low cash payoff (Markowtiz, 1952). If so, then agents would have made relatively low, risky offers. Note that this interpretation does not explain why agents' offers would increase over repeated interactions with owners, nor why that increase would not transfer to a new commodity. But it could contribute to agents' relatively low initial offers.

To examine the viability of this risky interpretation, we conducted a small study in which buyer's agents were given full information about owners' lowest selling prices. We divided a group of 12 Carnegie Mellon University students into six owners and six buyer's agents. The instructions and procedure mirrored those described earlier, except that owners were given a Carnegie Mellon key chain rather than a mug and buyer's agents could make offers as high as $5 rather than as high as $10. Before making their offers, buyer's agents were told the distribution of owners' lowest selling prices, which were: $1, $1, $1.5, $2, $3, and $3.5. They were told that they would be randomly paired with one of the sellers who had specified the prices.

If agents' low offers in the main study stem from a preference for risky offers, particularly given the relatively small amount of money at stake, then agents' offers for the key chain should be below the $2 expected-payoff maximizing offer. If, as we hypothesize, agents' low offers stem from their underestimation of the endowment effect and of owners' selling prices, then giving agents full (and accurate) information about owners' selling prices should lead them to make more optimal offers. In line with our interpretation, the average offer ($2.33) was slightly higher than the optimal offer of $2. Four agents made offers of $2 and two made offers of $3. Informed about owners' selling prices, then, buyer's agents

came close to maximizing expected value. This casts doubt on the risky interpretation of the buyer's agents' behavior.

4. General discussion

Because buyer's agents underestimated the impact of the endowment effect on owners' selling prices, they made suboptimal offers for an owner's commodity, leaving them with less money than they could have made. Buyer's agents learned to behave more optimally when this procedure was replicated with the same commodity, but this learning did not transfer to interactions with a superficially novel commodity. Rather, agents' initial offers for the second commodity were significantly less optimal than their final offers for the first commodity—they were equivalent, in fact, to agents' initial offers for the first commodity. In short, buyer's agents' underestimation of the endowment effect led them to behave suboptimally in a setting with economic consequences.

4.1. Implications for everyday economic behavior

Our findings naturally raise the question of whether underestimating the endowment effect might cause similarly suboptimal behavior in settings outside the laboratory. Although the results of our study do not address this question directly, they strongly suggest that it will. Our study was a conservative test of learning among buyer's agents. Less than 5 min elapsed between rounds 5 and 6, and so there was little time for agents to forget what they had learned from their dealings with the first commodity. Furthermore, the instructions for trading with the second commodity explicitly stated the similarity between trading with the two commodities. Subjects read "everything will be *exactly the same* as in the first five rounds, except that the owners have been given a [new commodity] for which they will state their lowest selling price and for which the buyer's agents will make offers" (italics added). Agents nonetheless did not generalize their learning from one commodity to another.

Outside the laboratory, in fact, learning may be more difficult. Buyers are unlikely to receive prompt, unambiguous feedback regarding sellers' reservation prices as they did in our study. Outside the lab, buyers may be informed only that their offer was rejected without learning what the owners' true lowest selling price was. Without such feedback, learning will be slow, if it occurs at all (Einhorn, 1982).

Another reason that learning may be even more difficult outside the laboratory is that the feedback people do receive may be open to many interpretations other than the endowment effect. A potential homebuyer, for example, may make several inferences about a high asking price, only one of which concerns the endowment effect. The buyer may instead infer that the owner is greedy, unintelligent, or misinformed about the value of the home. Evidence we report elsewhere suggests that people are likely to endorse such alternative explanations as these more readily than they endorse explanations based on the endowment effect (Van Boven, Dunning, and Loewenstein, Study 4). In that study, we asked owners and buyer's agents to rate several explanations for the behavior of the person in the other role with whom they were paired. One of the reasons was a simple description of the endowment effect; another reason was that the other person was greedy. People rated the other person's

greed as a significantly more likely explanation for the other person's behavior than the endowment effect.

The tendency to misinterpret behaviors that result from the endowment effect can itself have consequences for economic behavior outside the laboratory, in addition to the consequences of underestimating the endowment effect. If an individual interprets someone's behavior as stemming from greed as opposed to the endowment effect, the individual may come to dislike the other person. That dislike, in turn, may increase the individual's willingness to incur losses to hurt the disliked person (Gibbons and Van Boven, 2001; Loewenstein et al., 1989; Levine, 1998; Rabin, 1993). Underestimation of the endowment effect may therefore have both direct and indirect consequences for everyday economic behavior.

4.2. Empathy gaps in predictions of self and others

Underestimation of the endowment effect is part of a more general tendency for people to project their current, transient feelings and preferences onto their estimates of what their own and other people's preferences would be in a different role or situation (Loewenstein, 1996; Loewenstein and Adler, 1995; Loewenstein et al., 2001; Van Boven et al., 2002). In one study, for instance, people's current feelings of hunger or satiation influenced their preference for food to be consumed 1 week later (Read and van Leeuwen, 1998; see also Gilbert et al., 2002). In another study, male subjects who viewed sexually arousing photographs reported that they were more likely to engage in sexually aggressive behaviors on a hypothetical date than did male subjects who did not view sexually arousing photographs (Loewenstein et al., 1997).

Because people often use their own preferences as a basis for predicting other people's preferences (Davis et al., 1986; Hoch, 1987; Ross et al., 1977), their biased predictions of their own preferences will lead them to make biased predictions of other people's preferences. In one study, people's current feelings of hunger, thirst, and warmth influenced their predictions of the feelings of a hypothetical group of hikers lost in the woods without food or water (Van Boven and Loewenstein, forthcoming). More directly relevant to underestimation of the endowment effect and the present studies, Van Boven, Dunning, and Loewenstein (Study 5) showed that buyer's agents' offers to owners were closely linked to their predictions of what their own selling price would be if they were an owner. Buyer's agents who did not own a mug underestimated what their own selling price would be if they were an owner and made correspondingly low offers. In contrast, agents who had been endowed with mugs were significantly more accurate in their prediction of what their own selling price would be and they made correspondingly higher offers. Furthermore, the effect of owning a mug on agents' offers was statistically mediated by the effect of owning a mug on agents' predictions of what their selling price would be if they were an owner. In short, people's empathy gaps in self-predictions produce empathy gaps in social predictions.

4.3. Conclusion

Given the robustness and ubiquity of the endowment effect, anticipating the endowment effect is an important aspect of everyday economic life. The present studies indicate that

people's underestimation of the endowment effect's impact on other people's preferences can lead to behavior that can have costly economic consequences. The implications of this research extend beyond buyers and sellers. Individuals frequently change roles and experience different psychological states, and they are often in different roles or states than the people they interact with. Biased predictions of oneself and of others may therefore be an important source of suboptimal behavior in many aspects of everyday life.

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