

**An implicit approach to object valuation and psychological ownership**

by

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## Abstract

This study examined the role of ownership in the endowment effect. It used the Implicit Association Test to investigate the influence of effort cues on psychological ownership and object monetary valuation. It also examined whether factual ownership or loss aversion contributed to the endowment effect. Participants were either given a pen or not and either squeezed a stress ball or held it. They actually sold or purchased the pen, giving both selling and buying price for another person and either selling (owner) or buying (non-owner) price for themselves. Results support both loss aversion and psychological ownership but not factual ownership.

## CHAPTER 1. Introduction

*The endowment effect* was first demonstrated by Thaler (1980) more than three decades ago. In his experiment, coffee mugs were randomly given to students. Those who received the mug indicated their willingness-to-accept (WTA), the minimum price they would accept in order to give up the mug, and those who received nothing indicated their willingness-to-pay (WTP), the maximum price that they were willing to pay in order to acquire the mug. The results showed that the WTA of owner was significantly higher than the WTP of the non-owner. Indeed, the selling price was almost two times as high as the purchase price. Thereafter, the endowment effect was replicated extensively across many tangible objects such as candy bars (Knetsch, 1989), binoculars (Tom, 2004), pens (Kahneman, Knetsch, & Thaler, 1990, 1991); wine (vanDijk & vanKnippenberg, 1996), lottery tickets (Knetsch & Sinden, 1984), hunting permits (Cummings, Schulze, Gerking, & Brookshire, 1986), clean air (Cummings, et al., 1986) and the intangibles such as time (Hoorens, Remmers, & van de Riet, 1999); across different settings such as laboratory studies and field studies (Hoorens, et al., 1999; Johnson, Hershey, Meszaros, & Kunreuther, 1993).

Given the demonstrated robustness of the endowment effect for the last three decades, and a variety of moderators identified such as mood and personality (Forgas & Ciarrochi, 2001), the presence or absence of transaction demand (Mandel, 2002), and object desirability (Brenner, Rottenstreich, Sood, & Bilgin, 2007), there are multiple theories that attempt to explain the endowment effect. The traditional and standard explanation of the underpinning

mechanism behind the endowment effect was loss aversion, coined by Thaler (1980), which stated that the disutility of losing a good is significantly larger than the utility of gaining the identical good, according to prospect theory (Kahneman & Tversky, 1979). For instance, the joy of receiving a windfall is not experienced as intensely as the sadness related to a sudden loss of the same amount of money. People value something more simply because they are afraid of losing it. However, loss aversion was not found when objects were intended to be sold (Novemsky & Kahneman, 2005b) as well as when one was fairly experienced in trading (Engelmann & Hollard, 2010) or in small losses (Harinck, Van Dijk, Van Beest, & Mersmann, 2007). Novemsky and Kahneman (2005a) argued that in the context of loss aversion, impact bias, the inclination to overestimate the negative impact resulted from giving up an object, was attenuated when one was experienced in trading. Harinck, et al.(2007) came to a similar conclusion. In predicting one's emotion upon a small gain or a small loss, loss aversion predicts that the magnitude of predicted negative mood upon a small loss should be larger than the magnitude of predicted positive mood upon a small gain of identical amount. However, Harinck and colleagues found the opposite, and suggested that people were usually more experienced with small losses than small gains in real life. As a result, subjects' magnitude of predicted positive mood upon a small gain was larger than the magnitude of predicted negative mood upon a small loss.

Engelmann and Hollard (2010) adapted another common paradigm of the endowment effect study and had similar findings. In the exchange paradigm, participants are randomly endowed with one of two similar objects and they are allowed to trade freely with people who have a different object. Loss aversion predicts that people are reluctant to trade, an

indication of the endowment effect, because the pain of giving up one's original possessed item is larger than the joy of acquiring a similar one. Engelmann and Hollard found that exchange reluctance was eliminated when participants were forced to trade several rounds before the focal exchange round. They contended that the increase of trade experience mitigated trade uncertainty, which involved the cost and risk associated with market transactions. Altogether, though loss aversion remains an important theory in explaining the endowment effect, its applicability is limited by some boundary conditions.

Another proposed mechanism is that the endowment effect is not an effect of ownership per se, but the result of a more general difference between buying prices and selling prices. The most common demonstration of the endowment effect asks owners to give a selling price and non-owners to give a buying price. When the selling price is higher than the buying price, it is assumed that both prices represent how much the seller or buyer actually values the item. However, some studies suggest that when indicating WTA, sellers are influenced not only by their value for the item, but also the current market value of the item. In a between-subject design, Lin, Chuang, Kao and Kung (2006) randomly assigned both buyers and sellers into three groups, where they received no, low or high reference market price of a CD. The endowment effect was replicated in the no-reference condition, but more importantly, the difference between the buying and selling prices of the CD was not statistically significant in either the high and low reference market value conditions, indicating the elimination of the endowment effect. Moreover, compared to the no-information condition, the purchase price significantly increased in the high reference market value condition whereas the selling price in the low market value condition significantly

decreased. Therefore, it appears that one's valuation of an item is readily anchored to some external reference. In another study, Boothe, Schwartz, and Chapman (2007) found that there was preference reversal between a less preferred item that has higher market value (eggplant roulettes) and a more preferred item that has low market value (Coke). In a between-subjects experiment, when asked about which item was preferred between the Coke and eggplant roulettes, participants preferred the Coke. But when asked how much they would charge to sell the Coke or the eggplant roulettes, they demanded significantly more money for the eggplant roulettes than for Coke, indicating the use of a market value heuristic. Similar use of market value heuristic was also found in Brown's (2005) study.

The loss aversion explanation of the endowment effect does not propose that the owner actually values the mug more, only that the impact of losing a mug is larger than that of gaining an equally-valued mug. Another theory, psychological ownership, proposes that ownership per se increases the perceived attractiveness and value of owned objects. Heider (1958) first hypothesized that ownership increased the attractiveness of owned objects. Later Nuttin (1985, 1987) discovered the *name letter effect*, where one considered the letters of his or her own name the most attractive. Later, Hodson and Olson (2005) found that one's name might even predict career choices and brand name preference. Beggan (1992) demonstrated that owners had higher valuation of objects than non-owners, and it was termed the *mere ownership effect*. Unlike the loss aversion explanation, the ownership explanation states that one values an object not because loss looms larger than gain but simply because the object is owned by oneself. In other words, one values one's own object more compared to an identical one that is owned by another person. Sen and Johnson (1997) further showed that

merely possessing a coupon for a product as opposed to the actual product can increase consumers' preference for the coupon's option over its competitors' products.

Given the initial evidence that ownership plays an important role in the endowment effect studies, the potential theoretical contribution of the psychological ownership perspective deserves detailed examination. In a recent qualitative review, Pierce, Kostova and Dirks (2003) provided a useful framework that defined psychological ownership as the linkage between the self and an entity, which could be palpable or impalpable. They argued that such linkage was driven by intrinsic motives including the self-identity, need for efficacy, and investing the self into the target. Self-identity is inferred from one's value, possessions, and position in relation to the society standard. Another construct, feeling of efficacy, is in essence becoming the cause of some change. It is generated from the ability to control, which could be fulfilled through materialistic possession or the ability in determining an outcome in the environment. Lastly, psychological ownership could be strengthened when one invests oneself into the target, and it can be achieved through getting to know the target or working upon it. Though the evidence cited in Pierce et al. (2003) review is largely qualitative in nature, recent studies drawn from both psychology and marketing demonstrate a match between this psychological ownership postulation and the empirical results from both endowment effect studies and studies concerning monetary valuation.

The importance of self-identity on object valuation was demonstrated in two recent studies. Ariely, Kamenica and Prelec (2008) showed that when people's work or creation was destroyed in front of them, they demanded a higher wage than if their works remained but ignored or if their works were acknowledged. Though they interpreted the result from a



perceived meaning perspective, it could also be interpreted as part of the self concept that is represented by one's creation is being destroyed, which in turn led to the demand of wage premium. On the other hand, in two correlational studies, Ferraro, Escalas, and Bettman (2007) demonstrated that possession-self, the extent to which an object can represent the self-identity, is positively correlated with self-worth match, the extent to which a possession reflects an important self-worth domain. In other words, one can derive one's self-worth from objects that can represent one's identity. More importantly, both the possession-self link and the self-worth match are also positively correlated with distress at separation from the object and negative emotion upon loss of the object. Taken together, their results can be interpreted that psychological ownership is positively correlated with grief and distress upon loss of a possession.

Empirical evidence also demonstrated that object valuation increases with either real or perceived control of an object or the outcome of a task. Franke, Schreier, and Kaiser (2010) found that when consumers were the designers of a product, their WTP for the product was significantly higher than products that were identical but not designed by them. In addition, perceived contribution of the design serves as the moderator of the price difference. That is, the augmented valuation of one's designed product over an identical counterpart that is not designed by self will increase if perceived contribution increases and vice versa. Similar findings that reflect the role of need for efficacy were also repeated in the Fuchs, Prandelli, and Schreier (2010) study. Across four experiments, consumers who were empowered to select the products to be marketed showed significantly higher psychological ownership, perceived impact, WTP and purchase intention for the product than those who were not

empowered although both groups held similar subjective evaluations regarding the same products. Yet such difference disappeared if what is put into the market could not reflect their true preference or if they believed they lacked the relevant competence in making such decisions. Huang, Wang, and Shi (2009) further showed that while one's own possession was preferred to others' when both were chosen by a third party, this ownership effect disappeared when one happened to choose a possession for both oneself and others. Additionally, one's possession was preferred when chosen by oneself to one's possession that was chosen by others. This indicates that one's sense of psychological ownership toward an object is higher, as reflected by one's preference, when one could decide what object to choose than when one merely possesses an object. Consequently, behavioral studies show that the need for efficacy plays a moderating role in object valuation.

Other studies indicate that when subjects touched the object, the object valuation or psychological ownership or both increased. Tom, Lopez, and Demir (2006) demonstrated that the endowment effect could be strengthened in direct marketing channels, where buyers could have the physical possession of the product at the point of receipt, but not when an online purchase was executed, where one could also claim the legal ownership of the product without its physical possession. Reb and Connolly (2007) echoed their findings in two experiments that the ability to physically hold and examine an object (chocolate bar or coffee mug) led to higher object valuation and subjective feelings of ownership whereas legal ownership did not have a main effect on object valuation. Further analysis showed that subjective ownership significantly mediated object valuations. More recently, Peck and Shu (2009) further showed that regardless of legal ownership status and valence of touch

(whether the object was pleasant or unpleasant to touch) while controlling for product information, touching a product lead to higher perceived ownership. However, only positive valence of touch increased product valuation, while negative valence of touch decreased it. In summary, tactile information serves an important channel to know the target, which might in turn increase one's psychological ownership of the object.

Finally, WTP also increased as one is exposed longer to the object or as one can invest more time or effort into the target. An early study carried out by Strahilevitz and Loewenstein (1998) showed that when an object was in the subjects' physical possession, where they could touch it, increase of duration of ownership significantly increased object valuation. They also found in a third study that college undergraduates who owned a keychain for about an hour and lost it for a brief time valued it significantly more (\$1.30) than those who only owned it for a brief while without losing it (\$0.86). In other words, the influence of ownership history on object valuation was strong enough to reverse the traditional endowment effect, indicating that it was psychological ownership rather than legal ownership that drove the valuation difference. Their results were replicated by Wolf, Arkes, and Muhanna (2008) study in which the bids in auction were significantly higher in the group that could examine and touch the mugs for 30s than the 10s counterparts. Ku, Galinsky, and Murnighan (2006) also showed that duration of exposure can influence valuation in the absence of actual touch. They examined the sunk costs (measured by time spent viewing the auction and bids made) of winners and non-winners in a real-world ebay auction for a men's silk shirt. Results indicated that the winners' sunk costs were significantly higher than non-winners', and that winners' sunk costs significantly predicted final prices. Taken together,

these findings indicate that psychological ownership and object valuation could be increased through increase of passive exposure to the object or actively investing one's time and effort upon the target.

Despite the fact that ample evidence suggests psychological ownership plays a crucial role in object valuation, surprisingly few studies (Fuchs, et al., 2010; Peck & Shu, 2009; Reb & Connolly, 2007; Van Dyne & Pierce, 2004) include measures for it and even fewer directly investigate what drives its development with an object and how it affects object valuation. To my best knowledge, all the measures of psychological ownership used in previous studies are explicit measures such as self-reported questionnaires ranging from single item to multiple items on a Likert scale. Though these are popular instruments used in a variety of research, they might miss the contribution from one's implicit attitude. Confounds in past literature are another important issue that merits further investigation. It is very likely that conceptual overlap exists among psychological ownership constructs proposed by Pierce et al (2003), which could be further broken down into more basic factors. For instance, while it is now evident that the duration of exposure to the object increases one's psychological ownership and object valuation, it is uncertain whether this is due to duration of exposure per se or whether it is due to increased sense of efficacy through object manipulation made more probable by longer duration. It is also uncertain if it is investing one's effort or time per se that increases psychological ownership, or the by-product of time and effort such as increased knowledge of an object that increases ownership.

Of particular interest in this regard is the study carried out by Preston and Wegner (2007). In an anagram task where the anagram was presented simultaneously to two

participants in computers located in separated rooms, they asked participants to take turn to solve 60 anagrams. Each trial started with one player solving the anagram while the other player merely looked at the computer screen. After the anagram problem was presented, the active player indicated whether he knew the answer by clicking either yes or no. Then the anagram solution was presented and both players wrote down the solution, and the other player started a new trial. Participants were randomly assigned to one of four conditions in which they were required to squeeze a handgrip during the anagram task: during anagram problem presentation, during anagram solution presentation, during problem and solution presentation, or neither during problem nor solution presentation. Later both participants took a surprise memory test that required classifying whether the items tested did not appear in the anagram task, appeared during their partner's turn, or appeared during their own turn. Results indicated that if participants were required to hold down a handgrip during the anagram problem presentation, but not during the anagram solution presentation (high-low effort), plagiarism was significantly higher than in all other conditions. This effect was replicated when physical effort was replaced by mental effort, in which high and low effort was induced by presenting fonts in low contrast (yellow text) and high contrast font (black text), respectively. Though in their study this pattern of effort cue are misattributed as authorship, it is reasonable to argue that this can also be generalized to psychological ownership. It is so because this pattern of effort cue has been conditioned in numerous tasks in one's daily life. After all, change of the environment due to one's own work done must accompany one's exertion of effort followed by release of effort upon task completion.

Distinguishing and clarifying among the three possible mechanisms of the endowment

effect based on ownership, loss aversion, and buy/sell price elicitation constitutes another research gap in the literature because the three have been confounded in past studies. In the typical paradigm sellers were owners and faced the loss of the item, and buyers were non-owners and were considering the gain of the item. Furthermore, owners indicated their selling price whereas non-owners indicated their purchase price. Therefore, ownership status, applicability of loss aversion and buy/sell prices elicitation have been completely confounded with one another. Not until recently have two of the factors been de-confounded by Morewedge, Shu, Gilbert, and Wilson (2009). Besides the typical owner-seller and non-owner-buyer conditions, they added the owner-buyer and non-owner seller conditions in two experiments, respectively, and demonstrated that owners reported a higher price for the item than non-owners regardless of whether they were buying or selling. The result provided initial evidence that it was ownership but not loss aversion that explained the endowment effect. More recently, Shu and Peck (2011) showed across multiple experiments that psychological ownership (study 2 – 5) could mediate the endowment effect.

### **Objectives of the current study**

Given the above identified research gap, there are three objectives in the current study. The first is the application of the Implicit Association Test (IAT) (Greenwald, McGhee, & Schwartz, 1998) in measuring psychological ownership and implicit valuation in a typical endowment study paradigm, where one group of subjects is randomly endowed with an object but the other receives nothing. Specifically, it is hypothesized that there is significant positive correlation between implicit measures of psychological ownership and object monetary valuation, between implicit and explicit object evaluation, as well as between implicit and explicit measures of psychological ownership. IAT is capable of

measuring one's implicit preference without explicit thinking, and it has been used in both psychology and marketing study to measure object (Huang, et al., 2009) and brand preference (Maison, Greenwald, & Bruin, 2004), respectively. It also has demonstrated satisfactory reliability and validity (Greenwald, Nosek, & Banaji, 2003).

The second objective is to determine if effort per se contributes to the development of psychological ownership. Other than the Preston and Wegner (2007) study in which they specifically looked into the role of effort cues on a specific type of psychological ownership, one common feature of some of the literature related to psychological ownership and object valuation is that effort exerted by participants onto a task or an object serves as the prerequisite for psychological ownership development. For instance, participants actively participate in activities related to new product selection (Fuchs, et al., 2010), product design (Franke, et al., 2010), choosing between options (Huang, et al., 2009), and online auction (Ku, et al., 2006), all of which require either physical or mental effort or both during the task followed by release of effort upon completion. Therefore, it is hypothesized that psychological ownership may be induced by a similar effort pattern, high effort during a task and low effort toward the end of a task.

The third objective is to clarify whether the endowment effect is based on the difference between the selling and purchase price, on the difference between valuation as owners or non-owners, or on loss aversion. While Morewedge et al. (2009) found that it was factual ownership of an object that increased object valuation, rather than buying or selling the object as predicted by loss aversion, a recent study found the opposite. In a between-subject design, Yeung and Weber (2011) randomly assigned participants to one of the six

conditions, in which they either were given a pen or nothing and they drew with the pen for 10s, 30s, or 150s. The duration of touch of the pen was controlled in all conditions and the participants indicated their own selling and purchase price for the pen as well as prices they thought other fellow students may be willing to pay or to sell for the same pen. All elicited prices were hypothetical, so no actual transaction took place. It was found that selling price was significantly higher than the purchase price while prices did not statistically differ across factual ownership status. Therefore, the current study will attempt to clarify the conflict by using a procedure more similar to Morewedge et al. (2009) study, in which subjects will actually buy and sell the objects for themselves or others.

In a between-subjects design, the current study investigated the effect of factual ownership and effort exertion by randomly assigning participants to either an ownership (endowment of a pen) or no ownership condition and to either an effort exertion (squeezing a stress ball) or no effort exertion condition, respectively. Participants then completed two IAT measures, one for implicit psychological ownership and one for implicit object valuation, and an online questionnaire that comprised both the explicit measure of psychological ownership and object valuation in random order. At the end they indicated their monetary valuation of the object of interest.

It was predicted that the traditional endowment effect would be replicated, indicated by a significantly higher owner-selling price than non-owner buying price. In addition, I predicted that owners as well as participants who exerted effort would show higher sense of psychological ownership and higher non-monetary evaluation of the object, indicated by both implicit and explicit measures, compared to non-owners and participants who did not exert



effort, respectively. As for the ownership explanation, if the psychological ownership account is correct, it was further predicted that higher sense of psychological ownership would lead to higher monetary valuation of the object. Similarly, if the factual ownership explanation prevails, owners would value an object more than non-owners regardless of buy/sell prices. On the other hand, if the loss aversion explanation is correct, then it was predicted that selling prices would be significantly higher than buying prices regardless of ownership status as well as whether one bought or sold for oneself or another person.

## **CHAPTER 2. Method**

### **Design**

The experiment employed a 2 (endowment vs. no endowment) x 2 (effort vs. no effort) x 3 (buy/sell for self/other) mixed design. The dependent variables are the monetary valuations, pen evaluation, explicit measure of psychological ownership, and the IAT latency response times as well as the IAT error rate. To rule out the rival explanations that a detected effect was due to difference on product information and evaluation, the measurement of these two constructs were also implemented. It was expected that these constructs would not statistically differ across the levels of either factor.

### **Participants**

One hundred and fifty-five participants were recruited from the subject pool system in the psychology department in exchange for partial fulfillment of a course requirement.

### **Materials**

Pens with the university logo were used as the endowment and a stress ball was used in the effort exertion task.

### **Procedure**

Participants in a group of one to six reported to the laboratory and signed the consent forms, and the group was randomly assigned to one of the four experimental conditions. They then proceeded to the main task, which involved two subtasks that were composed of visually inspecting the pen while holding it for twenty seconds and checking by writing with it for another twenty seconds. Both sub tasks were performed by the dominant hand. Since past studies indicated that the presence or absence of touch with the object (Peck & Shu,

2009; Reb & Connolly, 2007; Tom, et al., 2006) and the duration of exposure to the object (Wolf, et al., 2008) affected object valuation, these factors were therefore controlled in the current experiment. It was believed participants who inspected a simple object such as a coffee mug for ten seconds would be long enough to acquire sufficient product information (Wolf, et al., 2008), so forty seconds in total in the current task would be more than sufficient.

Ownership and effort exertion were the two independent variables manipulated in the current study. In the ownership condition, prior to the main task participants were told that the pen was given to them and they could take it home after the end of the experiment, whereas in the no ownership condition they were instructed that the pens did not belong to them and that they had to return the pen to the experimenter after the experiment. As for the effort factor, participants in the effort exertion condition were instructed to squeeze a stress ball continuously during two subtasks while those in the no effort exertion condition were instructed to merely hold the stress ball without squeezing it. Preston and Wegner (2007) demonstrated that a specific pattern of presence and absence of effort cue that was independent of the focal task could lead to the increase sense of ownership of the focal task. Specifically, effort cue should be present during the performance of a task and it should be absent as the task ends in order to elicit such effect. It is similar to everyday experience that in the middle of a task effort is put forth and toward the end of a task effort is relaxed. Therefore, in the effort exertion condition of the current study, participants started squeezing the stress ball at the beginning of the each subtask with their non-dominant hand and then released it as each task ended. On the other hand, in the no effort condition they were

instructed not to squeeze the handgrip but merely to hold it with their non-dominant hand while performing the sub tasks.

Participants then proceeded to the following tasks in random order: online questionnaire and two IATs (Greenwald, et al., 1998). An online questionnaire was composed of explicit measures of psychological ownership, perceived information about the pen received, and pen non-monetary evaluation. All questions involved nine-point scales ranging from one to nine, where 1 = “strongly agree” to 9 = “strongly disagree.” Explicit measure of psychological ownership comprised six questions modified based on Van Dyne and Pierce (2004) study: “I have the feeling that it is ‘my’ pen”; “The pen incorporates a part of myself”; “I feel that the pen belongs to me”; “I feel connected to the pen”; “I feel a strong sense of closeness with the pen”; and “It is difficult for me to think of the pen as mine (reversed).” Perceived information acquired about the pen was measured by: “I feel I have enough information in order to evaluate the pen (adapted from Reb & Connolly, 2007)?” Pen non-monetary evaluation was measured by rating the pen according to the following words “bad” and “good” and “dislike” and like” (Edell & Keller, 1989). The order of the questions in the questionnaire was randomized to eliminate potential order effect.

Two IATs were administered where one measured implicit psychological ownership toward the pen and the other measured implicit non-monetary valuation of the pen. For the measurement of psychological ownership, the test involved two target categories (the ISU pen vs. other ball point pen) and two attribute categories (self vs. others). For ease of reference, the ISU pen will be referred to as the pen from now on. Attribute category words were adapted from Greenwald, et al. (2002) and they included self related words (I, me, my,

mine, self) and other related words (they them, their, theirs, others). The target category had five photos of the pen and five photos of a variety of other ball point pens. The test was completed on desktop computers. For instance, in an initial task one pressed the left key if pictures of the pen or words representing self appeared and pressed the right key if pictures of other pens or words representing others appeared. On the other hand, in the reversed task one pressed the left key if pictures of the pen or words representing others appeared and pressed the right key if pictures of other pens or words representing self appeared. This task classifying the targets into their specified category was called the categorization task. If the latency in the initial task was shorter than the reversed task, it suggested that the pen-self connection was stronger than other-pens-others. On the contrary, if the latency was shorter in the reversed task, it suggested that the pen-others connection was stronger than the other-pens-others. As for the measurement of implicit valuation of the pen, the above steps remained the same except that positive words (sun, luck, love, fun, happiness, pleasure, holiday, and friendship) and negative words (disease, death, murder, accident, poison, war, tragedy, and vomit) were used for the two attribute categories (Maison et al., 2004).

In the current study there were five categorization tasks in each of the IATs (Greenwald, et al., 2003; Huang, et al., 2009) and participants were required to press either the key “f” or “j” with their left and right index finger, respectively, in order to respond. There were twenty-four trials in Block 1, the attribute discrimination task, and participants pressed “f” when a word related to self (positive attribute) appears and “j” when a word related to others (negative attribute) appeared. There were twenty-four trials in Block 2, the target discrimination task, and participants pressed “f” when the ISU pen object was shown and “j”

when a fountain pen object was shown. There were twenty-four practice and forty-eight real trials in Block 3, the initial combined task, and participants were asked to press “f” when either a word related to self (positive attribute) or the ISU pen appeared and “j” when either a word related to others (negative attribute) or fountain pen object appeared. There were forty-eight trials in Block 4, the reversed target discrimination task, and the goal of this block was to reverse the specific key assignment in Block 2. During this task, participants pressed “f” when a fountain pen object was shown and “j” when a pen object was shown. There were twenty-four practice and forty-eight real trials in Block 5, the reversed combined task, and participants pressed “f” when a word related to self (positive attribute) or fountain pen object appeared and “j” when either a word related to others (negative attribute) or the ISU pen appeared. To counterbalance the block order, half of the subjects in each experimental condition completed the IAT in the block order as mentioned above, and the remaining half swapped Block 2 and 3 with Block 4 and 5. Only real trials in Block 3 and Block 5 will be used for later latency analysis although all data will be used for error rate calculation.

To maintain the ownership status throughout the experiment, the opportunity for transaction was arranged as the final task. In the beginning of the monetary evaluation task, participants were instructed to give three prices on three separate price elicitation sheets, one for themselves and two for another person. The price sheet for self could be for either selling (for owner) or buying (for non-owner) price. As for the two price sheets for others, one was for selling price and one was for buying price. There was a 75% and 25% chance that the participants would use the price sheet for self and for another person, respectively. This was accomplished by having participants thrown a 4-sided die. If they threw a one, a two, or a

three, they would use the price for themselves, which was the price sheet for self. On the other hand, if they threw a four, they would use the price sheet for others. To determine which sheet to use, participant drew from a box that had all participant numbers, each written down on a piece of paper, folded, and put in the box by the participant at the beginning of the experiment. If they drew their own participant numbers, then they re-drew until they got others'. Depending on the ownership condition, owners used other-sell sheet and non-owners used other-buy sheet.

All three prices were elicited by the BDM procedure (Becker, Degroot, & Marschak, 1964), which has been demonstrated to elicit one's true valuation of an object as well as to yield larger difference between WTA and WTP (Horowitz & McConnell, 2002). Each price elicitation sheet showed a list of thirty choices, where in each choice they decided between the pen and a specific amount of money, from \$0.10 to \$5.00, in \$0.10 increments between \$0.10 and \$1.40, \$0.20 increments between \$1.40 and \$3.00, and \$0.25 increments between \$3.00 and \$5.00. They were told that one of the thirty choices would be randomly selected and enacted by having them rolled a 30-sided die. For owner-sellers, the lowest price that they were willing to give up the pen represented their WTA and the highest price that non-owner-buyers chose represented their WTP.

Upon completion of all the above tasks, participants were debriefed. The experiment session took approximately thirty minutes.

## CHAPTER 3. Results

### Manipulation Check

In order for participants' data to be included in any analysis, they must have correctly indicated their experimental condition by choosing the correct statement regarding pen ownership ("This ISU pen is given to me" or "I need to return this ISU pen to the experimenter") and effort exertion ("I was supposed to start and keep squeezing the stress ball while I examined the ISU pen" or "I was supposed to merely hold the stress ball without squeezing it") in the online questionnaire, which was not recorded for 9 participants due to computer errors. Of the remaining 146 participants, 132, or 90.4% of them, passed the manipulation check, and the 14 participants who did not pass were excluded from analyses.

### Missing Data

Data for some dependent measures was missing due to either computer or procedural errors. One participant's pen was found broken after the experiment, so his data was discarded. For IAT data, two participants completed the IAT with one finger from one hand instead of both index fingers as instructed, so analyses that involved IAT excluded their data. In addition, another four participants only completed one IAT test instead of two. As for price data, fifty-five participants gave un-interpretable results such as inconsistent price by switching between money and the pen in at least one price elicitation sheet. Interpretable price data should have at most one transition point. Since it is possible that a given subject might have missing data for one IAT or object monetary valuation or any of the combinations, all analyses included the highest possible number of valid subjects for the specific statistical tests.



To rule out the possibility that any significant effect found on monetary valuation was due to systematic difference on perceived information about the pen across different levels of independent variables, a two-way ANOVA was performed and it showed that the perceived information was similar across experimental conditions ( $p > 0.298$ ). Therefore, this factor was dropped from subsequent discussion.

### **Explicit Measure of Psychological Ownership and Object Evaluation**

A composite measure of explicit psychological ownership was obtained by averaging the 6 items in the scale (on 9-point Likert scale) with the reversed items coded in the opposite direction. Cronbach's coefficient alpha showed acceptable reliability (0.889) from the sample. The same procedure was applied to 4-item explicit measure of object evaluation and the Cronbach's alpha also indicated acceptable reliability (0.877). It was hypothesized that factual ownership and effort exertion would increase both psychological ownership and object preference regardless of method of measurement (implicit measure such as IAT or explicit measure such as self-reported questionnaire), but a 2-way MANOVA with post-hoc univariate ANOVAs showed that only the main effect of factual ownership on the explicit measure of psychological ownership was significant,  $F(1, 126) = 34.04$ ,  $p < 0.0001$ , while the main effect of effort exertion and the interaction were not significant on explicit psychological ownership nor explicit measure of object evaluation,  $p > 0.166$ . Specifically, the psychological ownership for owner ( $M = 4.687$ ;  $SD = 1.633$ ) was significantly lower than non-owner ( $M = 6.436$ ;  $SD = 1.785$ ), with lower means indicating higher sense of psychological ownership. In other words, owners felt that they owned the pen more than non-owners. The result is shown in Figure 1. Regardless of the experimental conditions, the average explicit measure of object preference was approximately 3.4, indicating a positive

evaluation toward the pen because the lower the numeric value the more strongly the subject agreed that the pen was good and that they liked it.

### **Implicit Measures of Psychological Ownership and Object Evaluation and their effect on object monetary valuation**

The current study conducted two separate IATs, one for psychological ownership and one for object evaluation, and the data for the two tests were analyzed separately. IAT latencies were first reduced and natural-logarithm transformed following the common practice of data analysis procedure (Greenwald, et al., 1998; Huang, et al., 2009). Data from participants with error rates larger than or equal to 30% were excluded from further analysis. The first two trials of each real data block were excluded, and latencies longer than 3000ms and shorter than 300ms were re-coded to 3000ms and 300ms to control for inattention or anticipation. The overall error rates for the qualified participants for psychological ownership and object evaluation were 8.61% and 8.59%, respectively.

In the case of implicit psychological ownership, each participant had two key latencies, pen-self (P/S) and pen-non-self (P/NS), and differential in latency called self strength was created by subtracting the latter one from the earlier one (P/S - P/NS), which could be interpreted as the strength of association between the ISU pen and self, with a more negative value indicating stronger association. In the case of object evaluation, a similar differential in latency called positive strength was created for pen-positive (P/+) and pen-negative (P/-), where a more negative value between the two (P/+ - P/-) indicated stronger association between the ISU pen and positive attributes. Though subsequent reported latency differentials are reported in their non-transformed form, statistical analyses for IAT related test were performed based on the difference between the two key natural-logarithm-

transformed latencies.

A 2 (ownership) x 2 (effort) x 2 (IAT order) ANOVA on implicit psychological ownership yielded a significant main effect of IAT order,  $F(1, 109) = 11.567, p = 0.001$ , with the ISU pen on the left and other pens on the right in the initial block having significantly stronger association ( $M = -223.09; SD = 188.04$ ) than when other pens were presented on the left and ISU on the right ( $M = -113.50 \text{ ms}; SD = 115.01$ ). It is uncertain why there is an order effect. While the implicit psychological ownership toward the pen was slightly higher for owner ( $M = -184.99 \text{ ms}; SD = 171.28$ ) than non-owner ( $M = -160.24 \text{ ms}; SD = 163.60$ ), the difference was not significant,  $F(1, 109) = 0.608, p = 0.437$ . The result is shown in Figure 2. Although the psychological ownership was stronger for those who exerted effort ( $M = -190.82 \text{ ms}; SD = 177.33$ ) than those who did not ( $M = -155.70 \text{ ms}; SD = 156.89$ ), the difference was also not significant,  $F(1, 109) = 0.902, p = 0.344$ . The result is shown in Figure 3. The 3-way interaction and the simple interaction effects were not significant,  $p = 0.389$ .

As for implicit object evaluation, a three-way ANOVA with the same independent variables yielded a marginally significant main effect of pen ownership,  $F(1, 112) = 3.309, p = 0.072$ . Yet contrary to predictions, non-owners had better implicit valuation of the pen ( $M = -122.55; SD = 154.29$ ) than owners ( $M = -74.22; SD = 88.63$ ). The result is shown in Figure 4. The main effect of effort exertion was not significant,  $F(1, 112) = 0.001, p = 0.981$  but IAT order was significant,  $F(1, 112) = 6.820, p = 0.010$ , with other pens presented in the left and the ISU pen on the right higher in the initial block ( $M = -131.46; SD = 149.52$ ) than when the ISU pen was presented on the left and other pens on the right ( $M = -68.69 \text{ ms}; SD =$

95.52). While an IAT order effect was found for implicit object evaluation, the direction was the opposite as the one in implicit psychological ownership. Again the reason for this order effect is uncertain. While the simple interaction effect between effort exertion and IAT order was significant,  $p = 0.035$ , it was not of theoretical interest and therefore it was dropped from discussion. No other significant effect was found.

### **Test of the ownership and loss aversion accounts**

There were three within-subjects dependent variables of monetary valuation: other-buy, other-sell, and self-price (either self-buy or self-sell depending on the pen ownership), and their distributions are all positively skewed, with skewness from 1.31 to 1.50. In order to normalize the data, a square root transformation was performed and the post-transformation skewness among the three variables was brought down to 0.61 or below, indicating the data became close to normally distributed. The three transformed monetary valuations were subjected to a 2 (ownership) x 2 (effort) MANOVA with post-hoc univariate ANOVAs and the non-transformed means are reported here. The main effect of pen ownership was marginally significant on monetary valuation for oneself,  $F(1, 88) = 3.540$ ,  $p = 0.063$ . Specifically, owners' sell price ( $M = \$1.435$ ;  $SD = \$0.206$ ) was higher than non-owners' buy price ( $M = \$1.008$ ;  $SD = \$0.287$ ), and this is equivalent to the traditional endowment effect. However, there was no significant effect of ownership on other's buy price,  $F(1, 88) = 1.382$ ,  $p = 0.243$ , or other's sell price,  $F(1, 88) = 0.788$ ,  $p = 0.377$ . This suggests that owners did not value the pen more than non-owners when they were not selling their own pen, contradicting the ownership account of the endowment effect. The result is shown in Figure 5. The main effect of effort exertion and the interaction between pen ownership and effort exertion was not significant on any of the price measures,  $p > 0.244$ .

In order to test for loss aversion, transformed other-buy and other-sell prices were subjected to paired sample t-test, and it was found that when people made decisions on another's' behalf, they demanded significantly more to give up the pen ( $M = \$1.430$ ;  $SD = \$0.198$ ) than they were willing to pay to acquire the pen ( $M = \$1.261$ ;  $SD = \$0.239$ ),  $t(91) = -2.064$ ,  $p = 0.042$ . This is consistent with the loss aversion explanation of the endowment effect. The result is shown in Figure 6.

### **Effect of psychological ownership on monetary valuation**

Due to the design of the study, the self price essentially was identical to the prices represented in a typical endowment effect study, where owners gave selling price and non-owners gave buying price. Therefore self price was further investigated to see whether the endowment effect or part of it could be explained by psychological ownership. Data was re-coded so that higher value of online questionnaire and higher IAT latencies indicates higher sense of psychological ownership or general evaluation toward the pen for easier interpretation. A marginally significant positive correlation was found between implicit and explicit measures of psychological ownership ( $r(115) = 0.172$ ,  $p = 0.063$ ), indicating that there was overlap between the two constructs measured. In addition, the correlation between self price and the explicit measure of psychological ownership was marginally significant ( $r(85) = 0.207$ ,  $p = 0.055$ ) but the correlation between self price and factual ownership (coding for ownership: 0 for no ownership and 1 for ownership) status ( $r(88) = 0.157$ ,  $p = 0.140$ ) was not.

To further investigate if the factual ownership and both implicit and explicit measures of psychological ownership independently contribute to the explained variance in self price

after controlling for the other two factors, a simultaneous multiple regression with all three predictor variables was conducted and the model was highly significant,  $R^2 = 0.162$ ,  $F(3, 76) = 3.251$ ,  $p = 0.026$ . Results indicated that both explicit ( $b_{explicit} = 0.275$ ,  $t(76) = 2.250$ ,  $p = 0.027$ ) and implicit ( $b_{implicit} = -0.235$ ,  $t(76) = 2.097$ ,  $p = 0.039$ ) measures of psychological ownership were significant while factual ownership was not ( $b_{factual} = 0.064$ ,  $t(76) = 0.538$ ,  $p = 0.592$ ). This indicates that factual ownership did not significantly contribute to the understanding of self price. However, contrary to prediction, the measure was negatively related to price valuation. In other words, the more strongly subjects felt they owned the pen, the lower the monetary valuation they gave to self price. A follow-up stepwise multiple regression analysis with both measures of psychological ownership indicated that the two-factor model yields a slight increase of  $R^2$  (0.053) after entering implicit measure compared to the one-factor model with only explicit measure ( $R^2 = 0.057$ ). This indicates that after controlling for the effect of the explicit measure, the implicit measure of psychological ownership independently and significantly contributes to the understanding of price variance for self.

As for other price, the other-sell and other-buy prices were averaged and square root transformed and the new value was checked to see whether it had a significant correlation with ownership measures. A marginally significant correlation between other price and explicit measure of psychological ownership was found ( $r(87) = 0.180$ ,  $p = 0.092$ ), but that was not the case between other price and factual ownership ( $r(90) = 0.133$ ,  $p = 0.207$ ), and between other price and implicit ownership ( $r(83) = -0.081$ ,  $p = 0.460$ ). In addition, in a multiple regression model with factual ownership, and both implicit and explicit measure of

psychological ownership as the predictor variables was marginally significant,  $R^2 = 0.092$ ,  $F(3, 78) = 2.646$ ,  $p = 0.055$ . Moreover, the explicit measure of psychological ownership remained significant after controlling for the effect of the other two factors ( $b_{explicit} = 0.314$ ,  $t(78) = 2.559$ ,  $p = 0.012$ ) while the implicit measure ( $b_{implicit} = -0.140$ ,  $t(78) = -1.259$ ,  $p = 0.212$ ) as well as the factual ownership status ( $b_{factual} = -0.024$ ,  $t(78) = -1.199$ ,  $p = 0.843$ ) were not significant. In short, it is psychological ownership and not factual ownership that predicts one's monetary valuation.

### **Effect of object evaluation on monetary valuation**

No significant correlations were detected between implicit and explicit measures of object evaluation ( $r(118) = -0.036$ ,  $p = 0.698$ ) and between explicit measure of object evaluation and self price ( $r(87) = -0.051$ ,  $p = 0.636$ ). The negative correlation between self price and implicit measure of object evaluation was marginally significant ( $r(77) = -0.150$ ,  $p = 0.094$ ). Contrary to the prediction, self price was negatively associated with implicit object valuation.

## CHAPTER 4. Discussion

There were three objectives in the current study. The first was the application of the IAT in measuring psychological ownership and implicit valuation in a typical endowment study paradigm. We hypothesized that psychological ownership would predict object valuation and that there would be a correlation between implicit and explicit measures of psychological ownership. As predicted, there is a moderately significant correlation between implicit and explicit measure of psychological ownership. More importantly, after controlling for legal ownership, both implicit and explicit measure of psychological ownership significantly contributed to the price variance for self in a typical endowment effect study paradigm. This is in line with previous findings in Peck and Shu (2009) and Reb and Connolly (2007). While their studies used a self-reported questionnaire in measuring psychological ownership to significantly predict object monetary valuation, the current study is the first to add extra explanatory power on top of an explicit measure by applying the IAT in measuring implicit psychological ownership.

Three cues from the current study indicate that implicit and explicit measures of psychological ownership might be capturing different dimensions of the same construct, and both measures are worthy of further exploration in predicting object monetary valuation. First, the two measures were significantly correlated. Second, legal ownership affected explicit but not implicit psychological ownership. Third, while both measures significantly predicted object monetary valuation for self, only the explicit measure predicted monetary valuation for others. Based on the qualitative review of psychological ownership by Pierce et



al. (2003), it is logical to assume that psychological ownership is a rich construct that is unlikely to be fully captured together by the six-item self-reported scale and the IAT that are used in the current study. Further research may benefit from this direction by devising a richer measurement scale that can better capture the construct implicitly, explicitly, or both, which in turn might add further predictive power on object monetary valuation.

As for object non-monetary valuation, no clear conclusion can be drawn. It was hypothesized that owners would have a higher evaluation of the object. While the explicit measure supports the hypothesis by showing that one's sense of ownership, measured implicitly, is associated with higher object valuation, the implicit measure showed the opposite, where non-owners gave higher valuation than owners. What is also unclear is the fact that only the implicit measure shows that liking an object is associated with giving it less monetary value, although the association is only marginally significant. One possible explanation for the inconclusive result is that the four-item explicit measure and the implicit measure tap on different concepts. While the explicit one measured whether participants thought the pen was good or bad and whether the pen was liked or disliked, the implicit one may have measured something different.

A point worth mentioning is that the IAT order has a significant main effect on the outcome measured. Published studies usually do not show this order effect and it is not clear what drives the difference.

The second objective of the current study was to determine if effort per se contributes to the development of psychological ownership. No significant effect was detected for this factor. One possible explanation for the null findings is that the effort cue from squeezing a

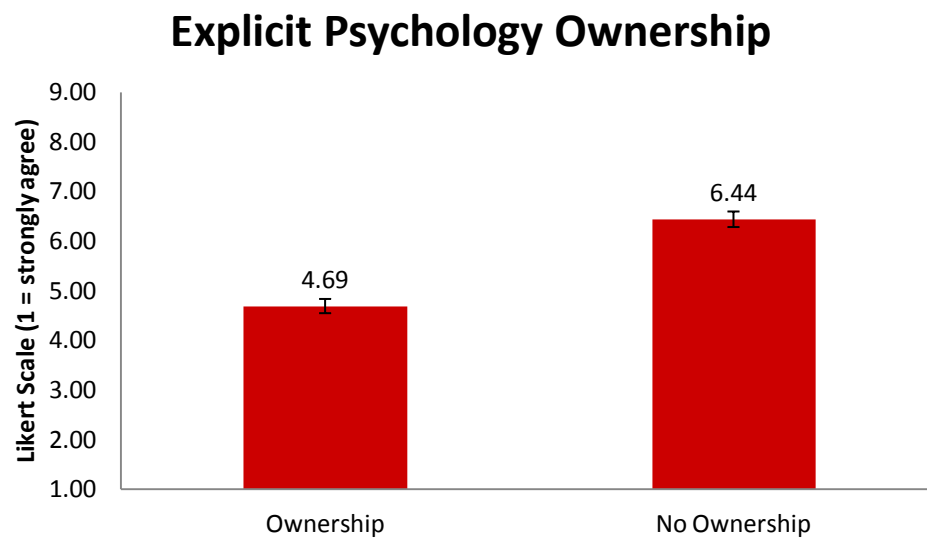
stress ball is too subtle to be registered by the participants. Another possible explanation is that effort exertion is not an objective measure. While squeezing a stress ball might sufficiently elicit sense of effort for some, it might be too easy for others. Future studies should include another measure that takes this factor into consideration such as self-reported subjective effort. Another potential remedy includes adapting the handgrip task paradigm that is common in self-regulation study, in which a baseline is established by having participants squeezed the handgrip for as long as they can. Subsequently, participants will be requested to squeeze for a proportion of duration in their baseline measure in the main task.

The third objective of the current study was to clarify whether the endowment effect is driven by loss aversion or by legal ownership as suggested by Morewedge et al. (2009). The ownership account states that owners value their belongings more regardless of buy or sell price while loss aversion predicts that stating the sell price elicits fears of losing an object and thereby the sell price should be higher than the buy price. The current study supports the loss aversion account. Regardless of legal ownership status, selling price is higher than buying price when people act on others' behalves, which converges with findings by Yeung and Weber (2010). On the other hand, there is no significant effect of legal ownership on object monetary evaluation other than the replication of the traditional endowment effect.

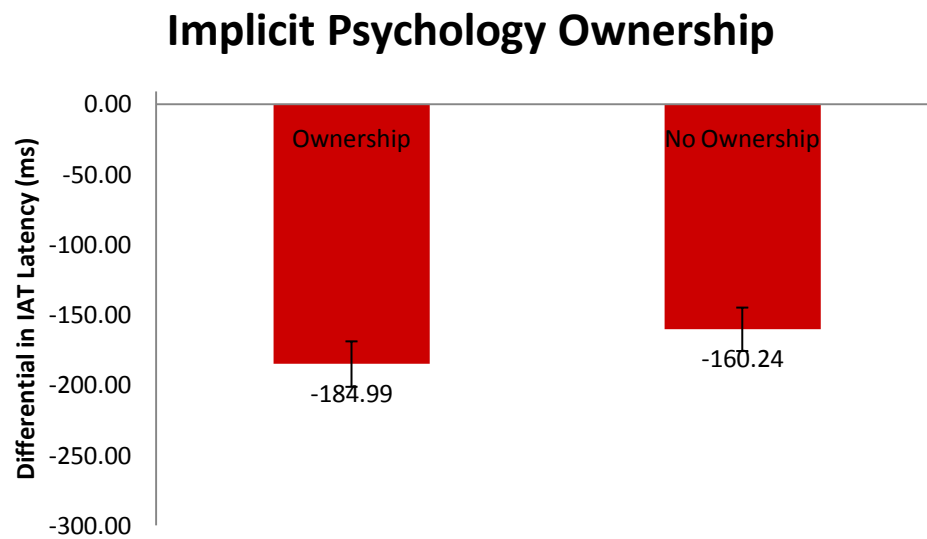
Although the current study attempted to use a paradigm more similar to Morewedge et al. (2009) by having owners and non-owners state their buy and sell price for others, it still fails to replicate their result and supports the loss aversion explanation instead. Indeed, Reb and Connolly's (2007) findings also indicated that it was psychological rather than legal ownership that drives the price difference. Lack of statistical power is an unlikely reason

because there are more than 40 valid participants in each level of the ownership factor in the current study, significantly more than the 20 plus per group in a typical endowment effect study. In addition, if participants attempted to appear consistent by shrinking the difference between their other buy and other sell price, the actual difference between the two prices should have been larger, which in turn supports the loss aversion explanation. To sum up, the current study provides a strong argument for the loss aversion as well as the psychological ownership explanation of the endowment effect.

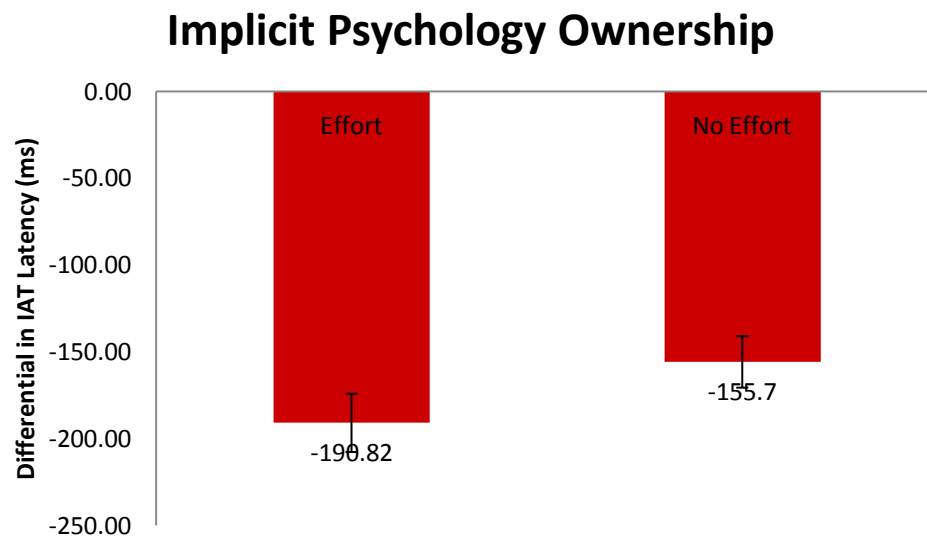
The endowment effect has been known for over three decades, but not until recent years had psychological ownership been brought up as one of the potential drivers of the effect. The current study shows that both loss aversion and psychological ownership are at work in affecting object valuation, demonstrating that the endowment effect is a complex process that merits further research.



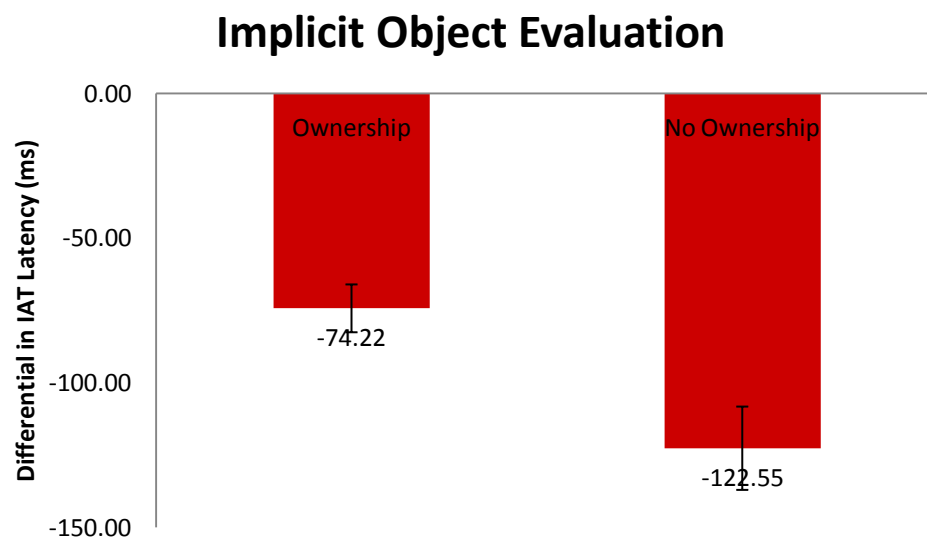
*Figure 1.* Mean explicit psychological ownership across the ownership factor.



*Figure 2.* Mean difference between IAT latencies of implicit psychological ownership across the ownership factor.



*Figure 3.* Mean difference between IAT latency of implicit psychological ownership across the effort factor.



*Figure 4.* Mean difference between IAT latencies of implicit object evaluation across the ownership factor.

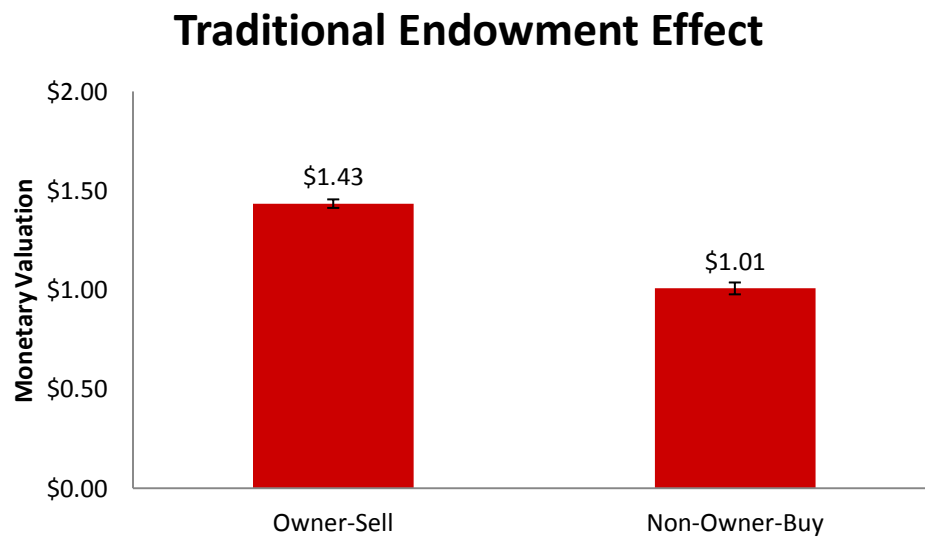
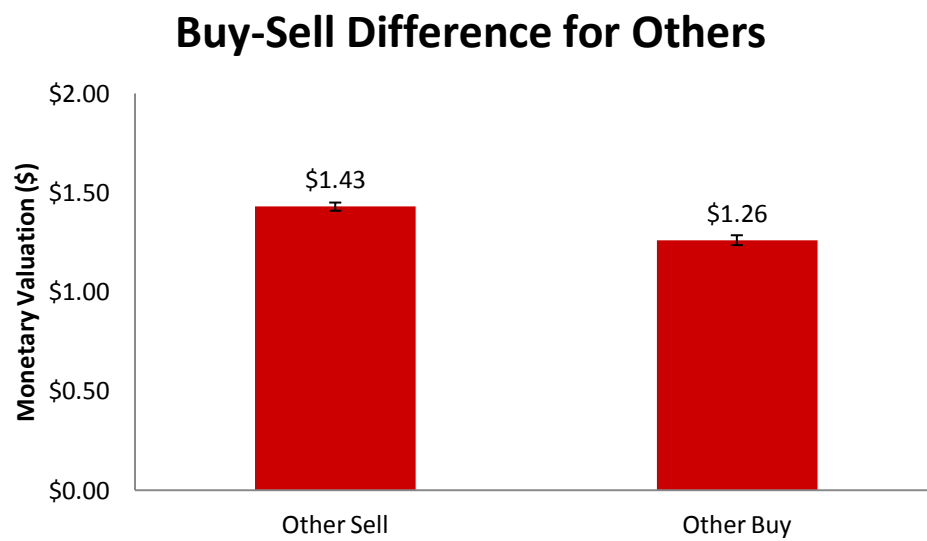


Figure 5. Mean monetary valuation for self across typical endowment effect conditions





*Figure 6.* Mean monetary evaluation between buy and sell price for others.

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