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The power of touch: An examination of the effect of duration of physical contact on the valuation of objects

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Abstract

The duration of ownership has been shown to increase the valuation of items that people currently own as well as items they have owned in the past, a phenomenon termed the "length-of-ownership effect." We hypothesize that the duration of exposure to an item will foster increased pre-ownership attachment to an item and increased valuations in a manner similar to duration of actual ownership. We examine this effect in two experiments, both variations of the classic mug experiment. To induce different levels of exposure, we varied the amount of time that participants examined the auctioned item (i.e., coffee mugs) prior to participating in real dollar auctions. In the first study, participants bid in online English open bid auctions. In the second study, participants bid in first-price sealed bid auctions. In both cases of duration of physical contact positively influenced valuations (i.e., bid levels).

Keywords: duration-of-exposure effect; length-of-ownership effect; behavioral economics; consumer decision making.

1 Introduction

Ownership of an item has been shown to increase the owner's valuation, a phenomenon termed the "endowment effect." The most widely-held explanation of the endowment effect is that it is a manifestation of the asymmetry of value that Kahneman and Tversky (1984) call loss aversion, based on the observation that loss has a greater subjective effect than does an equivalent gain. Extant literature suggests that endowment affects monetary valuations from the moment an individual gains factual ownership of an item. For this reason, Kahneman, Knetsch, and Thaler (1990) used the term "instant" endowment effect.

Strahilevitz and Loewenstein (1998) extended this notion, suggesting that, although adaptation of ownership begins immediately following endowment, complete adaptation to ownership is likely to take time. Strahilevitz and Loewenstein suggested that adaptation of ownership need not be all-or-nothing, because individuals may not adapt instantaneously and fully to either the acquisition or loss of an item. In a series of experiments, they demonstrate that the duration of ownership increases the valuations of items that people currently own as well as items they have owned in the past.

However, several recent studies suggested that the endowment effect may affect valuations even sooner; i.e., before actual ownership takes place (e.g., Reb & Connolly, 2007; Simonsohn & Ariely, 2007; Heyman, Orhun, & Ariely, 2004; Ariely & Simonson, 2003; Carmon, Wertenbroch, & Zeelenberg, 2003). For example, Casey (1995) discovered a gap between participants' compensation demanded and their willingness to pay for lottery tickets even in the absence of actual ownership. Likewise, Sen and Johnson (1997) found that merely possessing a coupon for a product increased a consumer's preference for that product in a manner similar to ownership. Carmon et al. (2003) showed that simply thinking about an option created a sense of pre-factual ownership of the option and an increased sense of loss after choosing an alternative option. These findings are consistent with earlier work by Dhar and Simonson (1992), who observed that that making an option the focus of a comparison enhanced its perceived attractiveness and the probability that it would be selected.

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Hoch and Loewenstein (1991) suggested that a change in an individual's reference point accompanies partial ownership of a good. They note that after partially adapting to the possession of a good, consumers may feel deprived if they are subsequently unable to fully acquire the item. As a result, Hoch and Loewenstein suggested that a consumer who partially adapts to ownership of a good may have increased motivation to acquire the item.

If these conjectures are true, then we should expect partial adaptation to ownership to begin immediately following the initiation of physical contact with the item and to intensify with the duration of the contact. This article investigates the effect of duration of exposure (i.e., the duration of the physical contact) on valuations in two separate experiments and makes several contributions to the growing literature on the endowment effect. Related experimental work (Heyman, Orhun, & Ariely, 2004) has found that the *duration of auction participation* (operationalized in terms of the number of rounds in which a bidder was allowed to participate) can affect a bidder's valuation of the auctioned item. However, our work is the first to investigate the effect of *duration of exposure to an item* on valuations (where "exposure" is operationalized as the amount of time that participants tactilely examine an item before bidding).

To accomplish this, we performed two variations of the classic mug experiment. To induce different levels of exposure, we varied the amount of time that participants examined the mugs before placing their bids. In the first study, participants bid in first-price sealed bid auctions. In the second study, participants bid in online English open bid auctions. Data from both studies suggest that *duration of exposure* affects valuations in a manner similar to *duration of ownership*; that is, examining an item for longer periods of time resulted in greater attachment to the item and thus higher valuations. We therefore show that the effects observed in Strahilevitz and Loewenstein's (1998) study do not appear to rely on factual ownership per se, but were the result of increased subjective feeling of ownership (pseudo-endowment) induced by increased duration of physical possession of an object. Our findings also suggest that subjective feelings of ownership may affect valuations much more quickly than prior researchers have envisioned. We begin with a brief review of endowment and pseudo-endowment effects.

1.1 Endowment and pseudo-endowment effects

Thaler (1980) coined the term the endowment effect to describe the fact that people often demand much more to give up an item they own than they are will to pay to acquire it. For example, Heberlein and Bishop (1986) found that on average, people were willing to pay $31 for a particular hunting permit but were not willing to sell the same permit for less than $143. A well-known experimental illustration of the gap between buyers' willingness to pay and willingness to accept was conducted by Kahneman, Knetsch, and Thaler (1990). In their study, those who were first given coffee mugs ("sellers") were asked about the lowest sum for which they would agree to exchange the mug. Those not given mugs ("buyers") were also asked about the highest sum they would pay for the mug. In this study, and in many similar investigations, the average selling price demanded was significantly larger than the average buying price.

Historically, examinations of the endowment effect have focused on situations involving actual ownership. However, several more recent studies show that that the endowment effect may affect valuation even sooner, before actual ownership even takes place (e.g., Reb & Connolly, 2007; Simonsohn & Ariely, 2007; Heyman, Orhun, & Ariely, 2004; Ariely & Simonson, 2003; Carmon, Wertenbroch, & Zeelenberg, 2003).

Reb and Connolly (2007) conducted a series of laboratory experiments examining the effects of actual ownership and mere physical possession on participant valuations. They found that, although physical procession had significant effect on valuations, actual ownership did not. Reb and Connolly suggest that the endowment effect may be primarily driven by subjective, rather than factual feelings of ownership *per se*.

In related work, Ariely and Simonson (2003) suggested that pre-factual subjective feelings of ownership and the accompanying emotional attachment toward the auctioned item may lead bidders to overbid. They posited that psychological ownership may take place during the auction process, i.e., the consumer with the current high bid may develop prefactual feelings of ownership toward the item and begin to feel a valuation-altering attachment to the item. Ariely and Simonson (2003) termed this phenomenon the "pseudo-endowment effect" and suggested that, once an item has become part of a bidder's psychological endowment, if the bidder is subsequently outbid, the attachment to the item may increase the bidder's willingness to bid higher in order to reclaim the lost endowment.

Supporting this hypothesis, Simonsohn and Ariely (2007) examined eBay auctions for DVD movies. They found that, in auctions with low starting bids (i.e., between $0.00 and $1.00), 17% of winners placed multiple bids. However, in auctions with higher starting bids, Simonsohn and Ariely found that winners placed a lower number of multiple bids. The authors suggested that the winners placed fewer repeat bids in these latter auctions because the higher starting-bids reduced the opportunities for bidders to develop an emotional attachment or pre-

factual feelings of ownership toward the auctioned items.

Similarly, in two experimental studies of auction bidder behavior, Heyman et al. (2004) presented evidence that "quasi-endowment," or a pre-factual sense of ownership, affects auction re-bidding. Heyman and colleagues' first study involved hypothetical auction scenarios and manipulated the duration of perceived ownership by having participants imagine that they had been the leading bidder for varying lengths of time. Heyman and his colleagues found that participants told to imagine they were in the lead for longer periods of time submitted higher bids. In Heyman et al.'s second study, participants participated in real-dollar auctions. The authors found that the number of rounds in which a bidder was allowed to participate positively affected bid levels.

Given past work that suggests potential presence of a pseudo-endowment effect, and related work which shows that length of participation in an auction can affect bidders' pre-ownership attachment to the auctioned items, we suggest that bidders with longer durations of exposure to the auctioned item will develop stronger attachment to the auctioned items than bidders with shorter durations of exposure. Since attachment accentuates bidders' desire to win the item and heightens their sense of loss should they lose the item, we suggest that the duration of exposure to the item will be positively associated with monetary valuations (i.e., bid levels).

2 Experiment 1

The purpose of this experiment was to test the effect of participants' duration of exposure to the item on their valuations (i.e., bid levels). To accomplish this, we varied the amount of time that participants spent physically examining coffee mugs and then asked participants to bid on the mugs in an online English open bid auction. We chose to conduct the auctions via software to preclude the possibility that the outcomes might be influenced by variations in how the auction was run (e.g., the skills of the auctioneer) as might be the case in an open cry auction.

2.1 Method

Participants. A total of 84 students from an introductory information systems course at a large Midwestern university participated in the study.

Procedure. Fourteen groups of six participants each were recruited for a 15-minute auction experiment. Each participant was paid a $10 show-up fee and seated at a computer terminal. Participant groups were assigned randomly to one of two treatments (either long- or short-exposure duration). The auctions were conducted via computer with only one group participating in each experimental session. The auction software allowed users to see all bids placed during the auction, with the current high bid and the time remaining in the auction displayed prominently.

Coffee mugs used in the experiment were purchased at a campus area bookstore located directly adjacent to the building where the study was conducted. Participants were informed that the mugs cost $4.49 and that several identical mugs still were available at the bookstore. The mugs were embossed with the university's 2006 football homecoming theme and a picture of the mascot. Each mug was new, unused, and still had the original price tag affixed.

In order to familiarize participants with the auction software prior to the mug auction, two one-minute warm-up auctions (one for a pen and one for a key ring) were conducted. After they were completed, the mug auction was conducted. Prior to the mug auction, mugs were placed in front of each participant. Participants were asked not to touch the mugs until the experiment began, and were informed that only the highest bidder of the auction would be allowed to keep his or her mug, and that the high bid would be subtracted from the winner's participation fee.

When the experiment began, participants were instructed to pick up the mugs in front of them and to continue examining it until instructed to stop. In the short duration group, participants examined their coffee mugs for 10 seconds; in the longer duration group, participants examined the mugs for 30 seconds. Ten seconds was chosen as the short-duration time, because it still permitted participants sufficient time to fully inspect the stimulus, as per observations in earlier pilot studies. In those trials, participants had unlimited time to examine their mugs, but typically ended their examinations in 10 seconds or less. This, we believe, makes it possible to rule out differential information across treatments as an explanation for the observed effect. We chose 30 seconds as the long-duration treatment; this is an intermediate amount of time used by Harrison and Zajonc (1970) and other mere exposure researchers who have examined the effect of visual exposure on liking for a stimulus. After the designated time elapsed, participants were instructed to put down their mugs and asked to participate in an online English open-bid auction.

As Lucking-Reiley (1999) notes, English auctions are probably the most familiar auction format; they are ascending-price auctions in which the last remaining bidder receives the auctioned item and pays the amount of the high bid. Each experimental auction also utilized a "soft" ending time. That is, if a bid was placed in the last 15 seconds of an auction, the auction's ending time was automatically extended 15 additional seconds. For example, if a bid was placed with 10 seconds left in the

auction, 15 seconds was added to the end time, resulting in 25 seconds left in the auction. This is similar to Amazon Auctions, which do not close until 10 "bidless" minutes have passed (Ariely, Ockenfels, & Roth, 2005).

We chose to use "soft" ending times, as opposed to eBay-styled "hard" (or fixed) ending times for our auctions, to reduce the effects of strategic last-second bidding (i.e., sniping). The soft endings also ensured that participants' bid were less likely to be omitted by participant error or software delay. The auction-ending rules were explained to participants prior to the warm-up auctions, which utilized identical ending rules. Each mug auction was scheduled to last two minutes. However, due to the "soft" ending times, the average auction duration was two minutes and 20 seconds.

2.2 Results and discussion

To test for the effect of duration of physical examination on willingness to pay, we performed a robust clustered multivariate regression with participant's high bids as the dependent variable and number of bids placed by all bidders prior to the participant's highest bid (*PreviousBids*), and an indicator (*Treatment*) which denotes the duration of examination (1 for 30 seconds, 0 for 10 seconds) as the independent variables. Data was clustered by experimental group. In this setting, high bid denotes the buyers' willingness to pay for the mug. We use the number of bids placed prior to the participant's highest bid as a proxy for the amount of competition in the auction. The regression equation is:

$$HighBid = b_1 PreviousBids + b_2 Treatment + \varepsilon \quad (1)$$

The data suggest that duration of exposure to the auctioned item is positively associated with bid levels (b = 1.80, p = .022). The data also suggest that bid levels are positively associated with the amount of competition in the auction (b = .14, p = .012). These two predictors accounted for just under one third of the variance in bid levels (R^2 = .33), which was significant, $F(2, 13)$ = 13.05, p = .0008. In addition, the average bid was \$2.44 for the bidders in the short duration group and \$3.91 for the longer duration group. The average winning bid was \$3.70 for short duration groups, with the winning bid exceeding the mug's retail price only once (\$7.50). The average winning bid was \$5.80 for the longer duration groups, with winning bids exceeding the mug's retail price four out of seven times (at \$10.00, \$10.00, \$6.41 and \$4.56). To ensure that our results were not driven by outliers, we performed additional regression analysis with both \$10.00 bids omitted. Dropping these bids did not materially change the results.

In our next experiment, we tested for the effect of duration of exposure on valuations in a first price sealed bid auction. In this setting — unlike that used in Experiment 1 — competitive arousal or "auction fever" should play a negligible role, if at all. We doubted that the presence of arousal could explain group differences in Experiment 1. However we did want to assess the generality of our findings by utilizing a different type of stimulus environment in Experiment 2.

3 Experiment 2

The purpose of this experiment was to test the effect of participants' duration of tactile exposure to the auctioned item on their valuations (i.e., bid levels) in a new setting, namely sealed-bid auctions, where each bidder is allowed to submit a single sealed bid. We again varied the amount of time that participants physically examined coffee mugs. After examining their mugs, participants were asked to bid on their mugs.

3.1 Method

Participants. A total of 60 students from an introductory information systems course at a large Midwestern university participated in the study.

Procedure. The coffee mugs were purchased at a campus area bookstore located directly across from the building where the study was conducted. Participants were informed that the mugs cost \$3.95 and that several identical mugs were still available at the bookstore. The mugs were new, unused, and each still had their original price tags affixed. Each group was randomly assigned to one of two treatments. In total, there were 10 groups of six participants each.

The experiment was conducted using one group at a time. Prior to the experiment, participants were asked to sit outside the experiment room until all members of the group were present. Once an entire group had arrived, all participants in that group were ushered into the room at the same time and asked to sit at one of six desks. Participants were told not to touch the mug until instructed to do so. Once all participants were seated, they were instructed to begin examining their mugs. In the short duration group, participants examined their coffee mugs for 10 seconds; in the longer duration group, participants examined the mugs for 30 seconds. After the designated time elapsed, participants were instructed to put down their mugs and to enter the maximum that they would be willing to bid on their bidding sheet. After entering their bid, participants were instructed to turn over their bid sheets.

After all participants had bid, participants were instructed to hold up their bid sheet and the high bidder was determined. At this time, the five low bidders were

paid $10 each. The high bidder was given the option of keeping the mug and receiving $10 minus their bid, or selling the mug back for $3.95 and receiving $10 minus their bid plus $3.95.

3.2 Results and discussion

To test for the effect of duration on willingness to bid, we conducted an analysis of variance (ANOVA) using subject bid as the dependent variable and duration of examination as the independent variable. The overall results support a duration-of-exposure effect. The model was statistically significant [$F(1, 58) = 4.46$, $p = .039$]. The average bid was $2.24 for the bidders in the short duration group and $3.07 for the longer duration group. Another interesting result was that three of the five auction winners in the long duration groups actually chose to keep their mugs, paying $6.00, $5.00, and $5.00, respectively. No short-duration condition winners chose to keep their mugs.

Data from both experiments are consistent with an effect of duration-of-exposure on valuation. An alternate explanation for these results may be that those examining the mugs for longer durations simply bid higher as a result of better information about the quality of the mugs. We doubt this explanation for several reasons. First, as noted earlier, while 10 seconds may seem like a short time to adequately ascertain the true value of an object, in earlier pilot studies where participants had unlimited time to examine their mugs, they typically ended their examinations in 10 seconds or less. In addition, in both studies, we chose a simple item to auction, plain white mugs with simple logos or slogans. Further, each mug was new, unused, and still had the original price tags affixed. In both cases, they were the least expensive mugs available at any campus area bookstore. Given each of the above, it unlikely that longer examination durations by experiment participants would produce higher quality estimates.

4 General discussion

The research presented here suggests that duration-of-exposure affects bidders' valuation of an item in a manner similar to duration-of-actual-ownership. In two distinct experimental contexts, we found evidence for a duration-of-exposure effect. In both experiments, participants examining their mugs for a longer duration bid significantly higher than the participants examining the mugs for shorter durations. This suggests that feelings of attachment or partial adaptation to ownership may be produced by simply holding an item and that these feelings are intensified with the duration of exposure.

A possible explanation of our results would be based on the mere exposure effect (Zajonc, 1968). Zajonc and others have shown that increased (visual and auditory) exposure to a stimulus results in greater liking for that stimulus. This phenomenon is called the "mere" exposure effect, because a person merely needs to see or hear the item. No interaction whatsoever is required for the increased liking to occur. However, prior mere exposure effect studies have not used willingness to pay as a dependent variable, as occurred in our study. Further, those studies have typically used visual and auditory, as opposed to tactile, stimuli. Also, such studies usually manipulated the number of exposures rather than the duration of each exposure, as occurred in our study. Therefore, it is uncertain whether the mere exposure effect may have contributed to the results we obtained.

Strahilevitz and Loewenstein (1998) demonstrated that the endowment effect could be expanded to explain the impact of the duration of past and current ownership on object valuation. They suggested that the effect of ownership begins immediately following possession of the item and intensifies with duration of ownership; a phenomenon they termed the "length-of-ownership effect." Reb and Connolly (2007) extended the work of Strahilevitz and Loewenstein by demonstrating that physical possession of an object, even without ownership, produced feelings of ownership and increased valuations in a manner similar to procession with actual ownership. Their findings suggest that mere physical possession may actually have a greater impact on feelings of ownership and valuations than actual ownership. Our works extends the research of both Strahilevitz and Loewenstein (1998) and Reb and Connolly (2007) in several ways.

First, previous mere exposure research, while never using willingness to pay as a dependent variable, showed that attractiveness monotonically increases during the first few minutes' worth of visual exposure to a stimulus (e.g., Harrison & Zajonc, 1970). Thus, we hypothesized that it might be possible that pseudo-endowment would also be engendered after only a relatively short period of time of tactile exposure and would increase monotonically immediately thereafter. Our hypothesis is supported after a surprisingly short (30-second) time frame, demonstrating the power of the effect. While Strahilevitz and Loewenstein employed long-durations of 20, 50 and 60 minutes, and Reb and Connolly used long-durations of "a minute or two" and 30 minutes, in this work, we compared valuations of those with 10 seconds of exposure to valuations of those with 30 seconds of exposure. Our long-duration is significantly less than the long durations employed by previous work. As such, one contribution of this work is that our findings suggest subjective feelings of ownership may affect valuations much more quickly than prior researchers have envisioned.

Another contribution of this work is that it disentangles the information and possession effects more fully than did previous work. As Reb and Connolly (2007) note, their choice of zero exposure for their control treatment makes it difficult to rule out differential information across treatments as an explanation for their observed possession effect. In fact, in their Experiment 2 when Reb and Connolly assessed participants' judgments of whether they had sufficient information to evaluate the coffee mug, the F test had a *p-value* of 0.07. While 0.05 is often used as a cut-off for significance in research publications, a p value of 0.07 makes it difficult to rule out information differences as a confound in that study.

In addition, this work presents further evidence of a pseudo-endowment effect in auctions, a phenomenon that previous researchers have suggested would take place *during* the auction process itself. For example, Ariely and Simonson (2003) suggest that the consumer with the current high bid may develop pre-factual feelings of ownership toward the item and begin to feel a valuation-altering attachment to the item. However, we find that pseudo-endowment effects can be produced *prior* to the start of an auction. This is confirmed in our second study where bidders are only permitted a single sealed-bid and competition (i.e., opponent effects) is reduced. In this setting, our data suggest that even when competitive effects are minimized, pseudo-endowment affects bid levels. Thus, auction dynamics do not appear to be required for the production of pseudo-endowment effects.

4.1 Implications

Traditional retailers have long known the value of enhancing the attachment between buyers and their products. It is partially for this reason that GM and other automobile companies offer 24-hour test drives to their customers. Car dealers intuitively suspect that if a customer drives a car home, they will be more likely to develop an attachment to the vehicle having ascertained its quality and ultimately would be more likely to purchase. This phenomenon is not exclusive to car buyers, and one can easily see examples in a variety of retail sectors. For example, pet store owners set aside special areas so customers can play with the puppies, and bookstores often provide customers with comfortable places to sit and read. This work suggests that retailers may want to expand the opportunities for customers to interact with their products and to permit longer durations of interaction.

In addition, duration-of-exposure may have implications for retailers interested in determining optimal duration for trial periods. Retailers in several industries (for example, computer software, mattresses and home exercise equipment) commonly allow potential customers to try their products for extended periods before making a purchasing decision. Product trials allow customers to ascertain product quality and determine if it functions as advertised. Software manufacturers commonly provide potential customers with trial versions of their products. These trial versions allow free use of the software for a limited duration (often 30 days). Similarly, the Bose Corporation offers 30 day in-home trials of its Acoustic Wave music system, and Select Comfort offers a 30 night trials of its Sleep Number mattress. This work suggests that these retailers may be able to increase consumer valuation and hence the number of people that purchase the product at the end of the trial by increasing the length of the trial period. Finally, in online markets, buyers cannot "touch and feel" the physical merchandise before purchase. Our findings also suggest that the implications of buyer's inability to inspect an item offered for sale online go beyond the classical "lemons" problem (Akerlof, 1970).

4.2 Limitations and future research

Our analysis suggests various avenues for future research. First, in both studies, participants in 30-second duration group bid higher than those in the 10-second duration group. Although the significant difference in bid levels attests to the strength of the effect, caution should be exercised before generalizing these results to longer durations of exposure. The effect of duration of exposure on valuation is undoubtedly not linear. Future research should focus on examining more fully the nature of the response function.

Second, Strahilevitz and Loewenstein (1998) suggested that ownership adaptation may vary depending both on the nature of the benefits provided by the object (e.g., sentimental or status value) and individual characteristics of the owner (e.g., gender and ethnicity). As such, it seems likely that duration-of-exposure effects will depend on the individual's demographic characteristics as well as the nature of the item. In addition, it seems likely that the nature of the exposure (e.g., physical contact or an image on a web page) may affect adaptation of ownership. More research is needed to understand the direct and indirect effects of these and other potential covariates.

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