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**“Ownership Polarization: Self-Reference as an Alternate  
Account of the Endowment Effect”**

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**OWNERSHIP POLARIZATION:**

SELF-REFERENCE AS AN ALTERNATE ACCOUNT OF THE ENDOWMENT EFFECT

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## **ABSTRACT**

The endowment effect is the tendency for people who own a good to value it more than people who do not. This phenomenon has recently been attributed to different cognitive frames determining the subset of information accessible at the time an object is evaluated. Ownership appears to be an especially potent frame—merely owning a good is sufficient to boost object evaluations, even in the absence of any threat of loss. Self-enhancement theories of ownership suggest that this effect is due to implicit self-esteem creating an additional positive self-association with owned objects. However, many of these findings are also consistent with an alternate account of ownership based on self-referential effects in memory—associating a stimulus with the self generally results in increased attention and better memory encoding.

In this dissertation, I develop novel predictions that differentiate these competing accounts of ownership effects, arguing that consideration of the self-concept as a cognitive structure affecting information processing (i.e., enhancing attention and memory for self-related stimuli) can explain why ownership might serve as an especially potent cognitive frame sufficient to produce an endowment effect due to mere ownership. Because most goods have predominantly positive features, increased salience of those features due to ownership should increase the weighting of those positive features, biasing object evaluations and increasing perceived value. For objects with predominantly negative features, increased salience of those features due to ownership should increase the weighting of those negative features, biasing object evaluations and decreasing perceived value. The contribution of my present theory is to explain why mere ownership would cause this chain of events. Furthermore, the present-self reference account can explain a previously puzzling finding that standard self-enhancement

based theories of ownership would not predict—the reversal of the endowment effect for “bads,” objects with predominantly negative attributes.

I report the results of a first study demonstrating the reversal of the endowment effect for such “bads” in a mere ownership paradigm, consistent with the present self-reference theory (Study 1). I replicate and extend this effect (Studies 2A & 2B), then develop a series of empirical tests pitting the predictions of the present self-reference theory against extant self-enhancement theory. The additional studies examine novel moderators derived from a self-reference perspective, such as individual differences in general self-referential memory advantage (Study 3), salient self-schema related to cultural primes (Study 4), private self-consciousness (Studies 5A & 5B), and features of the good that affect how readily it is connected in memory to salient identities (Study 6). I test the proposed mechanism via an aspect-listing task in order to examine the role of information processing in producing such ownership polarization effects (Study 7).

Although I observe an ownership polarization effect consistent with my hypotheses in the first three studies (Studies 1, 2A, & 2B), this effect did not consistently emerge in later studies attempting to examine the above-described moderators. In particular, there were no observed effects of ownership in Study 3 or Study 4. Results consistent with a standard endowment effect for goods were, however, observed in Study 2A, Study 2B, Study 5A, and Study 6. For the remaining studies, more nuanced patterns emerged, implicating private self-consciousness primes in Study 5B, and the valence of listed thoughts recorded in Study 7. I explain this evidence in more detail, and conclude my dissertation with an analysis characterizing the situations where effects of ownership did or did not appear to reliably emerge.

For bads, I observe a reversal of the endowment effect (i.e., evidence of ownership polarization) in Studies 1, 2A, and 2B. I observe no significant effects of ownership in Study 3,

4, and the follow-up replication attempt. I observe effects of ownership (or related interactions) for bads that support a competing theory, self-enhancement, in Studies 5A, 5B, and 6. I observe one interaction for the information processing mechanism that is consistent with the current theory (Study 7), whereas there were no significant effects of ownership for other aspects of the proposed mechanism in that same study.

Overall, the results indicate that there may be some heretofore unidentified boundary condition determining whether bads are subject to ownership polarization or a standard endowment effect. The present series of investigations were designed in order to thoroughly test my key hypotheses identified at the dissertation proposal stage. As a result, these studies were not designed to speak directly to such possible boundary conditions, thus some speculation is necessary to make sense of the mixed results. Nevertheless, I endeavor to report the results of my proposed line of inquiry thoroughly and accurately, in line with current best-practices, elucidating what the results may mean to the fullest extent scientifically possible.

Upon observing mixed results and reflecting in a General Discussion, a Resolution Study was conducted to address open issues. Specifically, in a preregistered design, I successfully replicated the mere ownership effect for goods, and then extended the paradigm to bads, all within an imagined ownership paradigm. This Resolution Study will be reported at the end of the dissertation, and finally, incorporated into an overall conclusion. Overall, the results of the Resolution Study help clarify the conditions under which mere ownership effects reliably replicate.

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## **PART 1: LITERATURE REVIEW AND THEORETICAL DEVELOPMENT**

### **INTRODUCTION**

People who own an object tend to value it more than people who do not (Thaler, 1980; Kahneman, Knetsch & Thaler, 1990). This reputedly robust pattern, the endowment effect, emerges even in the absence of choice, such as when possessions are allocated randomly (Knetsch, 1989). Historically, the endowment effect has often been attributed to loss aversion (Thaler, 1980; Kahneman, Knetsch, & Thaler, 1991). According to this theoretical perspective, sellers randomly endowed with an object consider the transaction as a loss relative to their status quo—owning the object. Buyers, in contrast, consider the transaction as a gain relative to their own status quo—not owning the object. The psychological impact of a loss from the status quo is weighted more heavily than a corresponding gain (Tversky & Kahneman, 1979), which leads sellers to demand more money to part with their possessions than buyers are willing to pay to acquire the same object.

Recently, evidence has emerged which is not readily explained by loss aversion (e.g., Morewedge, Shu, Gilbert, & Wilson, 2009). This evidence favors alternate accounts of the endowment effect, including psychological ownership and biases in information processing. Psychological ownership accounts posit that the endowment effect is driven by associations in memory between an object and the self-concept (Morewedge et al., 2009; Gawronski Bodenhausen, & Becker, 2007). Previous psychological ownership theories have explained the effect of psychological ownership as being due to the positive valence of the self-concept: because people generally show a self-enhancing tendency to view themselves in a favorable light (Greenwald & Banaji, 1995), this positive bias in turn reflects favorably on owned objects (Gawronski et al., 2007). Biased information processing theories have explained the endowment

effect as being driven by differences in the subset of information that is paid more attention or more elaborated in memory (Johnson, Haubl, & Keinan, 2007). That subset of information, in turn, is more heavily weighted in forming evaluations (Bordalo, Gennaioli & Schleifer, 2013).

In the following sections, I review evidence of the endowment effect, as well as evidence for and against these leading process theories (i.e., loss aversion, psychological ownership, and biased information processing). I then develop a new *ownership polarization* theory of the endowment effect based on research on self-referential biases, which are biases in information processing that stem from the basic cognitive effects of mentally associating a stimulus with the self. I later map out the three key propositions of this theory, and subsequently test this theory empirically over the course of ten experiments designed to differentiate the present self-reference theory from extant explanations.

## **THE ENDOWMENT EFFECT**

The core claim of the endowment effect is that merely being endowed with an object, such as by random assignment, is sufficient to cause owners to perceive that object as more valuable. The endowment effect is reputed to be robust, replicating across various objects and elicitation. The effect has been found across a range of cases from everyday consumer goods, such as mugs and pens, to more abstract entities such as land rights, intellectual property, and pollution (Buccafusco & Springman, 2010; Hammack & Brown, 2016; Horowitz & McConnell, 2002). The endowment effect challenges a core assumption in economic theory, Coase theorem (Coase, 1960), which is often relied on in policy and law (Korobkin, 2003). Coase theorem assumes that goods and entitlements will eventually be efficiently allocated (i.e. through trade or sale) to those parties who place a higher value on those goods and entitlements, regardless of

which party starts off with initial possession or ownership. In contrast, the endowment effect demonstrates the causal impact of merely owning a good, an effect which appears to emerge instantaneously even under hypothetical conditions, and only strengthens in magnitude for actual incentive-compatible outcomes (Horowitz & McConnell, 2002).

## **Experimental Paradigms**

The endowment effect has been demonstrated in a variety of experiments falling into three major paradigms: exchange, valuation, and mere ownership (see Morewedge & Giblin, 2015 for review).

### *Exchange Paradigm*

In the exchange paradigm, participants are randomly allocated one of two objects (e.g., a mug or a candy bar), which they then own. Subsequently, all participants are given the opportunity to exchange their assigned object for the alternate object they were not assigned. Regardless of which object they are initially endowed with, participants tend to show a reluctance to trade. In one study, for example, participants were randomly assigned to one of three groups (Knetsch, 1989). One group was endowed with a mug (mug-owners) and another group was endowed with a chocolate bar (chocolate-owners). When those participants were allowed the opportunity to exchange their endowment for the other object, only a small minority (less than 11%) chose to do so. A third control group (choosers) was not endowed with either object, but was given the opportunity to choose between receiving the two objects. In that case, choosers did not show a meaningful preference for one object over another: 56% chose the mug and 44% chose the chocolate bar. To the extent that this choice could be interpreted as a baseline

revealed preference for this population, trading would have been expected to result in similar proportions: people who happened to be assigned the mug but had an underlying preference for chocolate should trade for their desired option, and vice versa. The observed reluctance to trade supports the core claim of the endowment effect, that merely being endowed with an object via random assignment increases the object's perceived value.

### *Valuation Paradigm*

In the valuation paradigm, half of participants are initially endowed with an object, which they then own. Subsequently, they indicate the least amount of money they would be willing to accept (i.e., willingness to accept; WTA) in order to sell the object back to the experimenter, thus putting them in the position of a seller. The other half of participants who do not own the object indicate the highest amount of money they would be willing to pay (i.e., willingness to pay; WTP) in order to acquire the object, thus putting them in the position of a buyer. Sellers tend to demand significantly more money to part with the object than buyers are willing to pay (Kahneman, Knetsch, & Thaler, 1990), a finding that echoes the results of the exchange paradigm, and again supports the core claim of the endowment effect—that merely being endowed with an object via random assignment increases the object's perceived value. The ratio of WTA:WTP has been found to be 2.92 for ordinary private goods, and 10.41 for public or non-market goods, with incentive-compatible elicitations yielding higher ratios (Horowitz & McConnell, 2002). In other words, less typical goods, such as pollution rights, tend to have higher WTA:WTP ratios than more typical consumer goods, such as mugs or chocolate. These results are not merely due to the hypothetical nature of some studies—incentivizing participants to reveal their true valuations tends to increase, not decrease, WTA:WTP ratios.

It has become increasingly common for such valuation experiments to compare sellers to “choosers” rather than buyers (Lerner, Small, & Loewenstein, 2004). Choosers make a series of decisions between receiving various cash payments from the experimenter or receiving the object. First, participants view a series of choice pairs (i.e., “receive \$.50 or receive the object,” “receive \$1 or receive the object,” etc.). Next, they indicate their preference within each choice pair, with the understanding that one of the choices will be randomly selected to be enacted in reality, thus making the decision incentive compatible (Becker, DeGroot, & Marschak, 1964). This exact procedure can be mirrored for sellers, having them respond to a series of choice pairs that trade off keeping the object versus receiving various cash payments. The highest value at which the participant chooses the object over the cash payment is recorded as their valuation. Overall, choosers’ valuations tend to fall in between buyers’ and sellers’ (Kahneman, Knetsch, Thaler, 1991, p. 196; Knutson et al., 2008). Comparing sellers to choosers is a particularly clean design as these groups are effectively making the same series of choices (i.e., leaving the experiment with either a cash payment or the object) and the groups only differ in terms of their initial endowment (Lerner et al., 2004). Experiments utilizing choosers instead of buyers have the additional benefit of eliminating potential confounds such as participants’ individual levels of wealth or cash on hand.

### *Mere Ownership Paradigm*

In the mere ownership paradigm, half of participants are endowed with an object which they then own. Subsequently, all participants are asked to evaluate the object, such as by rating how desirable or likeable it is. For example, in one study, participants were randomly endowed with either a cold drink insulator or an alternate gift, and asked to rate the attractiveness of each

object. Participants endowed with the cold drink insulator (owners) evaluated it significantly more positively than participants endowed with the alternative gift (i.e., non-owners; Beggan, 1992). This pattern once again supports the core claim of the endowment effect, that merely being endowed with an object via random assignment increases the object's perceived value.

### **Competing Explanations**

The robustness of the endowment effect and its important implications, ranging from psychology to economics to public policy, have sparked a flurry of research aimed at identifying the underlying psychological processes (for reviews see Ericson & Fuster, 2014; Morewedge & Giblin, 2015). In the following sections, I review competing explanations of the endowment effect and the corresponding supporting evidence.

Three major explanations of the endowment effect can broadly be classified in terms of their theoretical focus on loss aversion, ownership, or information processing. First, theories based on loss aversion attribute the endowment effect to the differing positions of sellers and buyers in terms of either gaining or losing the object (Kahneman, Knetsch, & Thaler, 1990; Thaler, 1980). Second, ownership-based theories attribute the endowment effect to the differing positions of sellers and buyers in terms of owning the object and associating it with the self (Morewedge et al., 2009; Gawronski et al., 2007; Beggan, 1992). Third, information processing theories attribute the endowment effect to differences in the subset of value-relevant information that is searched for, attended to, or remembered, depending on endowment status (Carmon & Ariely, 2000; Johnson, Haubl, & Keinan, 2007; Ashby, Dickert, Glockner, 2012; Bordalo, Gennaioli, & Schleifer, 2012a; Pachur & Scheibehenne, 2012).

## LOSS AVERSION

Historically, the endowment effect has been primarily attributed to loss aversion. Early studies demonstrating the endowment effect utilized an exchange paradigm, and explained participants' reluctance to trade as being a result of their position relative to the reference point of their initial endowment (Knetsch, 1989). In the exchange paradigm, for example, participants were thought to view the trade in terms of losing the object they had been assigned versus gaining the other object. People are generally loss averse—the psychological impact of a loss is stronger than that of an equivalent gain. For example, losing \$20 is generally perceived to be more painful than gaining \$20 is perceived to be pleasurable. Due to loss aversion, the prospect of gaining the unassigned object is perceived as less desirable than the prospect of losing the assigned object is perceived aversive, resulting in a reluctance to trade (Knetsch, 1989). This theoretical perspective also extends from the exchange paradigm to the valuation paradigm: according to loss aversion, sellers in a position to lose the object perceive that loss as more impactful compared to buyers' (or choosers') perception of the corresponding gain. This asymmetry is in turn reflected in their monetary valuations, resulting in a willingness to pay/willingness to accept gap, commonly referred to as a WTP-WTA gap (Knetsch & Sinden, 1984).

Endowment studies are generally conducted using everyday consumer goods. Another variant of the exchange paradigm, however, tested willingness to trade between negative stimuli, “bads,” such as traffic fines and undesirable job attributes (Brenner et al., 2007; Shu & Peck, 2011). When endowed with negative stimuli, participants showed the opposite pattern as had been observed in the exchange paradigm for positive stimuli, exhibiting an eagerness to trade bads with which they were endowed. This pattern suggests that merely being endowed with a

negative stimulus via random assignment might *decrease* its perceived value. This pattern has been explained by a form of loss aversion called “possession loss aversion” (Brenner et al., 2007). According to possession loss aversion, “departures loom larger than arrivals,” meaning that the affective value of an object leaving one’s possession is exaggerated. In other words, it is perceived as more a relief to get rid of a bad than it is perceived as a burden to acquire another bad in exchange. Critically, possession loss aversion depends on the presence of a loss cue. One must be contemplating getting rid of something in order for the act of getting rid of it to “loom larger” than the prospect of acquiring a different negative stimulus.

## **OWNERSHIP**

The vast majority of empirical work on the endowment effect confounds loss framing with ownership—owners stand to lose the object while non-owners stand to gain it (Morewedge et al., 2009). Notably, two of the three canonical paradigms confound loss and ownership—both the exchange and valuation paradigms manipulate loss in tandem with ownership: sellers/owners consider giving up an object for either money or another object.

The endowment effect can be characterized in terms of mere ownership—that owners tend to view their possessions more positively than do non-owners. There are competing explanations for why this is, and whether ownership is necessary and/or sufficient to produce an endowment effect. Whereas the loss aversion account attributes the endowment effect to a loss or gain vis-à-vis the status quo, it neither predicts nor explains an endowment effect when there is no prospect of loss, as might be argued to be the case in everyday life when thoughts of losing a possession (i.e., by selling or trading it) are not necessarily salient (Nesselroade, Beggan, & Allison, 1999). Indeed, when loss and ownership are tested independently, the endowment effect



persists even in the absence of loss frames, suggesting that mere ownership might be sufficient to produce the effect (Morewedge et al., 2009).

In one such study disentangling ownership and loss aversion, the endowment effect was found to emerge under ownership conditions alone (Morewedge et al., 2009). Buyers who were previously endowed with an identical good (owner-buyers) were willing to pay a similar price as sellers demanded. Furthermore, non-owner-sellers acting as agents on behalf of others did not show increased valuations (i.e., selling prices), as would be predicted by a standard loss-aversion account (i.e., since the transaction represented a loss with respect to the status quo). This pattern holds across mere ownership studies asking people to evaluate how much they like owned vs. non-owned objects. Even without implicating any kind of loss (i.e., contemplating selling), owned objects tend to be rated as more desirable than non-owned objects (Beggan, 1992; Nesselroade et al., 1999). Mere-possession can also increase valuations independently of factual ownership (and loss frame) via increased psychological ownership (Reb & Connolly, 2007). These findings highlight the need to understand the underlying processes by which ownership affects evaluations.

Self-enhancement theories of ownership explain this pattern as arising from the positive valence of the self-concept (Gawronski et al., 2007). According to this perspective, ownership creates a mental association between the self and the owned object. Because people generally hold highly positive self-views (Greenwald & Banaji, 1995), objects associated with the self tend to benefit from positive self-associations. In one direct test of this process, for participants randomly endowed with one of two postcards in the lab, implicit self-evaluations were positively correlated with implicit evaluations of owned (vs. non-owned) objects (Gawronski, Bodenhausen, & Becker, 2007). In other words, participants who more readily associated self-

related words with positive concepts, an implicit measure of self-esteem, also tended to more readily associate newly owned objects with positive concepts. In this model, the self-concept functions like a positive source association. Other kinds of positive source associations, such as receiving a mug as a prize for good performance, have similarly been found to exacerbate the endowment effect, while negative source associations, such as a prize for poor performance, have been found to attenuate the endowment effect (Loewenstein & Issacharoff, 1994). This evidence supports the premise that positive associations, such as those formed by association with the self-concept, could ultimately drive the endowment effect.

## **INFORMATION PROCESSING**

Information processing theories emphasize the “cognitive building blocks” involved in basic processes, such as attention, perception, and memory. These basic processes can in turn be studied to better understand decision-makers’ sampling, retrieval, and integration of relevant information (Oppenheimer & Kelso, 2015, p. 283). A critical theme spanning numerous specific information processing theories is that attending to or recalling a specific piece of information (i.e., an object attribute) increases the weight of that piece of information in subsequent judgment and decision making.

Direct evidence for the role of information-processing in the endowment effect has recently come to light within the valuation paradigm. Attention, an early stage of information processing, can be studied through eye-tracking—where people are looking is considered a reliable indicator of the subset of information receiving relatively greater attentional processing (Underwood, Humphrey, & Van Loon, 2011; Humphreys et al., 2010). Within the valuation paradigm, such eye-tracking data indicate that sellers (vs. buyers) of lottery tickets attend more

to high (vs. low) possible outcomes, which in turn predicts differences in valuations (Ashby, Dickert, & Glöckner, 2012). In other words, sellers focus visually on a different subset of information than do buyers, and this differing visual focus mediates the relationship between buyer/seller status and valuations. This result is thus consistent with the amount of attention to a given piece of information predicting the weight of that information in subsequent decision making.

Similarly, another study examining information search tested the way that people navigated information about a lottery, depending on whether they were designated as a buyer or a seller of a ticket for that lottery (Pachur & Scheibehenne, 2012). Across conditions, participants could click repeatedly in order to view random draws from the payoff distribution of a given lottery, until they felt they had enough information to make an evaluation. Next, they indicated either the maximum price they would be willing to pay for the chance to play the lottery (i.e., buyers) or the minimum price they would be willing to accept to give up the chance to play the lottery (i.e., sellers). Sampling behavior differed depending on endowment status, with buyers tending to cease information search after having sampled relatively low-paying outcomes, and sellers tending to cease information search after having sampled relatively high-paying outcomes. In other words, endowment status influenced information processing via external information search, which in turn predicted the size of the resulting endowment effect. This result is consistent with the sampling of a given piece of information increasing the weight of that information in subsequent decision making.

## Query Theory

There is also evidence for the memory stage of information processing predicting information weighting and decision outcomes, specifically within the endowment paradigm. Query theory was one of the earliest of information processing theories to be applied directly to the study of the endowment effect (Johnson, Haubl, & Keinan, 2007) and assumes that “people’s preferences, like all knowledge, are subject to the processes and dynamics associated with memory encoding and retrieval, and that these principles of memory and attentional processes can explain observed anomalies in evaluations of choices” (Oppenheimer & Kelso, 2015, p. 283). Specifically, query theory posits that people pose a series of internal queries when faced with a decision, operationalized via a thought listing task. The starting point for these queries (i.e., the initial thoughts listed) is critical for two reasons: first, it tends to be systematically biased such that information is primarily recruited in support of the status quo. Second, initial queries in turn affect the scope of subsequent queries.

When posing internal queries, the starting point tends to be systematically biased towards information supporting the status quo. For choosers in a valuation paradigm, contemplating whether to pick the mug or the money at various dollar values, the status quo would be walking away without acquiring the mug, whereas for seller-owners, the status quo would be holding on to the mug. Query theory specifically posits that people tend to consider value-increasing aspects of the situation, that is, factors that either support the status quo or derogate the alternative. For owners, this would be positive thoughts about the mug (i.e., ‘it is useful’) and negative thoughts about the money (i.e., ‘it’s not that much money’). For non-owners, this would be positive thoughts about the money and negative thoughts about the mug. These predictions were borne out in the results—indeed, within the valuation paradigm, when choosers and sellers were given

an aspect listing task asking them to list their thoughts, both choosers and sellers tended to first list thoughts that supported their respective status quos (Johnson et al., 2007). Query theory only explicitly deals with consumer goods, such as mugs, and does not make any explicit prediction for “bads.”

The second reason the starting point for queries is critical is because the initial query in turn affects subsequent queries. Recruiting one piece of information has been found to inhibit the cognitive accessibility of other, related information, below baseline, a phenomenon called retrieval-induced forgetting (Anderson, Bjork, & Bjork, 1994). Due to this quality of human cognition, the first pieces of information activated in a decision-making task tend to be especially impactful. Indeed, in the query theory experiment, the content and order of these aspect listings in turn predicted valuations. Critically, query order was demonstrated to play a causal role shaping valuations. Specifically, instructions to start the thought-listing task with information inconsistent with the status quo (i.e., reasons for sellers to give up the mug, or for buyers to acquire it) changed the pattern of valuations, even producing an endowment effect in the absence of possession. Overall, these results are consistent with the recall of a given piece of information increasing the weight of that information in subsequent decision making.

The query theory researchers describe their theory as memory-based, however it should be noted that the object in question (i.e., a mug) was present in front of participants throughout the experiment, so the implications of attention and memory may be difficult to disentangle entirely. Generally, it might be argued that people constructing valuations from memory are later able to better recall and integrate information that received more attention at the time of encoding, reflecting an interplay between attention and memory (Chun & Turke-Browne, 2007). Furthermore, memory has been theorized to be a form of “internal attention” (Chun, Golomb, &

Turk-Browne, 2011). Overall, both attention and memory are integral to information processing theories, and the query theory paradigm demonstrates the causal role of information processing in shaping object valuations.

### **Salience Theory**

Salience refers to the following phenomenon, “when one’s attention is differentially drawn to one portion of the environment rather than to others, the information contained in that portion will receive disproportionate weighting in subsequent judgments” (Taylor & Thompson, 1982, p.175). The concept of salience has been used to model choice under risk, such as decisions about lotteries, where participants tend to overweight salient outcomes (Bordalo, Gennaioli & Shleifer, 2012b). This model of salience influencing decision weights has also been extended to riskless choice among goods with varying attributes (Bordalo, Gennaioli & Shleifer, 2013), with consumers overweighting in their choices the most salient aspects of each good they consider. Salience theory has also been specifically applied to modeling the endowment effect (Bordalo, Gennaioli, & Shleifer, 2012a). According to salience theory, within the exchange paradigm, initial endowments are compared against the backdrop of having nothing, and participants endowed with a good focus on the endowment’s most salient attributes, which for goods, tend to be positive and boost the relative valuation of owned goods.

### **Attribute Sampling Bias**

Recently we developed an integrative theoretical framework, *attribute sampling bias*, which spans all three instantiations of the endowment effect, including the exchange paradigm, the valuation paradigm, and mere ownership. Attribute sampling bias explains the endowment

effect as being the result of cognitive frames determining the subset of information accessible at the time an object is evaluated (Morewedge & Giblin, 2015). Cognitive frames can be either exogenous (e.g., role as a buyer or seller) or endogenous (e.g., psychological ownership) and influence the accessibility of value-relevant attributes by shaping the subset of transaction-relevant information that is searched for, attended to, encoded, and recalled. The most cognitively accessible subset of transaction-relevant information disproportionately influences evaluations. The relative cognitive accessibility of object attributes and object-related thoughts is critical because it can affect the salience and weighting of those attributes, ultimately affecting consumer judgments. Highly accessible (vs. inaccessible) attributes are more likely to be sampled and accumulated, shaping preference (Bhatia, 2013; Bordalo, Gennaioli, & Shleifer, 2012b). Decision-makers consider the attributes that are most accessible at a given time, whether that accessibility is driven by availability in the external environment, such as an eye-catching price label at the store, or the extent to which internal representations are cognitively activated and retrievable, such as vivid memories of past experiences with various brands.

### **Information Processing Explanations of Loss Aversion**

There remains debate whether loss aversion is truly a process explanation of the endowment effect. This puzzle is perhaps best highlighted by work suggesting underlying causes of loss aversion that implicate information processing. *Decision by sampling* theory posits that people's perceptions of value are affected by comparisons to their experiences with relevant values. In everyday life, the average person is subjected to many small monetary losses. Our bank accounts rack up many relatively small debits, compared to relatively fewer large credits (Stewart, Chater, & Brown, 2006). Because subjective value is a function of relative rank, a \$20

windfall is compared to our recent paycheck, and discounted as rather trivial compared to that large account credit. A \$20 parking ticket, in contrast, is compared to small debits like the cost of our morning coffee, next to which it feels more substantial. These comparisons could thus produce a pattern of loss aversion, if losses and gains tend to be compared to different life exemplars and those life exemplars tend to minimize gains and exacerbate losses. From a more limited, short-term, scope, research has also found that shifts in the samples available in the immediate environment affect whether loss aversion emerges, reverses, or attenuates (Walasek & Stewart, 2015).

## **SELF-REFERENCE EFFECTS**

To date, research in the psychological ownership tradition has consistently taken the perspective that the positive valence of the self-concept is what drives increased valuations of owned goods (e.g., Gawronski et al., 2007). However, there is a large body of work in cognitive psychology establishing a distinct cognitive effect of self-association, independent of positive self-evaluations (Sui & Humphreys, 2015). Associating a stimulus with the self affects cognition throughout multiple stages of information processing, impacting perception, attention, and memory for that stimulus. This pattern of self-bias is known as the *self-reference effect* (SRE; for reviews see Sui & Humphreys, 2015; Cunningham & Turk, 2017). The general pattern observed is that objects related to the self are more readily noticed in the environment, looked at longer, and remembered better.

In a classic self-reference study, participants view a series of target words (i.e., positive and negative trait adjectives) some of which they are asked to encode relative to the self (i.e., does this word describe you?) and others which they are asked to encode by another means, such



as relative to another person or semantic marker (e.g., does this word contain a vowel?). The proportion of target words later recognized or recalled depending on encoding condition is then analyzed for evidence of a self-referential advantage. Typically, stimuli encoded with reference to the self are better remembered, which is referred to as a self-referential memory bias, or self-reference effect. Such self-referential biases in memory have been attributed to increased elaboration and organization (i.e., depth of processing) of information encoded in association with the self-concept, a particularly well developed and frequently used mental construct (Symons & Johnson, 1997; Craik & Lockhart, 1972).

The self-reference effect emerges under implicit encoding conditions as well. In one study, an implicit encoding condition was included in addition to the classic explicit encoding (i.e., does this word describe you?). Participants showed better memory for stimuli incidentally paired with the self (i.e., having judged whether a word appeared above or below their name on a screen) than stimuli incidentally paired with an “other” (e.g., having judged whether a word appeared above or below the name “Angelina Jolie”). A direct comparison revealed that explicit encoding is even stronger, but implicit encoding appears to be sufficient to generate an advantage for self-relevant material (Turk, Cunningham, & Macrae, 2008). This finding can be taken as evidence that even a slight contextual association with the self can affect the way people encode and retrieve information.

### **Self-reference Effects and Ownership**

Although the canonical self-reference study uses trait adjectives, there is evidence that this paradigm may be extended to memory for consumer goods associated with the self via imagined ownership (Cunningham, Turk, Macdonald, & Macrae, 2008; Cunningham, Vergunst,

Macrae, & Turk, 2013). In one such study, participants sorted images of objects such as food, clothing, and electrical items, into baskets labeled as belonging either to themselves or to another participant. In a surprise recall test, participants showed better memory and faster recognition for “owned” objects that had been assigned to a virtual basket labeled with their own name (Cunningham et al., 2008).

In addition to affecting recall, self-reference has also been found to affect attention under conditions of both imagined ownership (Turk et al., 2011) and actual ownership (Constable et al., 2018). In one such study in an imagined ownership paradigm, participants showed a preferential pattern in their attention to nominally owned objects that had been randomly assigned to be “owned” by the self (vs. other) (Turk et al., 2011). Perhaps some of the best evidence for the influence of self-reference on attention is the difficulty people have orientating themselves *away* from self-referenced stimuli: the memory trace of self-reference also appears to be “sticky”—once people have encoded a stimulus with reference to the self, they show interference should that stimulus association be changed in the future (Wang, Humphreys & Sui, 2016). This suggests that processes at the time of encoding are particularly impactful in shaping self-reference effects (Sui & Humphreys, 2015).

Overall, the emergence of self-reference effects under conditions of imagined ownership echoes the previously described incidental self-encoding findings, suggesting that minimal self-associations are sufficient to produce self-referential effects in attention and memory processes. These results might be interpreted as an especially strong test of mere ownership. The effect would arguably be expected to persist, if not increase, under conditions of actual (vs. psychological) ownership.

### **Self-reference for Object Gestalt vs. Features**

Research has found evidence for self-reference effects at both the general, gestalt level (i.e., objects, concepts) as well as more specific features of those objects or concepts. First, the evidence for enhanced recognition of verbal stimuli (e.g., personality traits, see Symons & Johnson, 1997) and consumer goods (Cunningham et al., 2008; Cunningham et al., 2013) clearly demonstrates that self-referencing aids overall gestalt memory for objects and concepts. Second, recent work has directly tested for a more specific self-reference effect of object features, finding that the SRE persists for the accurate and robust encoding of object details needed to properly differentiate highly similar objects (Serbun, Shih, & Gutchess, 2011).

In one study, participants encoded images of consumer goods (e.g., earrings, eyeglasses, candles, towels) with reference either to the self, an intimately known other, or a familiar other they did not know personally. Referential-encoding was manipulated within-subjects and established by having participants answer the question of whether the depicted object is something the target [self, intimate other, other] would buy in the next year. Two days later, participants returned and were tested on their memory for the displayed objects. Included in the test set were exact matches, similar matches, and novel stimuli. Similar matches were drawn from the same previously-displayed object category, but with different features, such as two pairs of earrings that differed in shape, materials, and design. The key analysis compared exact same targets correctly identified as “same” (reflecting specific memory for detailed features) vs. similar targets reported as “same” (reflecting general memory for the gist of the object). Results revealed a significant SRE at both the general and specific level (Serbun, Shih, & Gutchess, 2011, Study 1). This finding has been replicated and extended, finding that self-referencing enhances memory for objects at both the general (i.e., gestalt) and specific (i.e., detailed feature)

levels, across both younger and older adults (Hamami, Serbun, & Gutchess, 2011). Across both those investigations, memory performance for objects paired with an intimately known other was similar to performance for the self, consistent with close others being, to some degree, integrated in the mental representation of the self (Aron, Aron, Tudor, & Nelson, 1991). Overall, both objects and specific object features benefit from self-reference effects in memory.

### **THE PRESENT SELF-REFERENCE THEORY OF ENDOWMENT**

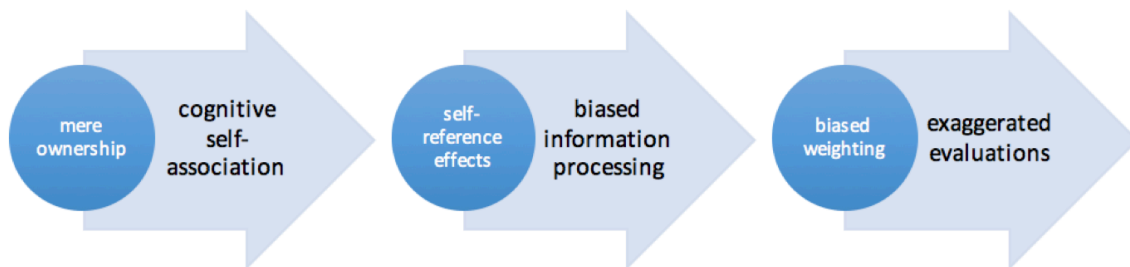
The goal of the present research is to test whether self-referential biases can serve as an alternate account of the endowment effect. In the following sections, I propose a new self-reference theory of the endowment effect and outline unique empirical predictions that differentiate the present research from previous work.

The present self-reference theory builds on the following propositions, each of which flow from one another. These three propositions will be developed in turn:

Proposition 1: Mere-ownership prompts cognitive self-association.

Proposition 2: Cognitive self-association induces biased information processing.

Proposition 3: Biased information weighting causes biased object evaluations.



*Figure 1. The Present Theoretical Model.* Each arrow represents one of the above propositions, which flow from left to right. The leftmost arrow represents Proposition 1; Mere Ownership

Prompts Cognitive Self-Association. The middle arrow represents Proposition 2; Cognitive Self-Association Induces Biased Information Processing. The rightmost arrow represents Proposition 3; Biased Information Weighting Causes Biased Object Evaluations.

### **Proposition 1. Mere Ownership Causes Cognitive Self-Association**

The first proposition of the present theory is that mere ownership associates goods with the self. In other words, merely owning an object causes that object to be psychologically linked to the self-concept. For instance, owning a mug leads one to associate it with one's self-concept (i.e., "my mug"). This is consistent with self-enhancement theory (e.g., Gawronski et al., 2007) as well as work considering the possession-self link formed by ownership (Beggan, 1992; Belk, 1988). Furthermore, effects depending on cognitive self-association can be triggered by mere ownership, and studies have demonstrated that the downstream effects of mere ownership can be observed in cases where that mere ownership is imagined (Cunningham et al., 2008; Cunningham et al., 2013; Turk et al., 2011). Mere ownership can also serve as a basic cognitive category affecting the way that owned (vs. non-owned) objects are processed and evaluated—owned object attributes tend to be assimilated to the self, and self attributes tend to be assimilated to owned objects (Johar, Chung, & Weiss, 2019; Weiss & Johar, 2013). For example, a person who views themselves as creative will view products they own (vs. do not own) as more creative, and taking ownership over a product viewed as highly creative will in turn bolster self-perceptions of creativity (Weiss & Johar, 2016). Overall, this research demonstrates how mere ownership engenders cognitive associations with the self-concept, which in turn shape downstream evaluations.

### **Proposition 2. Cognitive Self-Association Causes Biased Information Processing**

The second proposition of the present theory is that cognitive self-association causes biased information processing. A mental association between a stimulus and the self-concept biases information processing, such that that stimulus receives more attention and memory elaboration than if it were not associated with the self (Sui & Humphreys, 2015). For instance, owning a mug causes one to pay more attention to all of its attributes, and to better remember those attributes (versus a non-owned mug). As noted above, imagined ownership has been found to be a sufficient condition to cause such self-reference effects (Cunningham et al., 2008; Cunningham et al., 2013; Turk et al., 2011). Thus, even merely imagined ownership would be expected to cause an increased (i.e., biased) focus across all object attributes.

### **Proposition 3. Biased Information Processing Causes Biased Information Weighting in Evaluations**

The third proposition is that biased information processing leads to biased weighting of information in evaluations. In other words, information that is preferentially attended to or remembered is in turn assigned a higher weight when forming overall evaluations, such as value elicitation. For instance, owning a mug causes one to overweight its predominant attributes (which were earlier preferentially attended to) when assessing its value. For objects with predominately good attributes, this causes an increase in perceived value. For objects with predominately bad attributes, this causes a decrease in perceived value. This conjecture is consistent with several information processing theories, including those reviewed above. For example, query theory posits that the order in which information is recalled affects its weighting in evaluations (Johnson et al., 2007). Research on the tendency to “focus on the foregone”

similarly predicts that the subset of information receiving the most attention (i.e., focus) disproportionately affects evaluations (Carmon & Ariely, 2000). Attributes attracting attention also carry extra weight in impression formation (Fiske, 1980). In that research, attention predicted relative attribute weighting in generating overall evaluations (i.e., of likability). The results thus supported the underlying model of information integration (Anderson, 1971), overweighting information that had received more attention. Salience theory similarly models decision weights as distorted in favor of salient information (Bordalo, Gennaioli, & Shleifer, 2013).

Below I further specify my hypotheses, which I then test by conducting a series of studies to investigate this alternate theory of the endowment effect, empirically testing for the influence of self-referential effects of ownership on object evaluations. I also derive predictions for novel moderators relating to self-reference effects, which should in turn affect the direction and magnitude of the endowment effect.

## **HYPOTHESES**

### **H1. Ownership Polarization: Ownership increases the extremity of stimulus valence.**

The first hypothesis concerns the direction of the endowment effect depending on stimulus valence. Overall, self-reference theory predicts that the valence of owned objects will be polarized—in other words, ownership increases the perceived value of goods, and decreases the perceived value of bads. I term this pattern “ownership polarization.”

### *Comparison with Alternative Accounts' Predictions for Goods*

Self-reference theory predicts a standard endowment effect for goods, even within a mere ownership paradigm where there are no loss cues.

*Self-enhancement.* Self-reference theory is directionally consistent with self-enhancement theory, but diverges from self-enhancement theory in important ways. Although both theories predict a standard endowment effect for goods, such that owners value a good more than non-owners, self-reference theory employs a unique explanatory mechanism. Self-enhancement theory posits that those positive evaluations result from the good being associated with the positively valenced self-concept (Gawronski et al., 2007). In contrast, self-reference theory does not draw on the valence of the self-concept. Rather, self-reference theory draws on the cognitive effects of the self-concept in shaping attention and memory for self-related information (i.e., self-referential biases), suggesting that the mere ownership effect is due to boosted salience and increased weighting of owned-object attributes.

*Loss Aversion.* Self-reference theory is inconsistent with loss aversion, which relies on the presence of a loss cue. Loss aversion only predicts an endowment effect when owners stand to lose their endowment, and as a result, exaggerate its value because they are framing it as a loss. In contrast, self-reference theory predicts a mere ownership effect even in the absence of loss cues, anytime ownership causes a self-association with an object, which in turn biases attribute weighting and evaluations.

*Query Theory.* Self-reference theory is directionally consistent with query theory, which predicts that people focus on value-increasing aspects of the status quo (that is, for owners, positive attributes of the endowed object, or negative attributes of the alternative). Consistent with theories in the information processing tradition, query theory predicts that recalled



information will be disproportionately weighted when determining object evaluations. For goods where positive aspects have been recalled, query theory thus predicts a standard endowment effect for goods.

In sum, self-reference theory does not make directionally distinct predictions from these alternate theories (i.e., self-enhancement and query theory and loss aversion) in the presence of loss cues. In the absence of loss cues, self-reference theory does not make a directionally distinct prediction from self-enhancement or query theory accounts.

#### *Comparison with Alternative Accounts' Predictions for Bads*

Self-reference theory predicts that (mere) ownership should result in increasingly negative evaluations of bads. Because self-related information receives preferential information processing, it is then given greater weight in evaluations. In other words, the negative attributes of an owned bad are more salient than if it were not owned. This increased salience (i.e., attention) leads those negative attributes to be given greater weight, forming a more negative overall evaluation. Self-reference theory thus makes the unique prediction that owned bads will be perceived more negatively than non-owned bads within a mere ownership paradigm.

*Self-enhancement.* Self-reference theory is directionally inconsistent with self-enhancement theory. Self-enhancement theory predicts that owners will view the bad as less bad than non-owners, due to the positive self-association evoked by the owned bad.

*Loss Aversion.* Loss aversion has no basis to predict an effect in the absence of any loss cue. Notably, the reported reversal of the endowment effect has only been shown with the presence of a loss cue, thought to be required for the effect to emerge (Brenner et al., 2007).

However, self-reference theory predicts a reversal of the endowment effect even in the absence of a loss cue.

*Query Theory.* Self-reference theory is directionally inconsistent with query theory.

Query theory only explicitly accounts for owners considering value-increasing aspects of the status quo. Thus, owners would be predicted to focus on any ‘silver linings’ of the bad, and to disproportionately weight such information in their evaluations, ultimately viewing the bad as less bad than non-owners.

Overall, self-reference theory is unique in predicting a reversal of the endowment effect for bads within the mere ownership paradigm (i.e., absent any loss cues).

## **H2. Ownership polarization should be stronger for people who associate the stimulus more closely with the self-concept.**

The second hypothesis implicates moderators of the basic ownership polarization effect articulated in H1, and helps further distinguish the present theory from extant theory.

Specifically, it tests for convergent evidence across multiple moderators uniquely predicted by self-reference theory. Each of the moderators has been shown to implicate the cognitive structure of the self-concept (Smallwood et al., 2011; Wagar & Cohen, 2003; Hull & Levy, 1979; Hull et al., 1988), the basis for the basic self-reference effect that served as the foundation for the present theoretical development. I introduce each moderator below, and I will further elaborate on each of those moderators, in turn, within the preamble to each corresponding study.

### *Self-Reference Effects as an Individual Difference*

First, I investigate whether the direction and magnitude of the endowment effect is moderated by self-reference effects as an individual difference. People vary in the extent to which they show a self-referential memory bias, and previous research has used this inter-individual difference to study related phenomena (e.g., Smallwood et al., 2011; Study 2). For example, people who exhibit a stronger (vs. weaker) self-reference effect show a greater tendency toward prospective-focused autobiographical mind wandering. Within the current theoretical model, I expect that people who show a stronger self-reference effect will show a stronger ownership polarization effect (such that owned goods are rated more positively than non-owned goods, and owned bads are rated more negatively than non-owned bads). This experiment will serve as a basic test of the relationship between self-reference effects and mere ownership effects.

### *Cultural Construal*

Second, I investigate whether the direction and magnitude of the endowment effect is moderated by cultural construal. Westerners typically endorse independent (vs. interdependent) self-construals associated with a tendency to self-enhance (vs. self-criticize). Westerners also display a stronger endowment effect for goods than do Easterners, a pattern that has been replicated whether cultural mindset was manipulated or measured (Maddux et al., 2010). For example, participants primed with an independent (i.e., Western) cultural construal showed a stronger endowment effect than participants primed with an interdependent (i.e., Eastern) cultural construal. This has been attributed to the self-enhancing tendency of Western independent construals.

The present self-reference theory of ownership provides a novel interpretation of those previous findings. Notably, cultural differences have also been found for the self-reference advantage in memory. Specifically, Asian-Canadians (i.e., “Easterners”) do not show a typical self-reference effect—in fact they show a reversal by which individual personality trait-words encoded relative to the self are in fact *inhibited* relative to concepts encoded relative to others (Wagar & Cohen, 2003). For example, in a surprise memory test 40 minutes after answering questions about a series of words, Asian-Canadians showed a slower reaction time to words that had been encoded in reference to the self vs. a close other. Meanwhile, Asian-Canadians did show a standard self-reference effect (i.e., memory facilitation) for collective words that were situated in social relationships. In sum, the relative strength of individual vs. collective self-schemas across cultures appears to predict self-reference effects in memory. Indeed, within an individual ownership context, Westerners showed a memory advantage for self-owned (vs. mother-owned) items, while Asians showed the opposite effect (Sparks, Cunningham, & Kritikos, 2016).

Due to the connection between culture and ownership-induced memory (Sparks, Cunningham, & Kritikos, 2016), in the present study, I predict that culture will moderate ownership polarization such that the endowment effect (or its reversal, for bads) will be stronger under conditions where independent (vs. interdependent) cultural construals are salient. For goods, this might explain why people with an independent (i.e., Western) cultural construal show enhanced evaluations for owned (vs. non-owned) goods, as owned good attributes are better remembered or attended to, and in turn overweighted in evaluations. For bads, owned bad attributes being better remembered or attended to, and in turn overweighted in evaluations, should lead to ownership polarization for bads, such that owned bads are rated even worse than

non-owned bads. Both the endowment effect for goods, and its reversal for bads, should be stronger when independent (i.e., Western) cultural construals are salient (vs. interdependent, i.e., Eastern).

### *Private Self-Consciousness*

Third, I investigate whether the direction and magnitude of the endowment effect is moderated by private self-consciousness. Private self-consciousness is an individual difference in the extent to which one is self-aware and attentive to internal thoughts and feelings (Fenigstein, Scheier, & Buss, 1975). High (vs. low) private self-consciousness also predicts better memory for self-relevant stimuli in the environment (Hull & Levy, 1979; Hull et al., 1988). Because private self-consciousness has been found to moderate self-reference effects in memory, within the current model, I expect that moderating private self-consciousness should in turn moderate self-reference effects in memory, causing downstream effects on object evaluations. Specifically, I expect a pattern of ownership polarization such that owned goods are viewed more positively than non-owned goods, and owned bads are viewed more negatively than non-owned bads. I expect this pattern to be moderated by private self-consciousness, such that across both goods and bads, the effect of ownership polarization is stronger for participants higher (vs. lower) in private self-consciousness.

**H3. Ownership polarization should be stronger for stimuli that are more easily associated with the self-concept.**

The third hypothesis tests for convergent evidence for a different type of moderator, that is, characteristics of the object itself that make it more or less subject to the proposed chain of self-referential effects. I employ one such moderator, identity relevance, because it is theorized to affect the magnitude of ownership induced self-reference effects (e.g., Golubickis et al., 2020).

I manipulate the identity-relevance of an object to test how this affects the direction and magnitude of the endowment effect. Previous research has found identity-congruence, that is, the extent to which an object fits with a salient identity, to increase the valuation of owned goods such that people show an even stronger endowment effect for identity relevant goods (Dommer & Swaminathan, 2013). For example, in one study, participants exhibited a stronger endowment effect for a tote bag depicting their university logo (vs. a generic tote bag) (Dommer & Swaminathan, 2013; Study 2). This pattern is consistent with both self-enhancement theory and self-reference theory. For bads, however, these two theories make divergent predictions. According to self-reference theory, ownership polarization should be stronger for identity-relevant objects. In other words, the endowment effect should be stronger for identity-relevant goods, and its reversal should be stronger for identity-relevant bads. Self-enhancement, in contrast, would predict that the standard endowment effect should be exaggerated for identity relevant objects, whether the object be good or bad.

### **Contributions of the Present Research**

The present self-reference theory builds on *attribute sampling bias*, an integrative theoretical framework we recently developed and which was introduced above (Morewedge & Giblin, 2015). According to attribute sampling bias, the endowment effect is the result of cognitive frames determining the subset of information accessible at the time an object is

evaluated. The current self-reference theory builds on attribute sampling bias to posit that ownership engenders a type of cognitive frame that in turn affects information processing and evaluations across all three instantiations of the endowment effect: exchange, valuation, and mere ownership. The development of attribute sampling bias was sparked by gaps in previous theories in terms of explaining multiple manifestations of the endowment effect across those three key paradigms, and in particular, mere ownership. Theories based on the psychology of loss aversion do not apply to mere ownership paradigms in which solely self-association (via ownership) is manipulated. Mere ownership can, however, be productively integrated into a broader theoretical structure.

The present work goes beyond attribute sampling bias, however, by laying out a series of specific theoretical propositions (*see Figure 1*), thus going into much greater detail on the proposed process mechanism. The present work then moves to empirical tests which make specific, falsifiable predictions. Whereas attribute sampling bias noted which existing research which was consistent with its claims, the present work goes further to map out competing predictions within specific experimental paradigms designed to empirically test the present theory across goods and bads. For each empirical test of the present self-reference theory, predictions for multiple alternate theories will be elaborated in the preamble to each study, consistently covering loss aversion, query theory, and self-enhancement throughout this paper. This paper also goes into greater detail regarding the role of several predicted moderators affecting the cognitive structure of the self-concept, including individual differences in self-reference effects, cultural construal, private self-consciousness, and identity relevance. Finally, at the end of this paper, I reflect on the ways that attribute sampling bias might be refined in light of

the present empirical results. The present work thus makes both theoretical and empirical contributions to the literature on psychological ownership and endowment effects.

Whereas the previously reviewed self-reference literature in cognitive psychology establishes an effect of self-association (i.e., ownership) on various stages of information processing, from attention to memory, the present theory draws on the information processing literature to then establish the theoretical link between those self-reference effects and consumers' ultimate evaluations of owned objects. The present self-reference theory of endowment thus specifically addresses why ownership would act as a cognitive frame increasing the salience of owned object attributes. Through enhanced information processing (i.e., increased attention or encoding in memory), self-association via ownership may broadly increase the salience of owned object attributes. Because most goods have predominantly positive features, increased salience of those features due to ownership should generally increase the relative weighting of those features in judgment and decision-making (Bhatia, 2013; Bordalo et al., 2012a), in turn increasing perceived value. The contribution of my present theory is to specifically explain why mere-ownership would cause this chain of events, as well as to predict the implications across both goods and bads for several moderators. The present theory is unique in drawing on the self-reference literature and positing that due to self-concept being a highly elaborate and organized mental construct that shapes the depth of related information processing (Englert & Wentura, 2016; Craik & Lockhart, 1972), the resulting increased accessibility and weighting of self-related information causes more polarized evaluations than when those same stimuli are considered in the absence of self-association.

Overall, the above-described basic predictions for consumer goods are consistent with the large body of work finding a positive effect of ownership on object valuations. For objects with



predominantly negative features, however, increased salience and weighting of those features due to ownership is predicted to *decrease* perceived value. Here, the present theory diverges from previous work, particularly with regards to the proposed mechanism of self-reference.

### *Endowment Effect Reversal for Bads*

There is consistent evidence of a reversal of the endowment effect for bads—in other words, for people endowed with bads to be more willing to trade than would be expected by chance. This pattern was explained by a new version of possession loss aversion, which argues that people are especially sensitive to relinquishing (vs. acquiring) possessions (Brenner et al., 2007; Shu & Peck, 2011). Self-reference theory offers a potentially more parsimonious explanation, in that ownership may induce increased focus on and weighting of the predominant attributes of an owned endowment. It remains to be tested whether it is possible for the resulting pattern in evaluations to arise as the result of mere ownership, in the absence of any loss framing, as had been necessary to the theory previously used to explain the phenomenon (i.e., possession loss aversion; Brenner et al., 2007).

Information processing theories have previously been used to explain the endowment effect and its reversal for bads—being endowed with one alternative leads related attributes to be more cognitively accessible, and in turn over-sampled and accumulated, relative to less accessible cognitions unrelated to the endowed stimulus. This has been argued to occur via an automatic associative process (Bhatia, 2013). Such accumulation of positive attributes for endowed goods has been argued to lead to an increased weighting of those positive attributes in evaluation, and hence a stronger preference. In contrast, such accumulation of negative attributes for endowed bads has been argued to lead to an increased weighting of their negative attributes

in evaluation, causing a reduced preference (Bhatia, 2013, p. 538). These previous models do not, however, specify why merely being endowed with a stimulus would set off this chain of events. The process and proposed moderators of the present self-reference theory make it uniquely capable of specifying why owned objects would be salient to begin with, especially within a mere ownership paradigm. Self-reference theory is unique in positing an integrative explanation of the endowment effect across multiple instantiations, due to the cognitive effects of self-association.

Overall, the present self-reference theory can explain why ownership would be a particularly potent cognitive frame, enhancing attention and memory for objects associated with the self. It thus addresses a gap in the literature by offering an explanation for how endowment patterns, so often attributed to loss aversion, could arise in the absence of any loss-related framing. As noted above, there are indeed cases where previous information-processing theories predict a reversal of the endowment effect based on increased attentional processing (Bhatia, 2013; Bordalo, Gennaioli, & Shleifer, 2012a). However, the present investigation offers the mechanism of self-reference for understanding why endowed objects would receive such increased focus, even under conditions of mere ownership (i.e., in the absence of any loss frame). This differentiates the present self-reference theory from extant research, because the present theory explains why mere ownership, in the absence of any loss frame, might affect information processing, weighting, and ultimately, object evaluations. Further, self-reference theory of ownership generates novel predictions specifying when and for whom the endowment effect (or its reversal) will be strongest.

## OVERVIEW OF STUDIES

The initial empirical investigations for this dissertation research consist of nine experiments: Studies 1, 2A, 2B, 3, 4, 5A, 5B, 6, & 7, and one follow-up replication attempt. Upon observing mixed results and reflecting in a General Discussion, a Resolution Study was then conducted to address open issues. This Resolution Study will be reported at the end, and incorporated into an overall conclusion.

Studies 1, 2A, and 2B tested the effect uniquely predicted by the present self-reference theory: a reversal of the endowment effect for bads in a mere ownership paradigm (H1). Whereas Studies 1-5 focused on differences affecting how readily people link owned stimuli to the self (H2), Study 6 focused on features of the object itself (H3). Study 6 examined how object characteristics affect how well the object facilitates self-referential memory. Specifically, I manipulated the identity-relevance of an object, predicting that the reversal of the endowment effect would be stronger for negative stimuli more easily associated with the self in memory.

Studies 3-6 examined how factors uniquely predicted by self-reference theory interact with ownership in the context of the endowment effect (H2 & H3). Study 3 tested self-referential advantage in memory as an individual difference. Study 4 manipulated cultural mindset (i.e., interdependent vs. independent self-construal). Studies 5A & 5B examined private self-consciousness (both manipulated and measured) as a moderator. Whereas Study 1 tested the effect within the domain of bads (replicating stimuli from previous research (Brenner, Rottenstreich, Sood, & Bilgin, 2007)), follow-up studies tested self-reference predictions for goods as well. Furthermore, Studies 5 & 6 were designed to extend beyond mere ownership, using the exchange or valuation paradigms, which allow for additional inferences extending to outcomes more directly related to market behavior.

## PART 2: EMPIRICAL TESTS OF THE PRESENT THEORY

### STUDY 1: OWNERSHIP POLARIZATION FOR BADS

Based on a replication of the experiment used to demonstrate a reversal of the endowment effect for bads, (Brenner et al., 2007; Shu & Peck, 2011) this study instead used a mere ownership paradigm. This design rules out loss-aversion-based explanations by ensuring that participants are assigned to consider themselves as owners without the salient possibility of loss or transfer of that owned outcome. This isolates the role of ownership in the absence of any confounding loss frame, effectively testing whether the pattern found by Brenner et al., a reversal of the endowment effect attributed to valence loss aversion, extends from the exchange paradigm to the mere ownership paradigm.

#### Competing Predictions (For Studies 1, 2A, & 2B)

As depicted below, Brenner et al. would not predict a difference in object evaluations based on ownership—their theory depends critically on the perception of loss.

#### Valence-Loss Aversion Prediction

Stimulus Attributes	Non-Owners	Owners
Predominantly Good	+	+
Predominantly Bad	-	-

DV: Evaluation/liking for the stimulus

In contrast, self-enhancement theory predicts that ownership will add a positive association to the object. For objects with predominantly positive attributes (“goods”) this positive association produces a typical endowment effect—owners evaluate the good more positively than non-owners. For objects with predominantly negative attributes (“bads”), an

additional positive association should “lessen the blow” and mute owners’ negative evaluations, leading owners to evaluate the bad less negatively than non-owners. In other words, self-enhancement theory predicts a main effect of stimulus valence and a main effect of ownership.

#### **Self-Enhancement Prediction**

Stimulus Attributes	Non-Owners	Owners
Predominantly Good	+	++
Predominantly Bad	--	-

DV: Evaluation/liking for the stimulus

Query theory predicts that focus will be on aspects that support the status quo, which in a mere ownership paradigm, should simply be the target stimulus. For goods, this focus on positive aspects of the status quo should cause the evaluations of owners to be more positive, compared to non-owners. Similarly, for bads, this focus on positive aspects of the status quo should cause the evaluations of owners to be more positive, compared to non-owners. Thus, query theory makes the same directional predictions as self-enhancement theory.

#### **Query Theory Prediction**

Stimulus Attributes	Non-Owners	Owners
Predominantly Good	+	++
Predominantly Bad	--	-

DV: Evaluation/liking for the stimulus

In contrast to the three preceding theories, self-reference theory predicts that ownership will increase the intensity of perceived object valence, polarizing judgments of owned goods such that they are evaluated more positively than non-owned goods, and owned bads such that they are evaluated more negatively than non-owned bads. For goods, self-reference theory predicts a similar pattern to self-enhancement theory. For bads, however, self-reference theory

makes divergent predictions from both self-enhancement and valence loss aversion theories. For this reason, I begin my investigation in the domain of bads, testing whether the reversal of the endowment effect, previously attributed to loss aversion, can occur under conditions of mere ownership and in the absence of any loss frame.

### Self-Reference Prediction

Stimulus Attributes	Non-Owners	Owners
Predominantly Good	+	++
Predominantly Bad	-	--

DV: Evaluation/liking for the stimulus

If I indeed find this pattern of results for bads, it will be evidence that mere ownership is a sufficient condition to cause a reversal of the endowment effect. This would be a critical demonstration of the utility of self-reference theory for making novel predictions differentiated from alternate extant theory. Previously, a special version of loss aversion was needed in order to explain the reversal of the endowment effect (valence loss aversion; Brenner et al., 2007). The predicted results, however, would suggest that self-association alone can produce a reversal of the endowment effect, even in the absence of any loss frame. This boundary condition sheds light on the underlying mechanisms behind the endowment effect, isolating a setting where theories make divergent predictions.

For positive goods, where self-reference and self-enhancement make similar predictions, it is possible that both mechanisms contribute to endowment effects. My aim is to test processes uniquely related to the present self-reference theory of ownership to examine whether manipulating these factors alone can shift evaluations.

If I do not find the predicted pattern (i.e., endowment reversal for bads under conditions of mere ownership), this discovery will still be quite valuable. Specifically, if the results

resemble the predictions of self-enhancement theory (i.e., a standard endowment effect for bads under conditions of mere ownership), this would support an account by which the positive valence of the self-concept drives evaluations. Such a result would contribute to scientific knowledge by refuting the self-referential account of ownership, a theoretical conjecture which we have shared with the scientific community (Morewedge & Giblin, 2015). The present dissertation addresses this open empirical question through the design of the experiments—null results are nonetheless informative to the scientific record.

Indeed, if I find no effect of ownership on evaluations, this evidence would favor Brenner et al.'s original valence loss aversion account of the reversal of the endowment effect, suggesting that such a reversal does indeed require loss framing. This finding would be an important caveat for the proliferating research in favor of ownership accounts, as it would be a case where loss aversion better explains endowment phenomenon than ownership does. Furthermore, few if any information processing studies have yet isolated ownership from loss, so knowing what unique effects are expected in the negative domain is likewise important for theoretical development in that area.

## Method

### *Participants and Design*

Two hundred eight Americans (80 women;  $M_{\text{age}} = 35.31$  years,  $SD = 12.31$ ) completed a short survey on Amazon Mechanical Turk. The experiment employed a 2 (ownership status: non-owner, owner)  $\times$  2 (stimulus: traffic school, cash fine) between-subjects design.

### *Procedure*

Participants were randomly assigned to view and evaluate one of two stimuli: a visit to traffic school or a cash fine. Depending on ownership condition, the stimulus was described as belonging to the participant or not. Critically, both stimuli were drawn directly from previous research finding a reversal of the endowment effect for bads when participants had an opportunity to exchange for another bad (Brenner et al., 2007).

Specifically, the stimuli were presented as follows, depending on ownership condition: for the fine, participants read “Imagine that [you receive/there is] a \$100 fine for violating the posted speed limit.” For the traffic school assignment, participants in the ownership condition read “Imagine that [you receive/there is] a penalty of three 4-hour sessions of traffic school for violating the posted speed limit.”

After seeing the stimulus, participants rated it on two measures which served as the dependent variables. First, they reported to what extent they liked or disliked the penalty on a 7-point scale with labels (1) Dislike Extremely, (4) Neither Like Nor Dislike, and (7) Like Extremely. Next, they responded to the question “How good or bad is this penalty” on a 7-point scale with labels (1) Extremely Bad, (4) Neither Good Nor Bad, and (7) Extremely Good. Finally, participants reported their age and gender and were presented with an attention check (“To gauge your attention to the instructions of this survey, please do not click on any of the values in the scale below”) displayed above a 5-point scale anchored at (1) Very Unsatisfied and (5) Very Satisfied. This attention check was intended to serve as an exclusion criterion to identify participants who may have generally been inattentive (i.e., randomly selecting answers without reading the corresponding questions.)



## Results and Discussion

Four participants failed the attention check and are excluded from all subsequent analyses. The two dependent measures (liking and valence ratings) were highly correlated ( $r = .76, p < .001$ ) and were thus collapsed into a single “evaluation” measure for further analysis. Evaluations were submitted to a two-way ANOVA with ownership (owner, non-owner) and stimulus (cash fine, traffic school) as between-subjects factors.

### *Evaluation*

As predicted, there was a main effect of ownership on evaluation,  $F(1, 200) = 20.32, p < .001, \eta_p^2 = .092$ , such that owners ( $M = 2.68, SD = 1.30$ ) evaluated the stimulus significantly more negatively than non-owners ( $M = 3.67, SD = 1.82$ ); this main effect held if stimulus type was treated as a covariate,  $F(1, 201) = 20.40, p < .001, \eta_p^2 = .092$ . There was no main effect of stimulus type,  $F(1,200) = 1.22, p = .271, \eta_p^2 = .006$ , nor was the interaction between ownership and stimulus significant,  $F(1,200) = 1.13, p = .289, \eta_p^2 = .006$ . This pattern held when the DV’s were analyzed separately for liking and valence (see Appendix A).

The results of Study 1 are consistent with self-reference theory, suggesting that the reversal of the endowment effect extends beyond the exchange paradigm to the mere ownership paradigm. Using the same stimuli as Brenner et al., I replicate their result in the absence of any loss frame. This result would clearly not be predicted by their theory, which depends critically on loss aversion. Nor would this result be predicted by extant ownership theory based on self-enhancement, which would predict a standard endowment effect even for bads, such that owners would view bads in a more favorable light than non-owners (i.e., bads perceived somewhat less negatively when they benefit from a positive self-association).

Previous information processing theories have focused on how one of two options may receive increased attention affecting evaluations due to being the status quo subject to loss (Carmon & Ariely, 2000; Johnson, Haubl, & Keinan, 2007). The present research further suggests that ownership may be sufficient to change evaluations of a given negative stimulus depending not on loss, but solely on self-association.

## **STUDIES 2A & 2B: OWNERSHIP POLARIZATION ACROSS GOODS AND BADS**

### **STUDY 2A: OWNERSHIP POLARIZATION ACROSS DOMAINS**

The purpose of Study 2A was to generalize the findings of Study 1 by examining the observed effect in other domains (i.e., beyond traffic violations). Additionally, Study 2A (and all subsequent studies) included both goods and bads. This design facilitates more direct comparison, increasing the potential impact of the present research. The competing predictions for Study 2A mirror those outlined (for both goods and bads) in the preamble to Study 1.

Appropriate stimuli were identified by consulting relevant literature. Previous research has found an effect of comparisons, such that peoples' preferences shift depending on which choice alternative is the focal option (Dhar, Nowlis, & Sherman, 1999). This pattern is moderated by valence, such that goods are perceived as more attractive when they are the focal option, and bads are perceived as less attractive when they are the focal option (H1a & H1b; p. 295). The focal option was manipulated in those studies by asking participants how two options were different from one another before eliciting preferences. The focal option was manipulated between-subjects, such that X would be the focal option in the following comparison construction: "In what ways is X different from Y?" Although this previous research may be

applicable to explain the exchange paradigm of endowment, it is less clear how the comparison mechanism would be implicated in mere ownership or valuation paradigms. The present theory invokes an analogous pattern that applies across all three different elicitations of endowment: the cognitive effects of self-reference (i.e., self-association via ownership) affecting object evaluations. Thus, I adapted the negative stimuli for the present study directly from this previous, conceptually related work (Dhar, Nowlis, & Sherman, 1999; Study 1). Those authors drew conclusions about valence through sets of attractive and unattractive options that were not necessarily matched. Attractive sets included desserts, vacation spots, and jobs after graduation. Unattractive sets included punishments for breaking the speed limit (stuffing envelopes vs. cleaning graffiti), medications with various side effects (heartburn and indigestion vs. headaches), and apartment roommates with various annoying qualities (untidy vs. noisy). For a more closely-matched design that would facilitate meaningful comparisons between valence conditions, I started with the negative stimuli pairs and created positive analogs that were in more closely related domains: volunteer opportunities (local neighborhood vs. animal shelter), positive effects of supplements (improved digestion and gut health vs. improved memory), and apartment roommates with various desirable qualities (clean and tidy vs. quiet).

## Method

### *Participants and Design*

One hundred twenty Americans (57 women;  $M_{\text{age}} = 36.45$ ,  $SD = 11.20$ ) completed a short survey on Amazon Mechanical Turk. The experiment employed a 2 (stimulus valence: good, bad)  $\times$  2 (ownership: owner, non-owner) mixed design, with stimulus valence manipulated between-subjects and ownership manipulated within-subjects.

### *Procedure*

At the outset of the survey, participants were randomly assigned to a valence condition determining whether they would view either goods or bads for the remainder of the study. Within each valence condition, three pairs of stimuli were presented in random order. For each pair, participants were randomly assigned to imagine owning one stimulus, but not the other. Participants rated liking (e.g., To what extent do you like or dislike this [roommate, punishment, etc.]?) for each stimulus on a 7-point scale anchored at (1) Dislike Extremely (4) Neither Like Nor Dislike (7) Like Extremely. Similarly, they rated stimulus valence (e.g., “How good or bad is this [roommate, punishment, etc.]?”) on a 7-point scale anchored at (1) Extremely Bad (4) Neither Good Nor Bad (7) Extremely Good. Finally, participants reported age and gender and were subjected to the same attention check used throughout this research program, as described in Study 1.

### Results and Discussion

Three participants failed the attention check and are excluded from all subsequent analyses. The two dependent measures (liking and valence ratings) were highly correlated ( $r_s > .78$ ,  $p_s < .001$ ) and were thus collapsed into a single “evaluation” measure for further analysis. Separate analyses for the liking and valence measures can be found in Appendix B.

Evaluations were submitted to a three-way mixed ANOVA with valence (good, bad) as a between-subjects factor, and both ownership (owner, non-owner) and stimulus category (supplements, experiences, roommates) as within-subjects factors. Overall, there was a significant 3-way interaction between valence, ownership, and stimulus category on evaluation,  $F(1, 115) = 4.78$ ,  $p = .031$ ,  $\eta_p^2 = .040$  (all results reported at lower bound). For goods, there was

no significant interaction of ownership and stimulus category on evaluation,  $F(1, 58) = 2.32, p = .134, \eta_p^2 = .038$ . For bads, there was a marginally significant interaction of ownership and stimulus category on evaluation,  $F(1, 57) = 2.81, p = .099, \eta_p^2 = .047$ .

The purpose of Study 2A was in part to identify paradigms in which to further study my effect throughout the remaining experiments of my dissertation. Thus I present the results here by category, with the data separated by valence (good vs. bad), in order to examine the effect of the focal variable, which was ownership.

For bads, a paired samples t-test revealed a significant effect of ownership on evaluations within the supplement category,  $t(57) = -2.45, p = .017$ , such that owned supplements ( $M = 2.63, SD = 1.09$ ) were rated more negatively than non-owned supplements ( $M = 2.91, SD = 1.04$ ). For bads, ownership did not have a significant effect on evaluations within either of the other two categories (experiences,  $t(57) = 1.20, p = .24$ ; roommates,  $t(57) = 1.25, p = .22$ ).

For goods, a paired t-samples test revealed a significant effect of ownership on evaluations within the supplement category,  $t(58) = 2.91, p = .005$ , such that owned supplements ( $M = 5.92, SD = 1.02$ ) were rated more positively than non-owned supplements ( $M = 5.62, SD = 1.08$ ). For goods, ownership did not have a significant effect on evaluations within either of the other two categories (experiences,  $t(58) = .388, p = .70$ ; roommates,  $t(58) = -.785, p = .44$ ).

Although I had predicted a mere ownership effect for goods across all three categories, and a reverse mere ownership effect for bads across all three categories, such results only manifested for one category: supplements. In Study 2B, I test whether the effect found for the supplement category does indeed replicate. The null results for the other two categories in Study 2A do raise questions about unspecified boundary conditions. In this dissertation, I first focus on examining cases where my predicted pattern does arise, and testing related mechanisms that

would illuminate why that is so. In the future it will be productive to study what kinds of moderators can attenuate the effect, as appears to have happened for some categories in Study 2A.

## **STUDY 2B: REPLICATING OWNERSHIP POLARIZATION FOR SUPPLEMENTS**

The purpose of Study 2B was to replicate the effect within the paradigm that had worked for Study 2A, before building on that paradigm in subsequent studies. This would ensure that the results were robust for supplements, which was especially important given that I had no a priori reason in Study 2A to predict that this category would behave uniquely from the other two categories I had tested. The competing predictions for Study 2B mirror those outlined (for both goods and bads) in the preamble to Study 1.

### **Method**

#### *Participants and Design*

One hundred twenty Americans (50 women, 1 “prefer not to respond”;  $M_{\text{age}} = 35.85$ ,  $SD = 11.84$ ) completed a short survey on Amazon Mechanical Turk. Study 2B employed a 2 (stimulus valence: good, bad)  $\times$  2 (ownership: owner, non-owner) mixed design, with stimulus valence manipulated between-subjects and ownership manipulated within-subjects. As in the previous studies, the dependent measure consisted of two continuous variables: liking and valence ratings.

#### *Procedure*

At the outset of the study, participants were assigned to one of two stimulus valence conditions, which determined whether they would see goods or bads. Each participant was

displayed information about two supplements. Ownership framing was varied within-subjects such that one supplement was framed as being owned by the participant and the other was not. Specifically, participants assigned to view and rate goods read, depending on ownership condition, “Imagine that [you take/there is] a nutritional supplement that improves [your] [digestion and gut health/memory].” Participants assigned to view and rate bads read, depending on ownership condition, “Imagine that [you take/there is] a nutritional supplement that causes [you] [frequent mild headaches/mild heartburn and indigestion] as side effects.” Participants rated each of the two supplements they had viewed on two 7-point scales, as in Study 1 and Study 2A (“To what extent do you like or dislike this nutritional supplement?” “How good or bad is this nutritional supplement?”).

## Results and Discussion

Four participants failed the attention check, and are thus excluded from subsequent analyses. Liking and stimulus valence ratings were highly correlated ( $r_s \geq .94$ ), and were thus collapsed into a single evaluation measure.

### *Evaluation*

Evaluations were submitted to a 2 (stimulus valence: good, bad)  $\times$  2 (ownership: owner, non-owner) mixed ANOVA with stimulus valence as the between-subjects factor and ownership as the within-subjects factor. There was a significant ownership  $\times$  stimulus valence interaction,  $F(1,114) = 6.18, p = .014, \eta_p^2 = .051$ . Given the significant interaction, data were next examined for simple main effects of ownership. Within bads, there was a marginal effect of ownership such that owned bads ( $M = 2.19, SD = 1.08$ ) were evaluated lower than non-owned bads ( $M =$

2.43,  $SD = 1.26$ ),  $F(1, 57) = 3.59$ ,  $p = .063$ ,  $\eta_p^2 = .059$ . Within goods, the effect of ownership on evaluation was marginal, however, the pattern was trending in the direction of a standard endowment effect, such that owned goods ( $M = 5.84$ ,  $SD = 1.12$ ) were evaluated (non-significantly) higher than non-owned goods ( $M = 5.59$ ,  $SD = 1.30$ ),  $F(1, 57) = 2.73$ ,  $p = .104$ ,  $\eta_p^2 = .046$ .

### *Liking*

The pattern of results reported for the collapsed evaluation measure was similar to that for liking alone (see Figure 2). For liking, there was a significant ownership  $\times$  stimulus valence interaction,  $F(1, 114) = 7.82$ ,  $p = .006$ ,  $\eta_p^2 = .064$ . Within bads, owned bads ( $M = 2.00$ ,  $SD = 1.06$ ) were significantly less liked (i.e., more disliked) than non-owned bads ( $M = 2.31$ ,  $SD = 1.33$ ),  $F(1, 57) = 4.94$ ,  $p = .030$ ,  $\eta_p^2 = .080$ . Within goods, owned goods ( $M = 5.81$ ,  $SD = 1.23$ ) were marginally more liked than non-owned goods ( $M = 5.50$ ,  $SD = 1.39$ ),  $F(1, 57) = 3.24$ ,  $p = .077$ ,  $\eta_p^2 = .054$ . Given this result, supplements were utilized in subsequent studies.



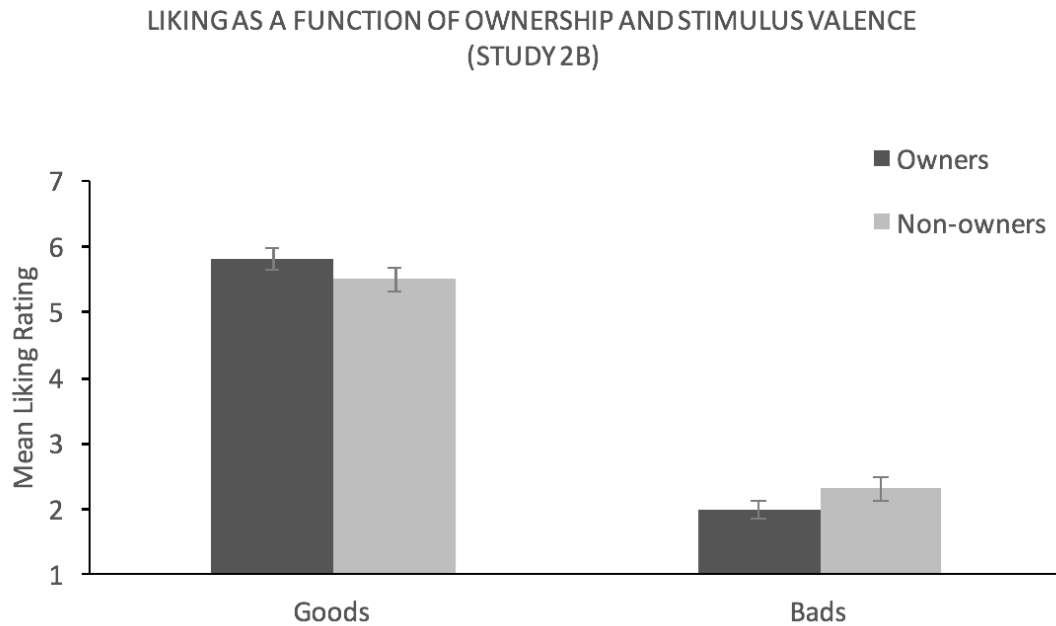
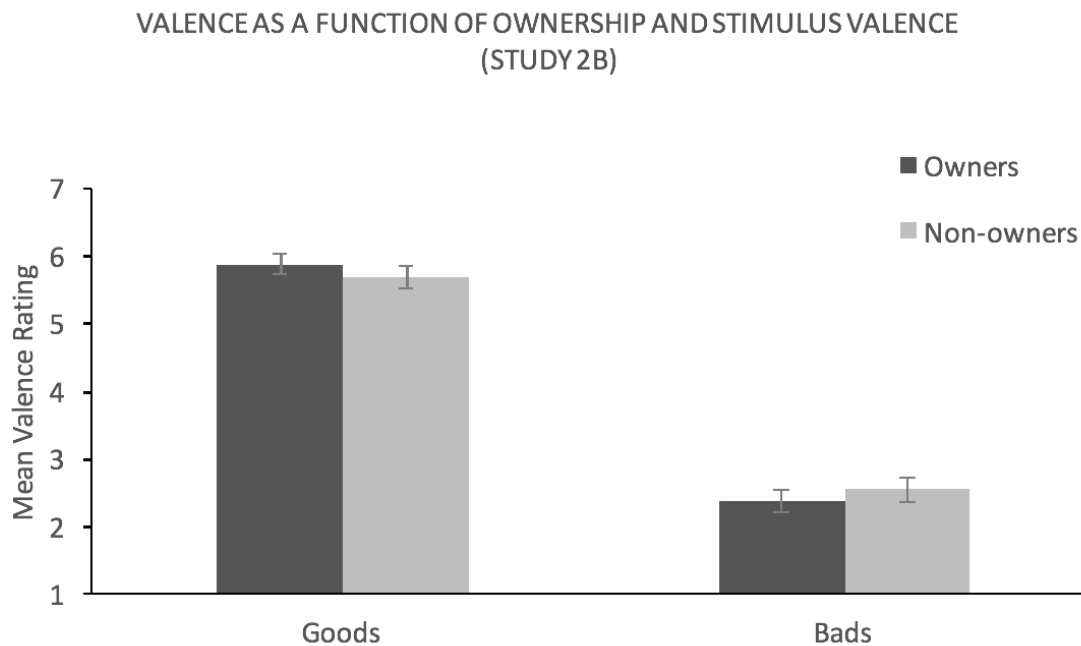


Figure 2. The effect of ownership and stimulus valence (goods vs. bads) on liking ratings in Study 2B. Error bars represent  $\pm 1$  SE.

### Valence

For the valence outcome measure, the stimulus valence condition  $\times$  ownership interaction was marginal,  $F(1, 114) = 3.25, p = .074, \eta_p^2 = .028$ . (see Figure 3). Examining the simple main effects of ownership, the trends were consistent with the present theory, but were also non-significant. Within goods, owned goods ( $M = 5.88, SD = 1.09$ ) were rated as somewhat more good than non-owned goods ( $M = 5.69, SD = 1.29$ ),  $F(1, 57) = 1.63, p = .207, \eta_p^2 = .028$ . Within bads, owned bads ( $M = 2.38, SD = 1.21$ ) were rated as somewhat less good (i.e., more bad) than non-owned bads ( $M = 2.55, SD = 1.31$ ),  $F(1, 57) = 1.63, p = .207, \eta_p^2 = .028$ .



*Figure 3. The effect of ownership and stimulus valence (goods vs. bads) on valence ratings in Study 2B. Error bars represent  $\pm 1$  SE.*

### STUDY 3: SELF-REFERENCE EFFECTS AS AN INDIVIDUAL DIFFERENCE

Study 3 is designed to replicate the results of the previous studies, in addition to extending those findings. Study 3 tests my second hypothesis, that stimulus valence should be more intense for people who more readily associate the stimulus with the self.

#### Competing Predictions

I predicted the reversal of the endowment effect for bads would be stronger for people who show a stronger self-reference effect in a preceding (unrelated) task (i.e., who show greater evidence of privileged memory encoding for self-referent stimuli).

For goods, I predicted that the standard endowment effect would be stronger for people who show a stronger self-reference effect.

#### **Self-Reference Prediction for GOODS**

	Non-Owners	Owners
High Self-reference Score	+	++
Low Self-reference Score	+	+

DV: Evaluation/liking for a GOOD

In contrast to the present self-reference theory, which invokes the cognitive effects of the self-concept, self-enhancement theory invokes the positive valence of the self-concept. There is not a clear connection between the self-reference effect as an individual difference and constructs related to the valence of the self-concept. Thus, self-enhancement theory would not predict moderation by self-reference scores.

#### **Self-Enhancement Prediction for GOODS**

	Non-Owners	Owners
High Self-reference Score	+	++
Low Self-reference Score	+	++

DV: Evaluation/liking for a BAD

For bads, however, the predictions of self-enhancement theory clearly diverge from those of self-reference theory. First, in direction: self enhancement predicts that owned bads will be rated less negatively than non-owned bads. Second, for the moderation, which self-enhancement theory has no basis to predict, given its focus on the valence of the self-concept, which is not directly related to the cognitive effects of the self-concept on memory.

**Self-Reference Prediction for BADS**

	Non-Owners	Owners
High Self-reference Score	-	--
Low Self-reference Score	-	-

DV: Evaluation/liking for a BAD

**Self-Enhancement Prediction for BADS**

	Non-Owners	Owners
High Self-reference Score	--	-
Low Self-reference Score	--	-

DV: Evaluation/liking for a BAD

Study 3 utilizes the same style of mere ownership paradigm as Studies 1, 2A, and 2B. Critically, mere ownership does not invoke any form of loss. Therefore, loss-aversion-based theories would not predict any endowment effect nor reversals, for neither goods nor bads. Furthermore, loss aversion does not directly relate to self-reference as an individual difference. Therefore, there is no clear basis for loss aversion to predict any form of moderation by self-reference score.

**Loss Aversion Prediction for BADS (*null effect*)**

	Non-Owners	Owners
High Self-reference Score	-	-
Low Self-reference Score	-	-

DV: Evaluation/liking for a BAD

**Loss Aversion Prediction for GOODS (*null effect*)**

	Non-Owners	Owners
High Self-reference Score	+	+
Low Self-reference Score	+	+

DV: Evaluation/liking for a GOOD

Query theory states that people focus on the value-increasing aspects of the status quo, and the value-decreasing aspects of the alternate option. In the present paradigm, there is no

alternate option, so the focus should be solely on the value-increasing aspects of the status quo. For both goods and bads, this would lead to a standard endowment effect. Query theory does not directly relate to self-reference as an individual difference. Therefore, there is no clear basis for query theory to predict any form of moderation by self-reference score.

#### **Query Theory Prediction for BADS**

	Non-Owners	Owners
High Self-reference Score	--	-
Low Self-reference Score	--	-

DV: Evaluation/liking for a BAD

#### **Query Theory Prediction for GOODS**

	Non-Owners	Owners
High Self-reference Score	+	++
Low Self-reference Score	+	++

DV: Evaluation/liking for a GOOD

Overall, the present self-reference theory is unique in its prediction that there will be a mere ownership reversal for bads, such that owned bads are rated as worse than non-owned bads (as in Studies 1, 2A, and 2B). Study 3 aims to replicate this finding, consistent with my first hypothesis. Additionally, self-reference theory is unique in its prediction that the endowment effect (and its reversal for bads) will be moderated by individual differences in self-reference. As such, Study 3 aims to empirically test my second hypothesis.

## **Method**

### *Participants and Design*

Two hundred eleven Americans (89 women,  $M_{\text{age}} = 33.96$ ,  $SD = 10.75$ ) completed a short survey on Amazon Mechanical Turk. The study was divided into two parts. The first part of the

study measured the extent to which participants showed a general self-referential memory advantage (i.e., as an individual difference score). In the second part of the study, participants were randomly assigned to an ownership condition (owner, non-owner) and recorded their evaluations of stimuli.

### *Procedure*

The two parts of this study were presented as unrelated. First, participants completed a standard self-reference task in which they encoded personality trait words in relation to self vs. other. Following previous research investigating individual differences in the strength of the self-reference effect, participants considered 32 traits total: half in reference to themselves (e.g., ‘To what extent does the word tidy describe you?’) and half in reference to a familiar other (e.g., a president of the United States, ‘To what extent does the word tidy describe Barack Obama?’) (see Smallwood et al., 2011; Study 2). Each response was recorded on a 100-point slider scale ranging from 0 (Not at all) to 100 (Extremely). These responses were merely a way to expose participants to the target words, and are not central to the study of self-reference effects.

Afterwards, participants completed a surprise recognition-memory task in which they were presented 64 trait adjectives (half of them new) and asked, for each word, to indicate whether it had appeared earlier in the experiment. Participants responded via a dichotomous Yes/No measure. The proportion of correct “hits” for self vs. other was later converted to an individual self-reference score. Part 2 replicated Study 2B of the present paper, testing the effects of mere ownership on evaluations, across both goods and bads, within the nutrition supplement paradigm.

## Results and Discussion

Five participants failed the attention check, and are thus excluded from subsequent analyses. To test for a basic self-reference effect, the proportion of correct “hits” was first compared between the self vs. other (within-subjects) conditions. Data were submitted to a paired sample t-test, revealing a significant effect of condition, such that a significantly higher proportion of words encoded with reference to the self ( $M = 0.85$ ,  $SD = 0.16$ ) were correctly recognized, compared to words encoded with reference to another person ( $M = 0.76$ ,  $SD = 0.18$ ),  $t(205) = 7.43$ ,  $p < .001$ . For each participant, a self-reference score was calculated as the ratio of correctly recognized self-words to correctly recognized other-words ( $M = 1.18$ ,  $SD = .38$ ).

Liking and stimulus valence ratings were highly correlated ( $r_s \geq .87$ ,  $p_s < .001$ ), and were thus collapsed into a single evaluation measure. An “ownership difference score” was calculated for each participant by subtracting their non-ownership evaluation from their ownership evaluation, such that ownership difference scores further from zero indicated a stronger tendency towards ownership polarization (i.e., with positive scores indicating that owned stimuli were evaluated more positively than non-owned stimuli, and negative scores indicating that owned stimuli were evaluated less positively than non-owned stimuli).

An analysis regressing ownership difference score onto valence condition (good = 1; bad = 0) and SRE score revealed no effect of valence condition,  $b = .36$ ,  $p = .46$ , no effect of SRE score,  $b = .11$ ,  $p = .74$ , and no significant interaction,  $b = -.33$ ,  $p = .41$ .

Evaluations were also submitted to a 2 (stimulus valence: good, bad)  $\times$  2 (ownership: owner, non-owner) mixed ANOVA with stimulus valence as the between-subjects factor and ownership as the within-subjects factor. There was no significant ownership  $\times$  stimulus valence interaction,  $F(1, 204) = .054$ ,  $p = .817$ . The only significant effect was the main effect of

stimulus valence, such that goods ( $M = 5.28$ ,  $SD = 1.15$ ) were evaluated more positively than bads ( $M = 2.49$ ,  $SD = 1.15$ ),  $F(1, 204) = 301.01$ ,  $p < .001$ .

Overall, the results do not support any form of ownership polarization and are consistent with neither self-enhancement theory, which predicts a positive mere ownership effect for goods, nor the present self-reference theory, which predicts ownership polarization such that ownership cause evaluations of goods to be more positive, and evaluations of bads to be more negative. Furthermore, the results do not support any role for individual differences in self-reference score, counter to the present self-reference theory. Notably, the results did replicate a basic self-reference effect in memory, however, such that words encoded with reference to the self were better remembered. In Study 4, I examine another potential moderator drawing on the proposed theory: cultural construal.

#### **STUDY 4: MODERATION BY CULTURAL CONSTRUAL**

Culture is a type of self-construal which fundamentally affects the way people view themselves in social contexts. Self-enhancement theory of ownership has been evoked to explain cultural differences in the endowment effect. In previous research, people with a Western cultural construal displayed a stronger endowment effect for goods than people with an Eastern cultural construal, a pattern that was replicated whether culture was primed or treated as a stable individual difference (Maddux et al., 2010). This pattern was explained in terms of independent construals typically endorsed by Westerners being associated with a tendency to self-enhance vs. self-criticize.



### Competing Predictions

From this perspective, self-enhancement theory would predict that people with a salient independent self-construal should evaluate bads more positively when they are owners (vs. non-owners).

#### Self-Enhancement prediction

	Non-Owners	Owners
Independent Self-construal	-	+
Interdependent Self-construal	-	-

DV: Liking for a BAD

For goods, self-enhancement theory would predict that people with a salient independent self-construal should evaluate goods more positively when they are owners (vs. non-owners).

#### Self-Enhancement prediction

	Non-Owners	Owners
Independent Self-construal	+	++
Interdependent Self-construal	+	+

DV: Liking for a GOOD

The present self-reference theory of ownership provides a novel interpretation of the finding that Easterners show a weaker endowment effect for goods than Westerners. Notably, cultural differences have also been found for the self-reference advantage in memory. Asian-Canadians do not show a typical self-reference effect—personality traits (e.g., happy, stubborn, honest, shy) encoded in reference to the self are inhibited in recognition memory (i.e., slower response time) compared to when such traits are encoded in relation to another person (i.e., close friend) or a semantic property (i.e., presence of a vowel) (Wagar & Cohen, 2003). This finding is consistent with the assertion that the independent self-concept is a more efficient cognitive

structure enhancing memory in Westerners, while the interdependent self-concept might play an analogous role in Easterners. Pairing a stimulus with an incongruent self-construal (i.e., individual independent ownership for Easterners) appears to lead to inhibited memory.

For goods, this might explain why Westerners show enhanced evaluations for owned goods associated with the self, compared to non-owned goods. (It follows that Easterners might show a similar pattern for goods linked to the collective interdependent self-construal that tends to be more accessible and cognitively elaborate, however this is not a proposition I directly test in the current study).

For bads, the self-reference theory of ownership predicts that when an independent self-construal is more salient, people will rate owned bads more negatively than non-owned bads, showing a strong reversal of the typical endowment effect. When an interdependent self-construal is salient, people should less readily encode information linked to the (incongruent) independent self (i.e., the self evoked in individual ownership) and will show an attenuated reversal of the typical endowment effect.

Specifically, I predicted that this pattern of the reversal of the endowment effect for bads would be stronger when an independent (vs. interdependent) self-construal is salient.

#### **Self-Reference Prediction**

	Non-Owners	Owners
Independent Self-construal	-	--
Interdependent Self-construal	-	-

DV: Liking for a BAD

For goods, self-reference theory predicts that the endowment effect will be stronger when an independent (vs. interdependent) self-construal is salient. Thus, self-enhancement and self-

reference both predict a similar culture prime  $\times$  ownership interaction for goods, rendering the predictions for bads particularly critical for distinguishing these two theories.

### **Self-Reference Prediction**

	Non-Owners	Owners
Independent Self-construal	+	++
Interdependent Self-construal	+	+

DV: Liking for a GOOD

Because the present experiment utilizes a mere-ownership paradigm that does not implicate loss, loss aversion would not predict any effect of ownership alone, whether for goods or bads. There is also no direct basis for loss aversion to predict any effects of cultural construal, whether for goods or bads.

Query theory predicts that people will recruit positive aspects from memory that support the status quo, which in a mere ownership paradigm, is simply the focal stimulus. This should result in relatively more positive evaluations for owned (vs. nonowned) stimuli, whether they be goods or bads. However, there is no direct basis for query theory to predict any effects of cultural construal, whether for goods or bads.

### *Expected Results*

Based on the present self-reference theory, I had predicted a significant ownership  $\times$  valence interaction (i.e., ownership polarization) such that for goods, ownership would increase positive evaluations (i.e., a standard endowment effect), and for bads, ownership would decrease positive evaluations (i.e., a reversal of the standard endowment effect). Furthermore, I had predicted that these patterns will be moderated by cultural primes.

For goods, I had predicted a significant interaction between cultural self-construal and ownership status, such that people would show a stronger endowment effect for a good following an independent (vs. interdependent) self-construal prime. This pattern would effectively replicate the findings of Maddux and colleagues (2010).

The key differentiating prediction of self-reference theory is in the domain of bads. For bads, I had predicted a significant interaction between cultural self-construal and ownership status, such that people would show a stronger reversal of the endowment effect for a bad following an independent (vs. interdependent) self-construal prime. This pattern would be consistent with self-reference theory, suggesting that the pattern for goods previously attributed to self-enhancement (Maddux et al., 2010) might alternatively be explained by self-reference.

## Method

### *Participants and Design*

Four hundred participants from Amazon Mechanical Turk (171 women, 3 “Prefer not to respond”;  $M_{\text{age}} = 35.34$ ,  $SD = 10.92$ ) completed a survey in exchange for monetary payment. This study employed a 2 (culture: interdependent, independent)  $\times$  2 (stimulus valence: good, bad)  $\times$  2 (ownership: owner, non-owner) design with culture and stimulus valence manipulated between-subjects, and ownership status manipulated within-subjects.

### *Procedure*

*Culture Prime.* Participants first completed a “participant information survey” containing one of two (randomly assigned) cultural primes in the form of a short essay prompt adapted directly from previous research on cultural moderation of the endowment effect (Maddux et al.,

2010; Study 2). The prompts serve the purpose of priming either interdependent or independent cultural self-construals. Specifically, in the interdependent self-construal condition, participants were asked to “write a brief essay about your friendships and family ties with other people, and how you might foster these relationships.” In the independent self-construal condition, participants were asked to “write a brief essay about your unique character and skills, and how you might stand out compared to other people.” Next, participants were presented with the same nutritional supplement descriptions as Study 2B.

*Nutritional Supplements.* All participants next viewed information about two hypothetical nutrition supplements presented on separate pages. Depending on valence condition, both supplements had either positive or negative attributes. Within-subjects, each participant was randomly assigned to view one supplement as an “owner” and the other supplement as a “non-owner.” Specifically, in the good condition, depending on ownership assignment, participants were asked to “Imagine that [you take/there is] a nutritional supplement that improves [your] [digestion and gut health/memory].” In the bad condition, participants were asked to “Imagine that [you take/there is] a nutritional supplement that causes [you] frequent mild [headaches/heartburn and indigestion] as a side effect.” Order was counterbalanced both for ownership and for specific nutrition supplement attributes.

*Evaluation.* On the same page that participants read about a given nutritional supplement, they rated that supplement on two dimensions.

*Liking.* First, participants reported their liking of the supplement (i.e., “To what extent do you like or dislike this nutritional supplement?”) on a 7-point scale anchored at (1) Dislike Extremely (4) Neither Like Nor Dislike (7) Like Extremely.

*Valence.* Second, participants rated the valence of the supplement (i.e., How good or bad is this nutritional supplement?”) on a 7-point scale anchored at (1) Extremely Bad (4) Neither Good Nor Bad (7) Extremely Good.

*Demographics.* All participants were asked to report age and gender. Additionally, because this study implicated culture, participants were also asked to report their ethnic background and whether they were a citizen of the United States so that this data would be available as a covariate. Finally, participants were given the opportunity to leave any optional comments.

## Results and Discussion

Fifteen participants failed the attention check and are thus excluded from further analyses. An additional two participants did not accurately complete the writing task (i.e., incoherent and unrelated responses to the culture prime) and are thus also excluded from further analyses. The two dependent measures (liking and valence ratings) were highly correlated for both owned ( $r = .915, p < .001$ ) and non-owned ( $r = .882, p < .001$ ) stimuli. Liking and valence ratings were thus collapsed into a single “evaluation” measure for further analysis.

### *Evaluation*

Evaluations were submitted to a mixed ANOVA with valence condition and culture condition as between-subjects factors and ownership condition as a within-subjects repeated measure. There was an effect of valence condition on evaluations,  $F(1,379) = 656.957, p < .001, \eta_p^2 = .634$ , such that goods ( $M = 5.33, SD = 1.06$ ) were evaluated significantly more positively than bads ( $M = 2.42, SD = 1.17$ ). All other effects were non-significant. Specifically, the three-way interaction was non-significant,  $F(1, 379) = .314, p = .576, \eta_p^2 = .001$ . Notably, there was no main effect of ownership,  $F(1,379) = .229, p = .633, \eta_p^2 = .001$ , nor was there an ownership  $\times$  valence interaction,  $F(1,379) = .512, p = .475, \eta_p^2 = .001$  (all results are reported at the lower bound). Thus, this study did not replicate the basic ownership polarization effect predicted by self-reference theory and found in the initial studies of the present research program (Study 1, Study 2A, Study 2B). Furthermore, there was no significant ownership by culture interaction,  $F(1, 379) = .284, p = .595, \eta_p^2 = .001$ , nor was there any significant main effect of culture,  $F(1, 379) = .111, p = .74, \eta_p^2 < .001$ . Thus, the lack of significant effects for the culture prime indicate a failure to conceptually replicate the previous finding for goods, that independent (vs. interdependent) cultural construal causes a stronger endowment effect (Maddux et al., 2010).

### **STUDIES 5A & 5B: MODERATION BY PRIVATE SELF-CONSCIOUSNESS**

Private self-consciousness is an individual difference in self-awareness and attention to internal thoughts and feelings (Fenigstein, Scheier, & Buss, 1975). For people high in private self-consciousness, the self-concept tends to be chronically accessible in memory (Eichstaedt & Silvia, 2003). Private self-consciousness has been found to moderate self-reference effects in memory such that high (vs. low) private self-consciousness predicts better recall of self-relevant

stimuli (Hull & Levy, 1979; Hull, Van Treuren, Ashford, Propsom, & Andrus, 1988).

Theoretically, this pattern has been explained by private self-consciousness implicating the extent to which people tend to encode information in terms of its self-relevance and tend to be particularly responsive to self-relevant aspects of the environment (Hull & Levy, 1979).

### **Competing Predictions (For Studies 5A & 5B)**

I expected that private self-consciousness would moderate the endowment effect as follows: I expected a main effect of ownership of a good such that valuations would be higher amongst owners compared to non-owners (i.e., standard endowment effect). I expected this endowment effect to be stronger for participants high (vs. low) in private self-consciousness. For bads, I expected a reversal of the endowment effect (i.e., a main effect of ownership such that owned bads would be valued less than non-owned bads). I expected this reversal of the endowment effect to be stronger for participants high (vs. low) in private self-consciousness.

As depicted below, for goods I had predicted that private self-consciousness would interact with ownership status such that owners higher in private self-consciousness would indicate a higher valuation of a good than owners lower in private self-consciousness. This interaction is the key prediction, as it differentiates self-reference theory from alternate accounts of the endowment effect.

#### **Self-Reference Prediction for a GOOD**

	Non-Owners	Owners
High Private Self-consciousness	+	++
Low Private Self-consciousness	+	+

DV: Valuation of a GOOD



As depicted below, for bads I had predicted that private self-consciousness would interact with ownership status such that owners higher in private self-consciousness would indicate a lower valuation of a bad than owners lower in private self-consciousness. This interaction is the key prediction, as it differentiates self-reference theory from alternate accounts of the endowment effect.

#### **Self-Reference Prediction for a BAD**

	Non-Owners	Owners
High Private Self-consciousness	-	--
Low Private Self-consciousness	-	-

DV: Valuation of a BAD

Self-enhancement, by contrast, predicts a main effect of ownership across both goods and bads. Owners would be expected to have higher valuations of objects than non-owners, regardless of whether a good or a bad is being considered. Since self-enhancement theory implicates the positive valence of the self-concept rather than the cognitive structure of the self-concept, there is not a direct basis for self-enhancement theory to make a prediction for any moderation by private self-consciousness.

#### **Self-Enhancement Prediction for a GOOD**

	Non-Owners	Owners
High Private Self-consciousness	+	++
Low Private Self-consciousness	+	++

DV: Valuation of a GOOD

**Self-Enhancement Prediction for a BAD**

	Non-Owners	Owners
High Private Self-consciousness	--	-
Low Private Self-consciousness	--	-

DV: Valuation of a BAD

Query theory predicts that people will focus on value-increasing aspects of the status quo, along with value-decreasing aspects of the alternative. For owners, possession of the endowed object is the status quo. A focus on value-increasing aspects of the status quo would therefore emphasize the positive aspects of the object, increasing valuations. A focus on the value-decreasing aspects of the alternative would emphasize the negative aspects of the cash, similarly biasing participants to view the object more positively (i.e., as more valuable) in comparison. Overall, query theory predicts a standard endowment effect across both goods and bads: owners should view owned objects relatively more positively than non-owners. In other words, in the case of bads, owners should view owned bads relatively less negatively than non-owners.

Critically, since query theory implicates the status quo rather than the cognitive structure of the self-concept, there is no direct basis for query theory to predict any moderation of the endowment effect by private self-consciousness. Therefore, the query theory predictions for this particular study map out similarly to the self-enhancement predictions, albeit for different underlying reasons.

**Query Theory Prediction for a GOOD**

	Non-Owners	Owners
High Private Self-consciousness	+	++
Low Private Self-consciousness	+	++

DV: Valuation of a GOOD

**Query Theory Prediction for a BAD**

	Non-Owners	Owners
High Private Self-consciousness	--	-
Low Private Self-consciousness	--	-

DV: Valuation of a BAD

Theories implicating loss aversion predict an emphasis on the forgone (Carmon & Ariely, 2000). This could result in an exaggeration of perceived attributes for the status-quo (i.e., what stands to be lost). In contrast to query theory, the focus would not necessarily be on the value-increasing aspects of the status quo. Assuming people focus on and exaggerate the valence of whatever they stand to lose, loss aversion predicts that owners should exaggerate the valence of owned objects when they are thinking about a prospective loss (i.e., when considering selling or trading an object). In this sense, it could be argued that a loss-aversion-based theory predicts an endowment effect for goods and a reversal of the endowment effect for bads in this study. This is because the dependent variable measures valuations which implicate loss (in contrast to evaluations such as liking, which do not necessarily entail a salient loss). Critically, however, because loss aversion theories rely on the prospect of forgoing the status quo rather than the cognitive structure of the self-concept, there is no direct basis for loss aversion to predict any moderation of the endowment effect (or its reversal) by private self-consciousness.

**Loss Aversion Prediction for a GOOD**

	Non-Owners	Owners
High Private Self-consciousness	+	++
Low Private Self-consciousness	+	++

DV: Valuation of a GOOD

**Loss Aversion Prediction for a BAD**

	Non-Owners	Owners
High Private Self-consciousness	-	--
Low Private Self-consciousness	-	--

DV: Valuation of a BAD

Overall, any moderation of the endowment effect (or its reversal) by private self-consciousness is uniquely predicted by the present self-reference theory.

**STUDY 5A: MEASURING PRIVATE SELF-CONSCIOUSNESS****Method***Participants and Design*

Two hundred participants from Amazon Mechanical Turk (79 women;  $M_{\text{age}} = 33.44$ ) completed a survey in exchange for monetary payment. This study employed a 2 (valence: good, bad)  $\times$  2 (ownership: owner, non-owner) design. All participants viewed the same image of a product. Ownership status was randomly assigned by endowing half of participants with the product in an imagined ownership paradigm. Product valence was manipulated by describing that product with an attribute pretested as either positive or negative. All participants reported their evaluation and valuation of the product, the latter dollar valuation serving as the key dependent measure. Private self-consciousness was measured as a continuous independent variable.

### *Procedure*

All participants were asked to “Please imagine that you are participating in a research study about your opinion of products. You are given a pen to inspect and answer questions about.” On the same page, all participants viewed an image of a Caliber brand black gel pen. This image was identical across all conditions.

*Ownership Manipulation.* Within a standard imagined ownership and valuation paradigm, half of participants were endowed with the Caliber brand gel pen depicted in the image (i.e., “owners”). Specifically, owners read “You will keep the pen after the study is over.” The other half of participants were non-owners, who instead were told “You will return the pen after the study is over.” Furthermore, all participants read a list of three facts about the pen. Depending on ownership condition, these statements either described “Your pen” or “This pen.” For example, the first statement was “[Your/This] pen is a Caliber brand pen.” The second statement read “[Your/This] pen uses jet black ink.” The content of the third statement depended on the valence manipulation described below.

*Valence manipulation.* Participants were randomly assigned to read a positive or negative third statement about the depicted pen that framed it as either a good or a bad. Specifically, participants in the good condition read “[Your/This] pen was made using fair trade labor practices.” Participants in the bad condition read “[Your/This] pen was made in a foreign country by a worker paid \$0.13 per hour.” These attributes had been pretested to significantly affect reported purchase likelihood for this pen.

*Liking measure.* Still on the same page, participants reported their evaluation of the pen on a 7-point scale anchored at (1) Dislike Extremely (4) Neither Like Nor Dislike (7) Like Extremely. This liking measure is similar to those employed in the previous studies conducted for this dissertation, and allows those previous results (particularly those of Study 1) to be conceptually replicated with new stimuli and valence manipulations (i.e., pens described with different attributes).

*Dollar valuation measure.* Still on the same page, participants were asked to indicate in a series of choice pairs whether they would rather receive the pen or various amounts of payment. This structure followed a standard hypothetical BDM procedure for owners versus non-owner choosers. Specifically, owners were asked to make choices between “keep your pen” or “sell your pen and receive indicated payment.” Non-owners chose between “receive the pen” or “receive indicated payment.” Twelve such choices were made at price points starting at \$0, \$.01, \$.05, \$.10, \$.25, then increasing in \$.25 increments to a maximum of \$2.00. Across both owners and non-owners, the highest price point at which participants chose the product over the cash payment was recorded as their valuation. This valuation measure is the key dependent variable outcome on which the predictions outlined in the preamble to this study are based.

*Private self-consciousness measure.* Participants completed a questionnaire used in previous research to measure individual differences in private self-consciousness (Fenigstein et al., 1975; see Appendix C). The experimental order was counterbalanced such that the individual difference measure randomly appeared either before or after all tasks related to the pen (described above).

## Results and Discussion

Twelve participants were excluded from further analysis because their responses on the Becker-DeGroot-Marschak valuation were inconsistent (i.e., jumped back and forth from picking the pen to the money at various dollar amounts) and thus uninterpretable as valuations. Data were analyzed for the remaining 188 participants.

Scores for the individual difference measure of private self-consciousness (PSC) were calculated by taking the sum of participant responses for each of the nine scale questions (Fenigstein et al., 1975; see Appendix C), measured on 4-point scales from 0 to 3, including one reverse-coded question. The resulting PSC scores thus could range from 0 (if a respondent selected '0' for each question) to 27 (if a respondent selected '3' for each question).

An analysis regressing liking onto PSC score, the dummy coded valence (0 = bad, 1 = good) and ownership (0 = nonowner, 1 = owner) conditions, and their interactions, revealed no significant effects ( $ps > .10$ ). Similarly, an analysis regressing dollar valuations onto PSC, the dummy coded valence and ownership conditions, and their interactions, revealed no significant effects ( $ps > .38$ ).

As an exploratory analysis, I also examined goods and bads separately, regressing liking onto PSC score, ownership, and their interaction. For bads, there were no significant effects ( $ps > .22$ ). For goods, however, there was a significant effect of ownership condition,  $B = -6.34$ ,  $t = -2.10$ ,  $p = .039$ , and a marginally significant interaction of ownership and PSC score,  $B = .622$ ,  $t = 1.93$ ,  $p = .057$ . To further interpret this pattern, I performed a floodlight analysis using the Johnson-Neyman technique (as recommended by Spiller, Fitzsimons, Lynch, & McClelland, 2013) to examine the influence of ownership on liking of goods across the entire range of

observed PSC scores (min = 0, max = 24). This analysis revealed that ownership influenced liking for any PSC score less than or equal to 8.4 (out of 27),  $B_{IN} = -.61$ ,  $SE = .31$ ,  $p = .048$ , but not for any PSC score greater than 8.67.

### **STUDY 5B: MANIPULATING PRIVATE SELF-CONSCIOUSNESS**

Private self-consciousness can also be manipulated by having people focus on features of the self that make them distinct from others, in turn increasing the cognitive accessibility of the self-concept (Eichstaedt & Silvia, 2003).

Because of the link between private self-consciousness and self-reference effects in memory outlined in the rationale for Study 5A, I predicted a similar pattern of results in Study 5B. Specifically, I expected an ownership  $\times$  valence interaction (i.e., ownership polarization) such that valuations of goods would be higher amongst owners compared to non-owners, and valuations of bads would be lower amongst owners compared to non-owners. I expected these patterns to be stronger for participants primed with private self-consciousness.

Study 5B was designed to extend the findings of Study 5A from stable trait differences related to the chronic accessibility of the self-concept to transient experimentally manipulated differences. Conceptually, the predictions for Study 5B across competing theories mirror those outlined in the preamble for Study 5A, in an exchange paradigm rather than a valuation paradigm. Manipulating private self-consciousness in Study 5B would help assure that the (predicted) results of Study 5A would not be due to any confounding variable that happens to relate to individual differences in private self-consciousness. Ruling out such confounds was considered especially important for the current investigation, as it would help address alternate explanations related to self-enhancement, and provide additional evidence that the predicted



patterns were uniquely predicted by self-reference theory. This prediction is also consistent with the recent finding that increased self-focus can uniquely increase evaluations of owned (vs. non-owned) objects, even in a population which normally does not show an endowment effect—Western children ages 3-4 (Hood, Weltzien, Marsh, & Kanngiesser, 2016).

#### Self-Reference Prediction

	Non-Owners	Owners
High Private Self-consciousness (Prime)	-	--- (low willingness to trade due to high valuation)
Low Private Self-consciousness (Control)	-	--

DV: Willingness to Trade for another GOOD

#### Self-Reference Prediction

	Non-Owners	Owners
High Private Self-consciousness (Prime)	+	+++ (high willingness to trade due to low valuation)
Low Private Self-consciousness (Control)	+	++

DV: Willingness to Trade for another BAD

### Method

#### *Participants and Design*

Four hundred two participants (197 women;  $M_{\text{age}} = 35.83$  years,  $SD = 11.39$ ) completed a short survey on Amazon Mechanical Turk. The experiment employed a 2 (valence: good, bad)  $\times$  2 (ownership status: owner, chooser)  $\times$  2 (private self-consciousness: prime, control) design.

#### *Procedure*

Participants were randomly assigned to either a condition priming private self-consciousness or a control condition. The private self-consciousness prime was taken verbatim

from previous research, and was displayed for half of participants at the outset of the study. It consisted of 3 brief questions: “What is it about you that makes you different from [your friends/your family/people in general]?” (Eichstaedt & Silvia, 2003, Study 2). According to Eichstaedt and Silvia, “Past work has validated this task as a manipulation of self-focused attention (Silvia & Eichstaedt, 2004), and the task replicates conventional manipulations, for example, mirrors (Silvia, 2001, 2002)” (2003).

Control participants proceeded straight to the next step of the study. This decision was made in light of previous findings directly contrasting this style of “no control” with a “neutral control” essay task intended to hold writing effort equivalent without invoking self-focus. In previous research relating to self-focus (i.e., response latency recognizing self-related words), the two control conditions did not lead to different patterns of results, and both types of control conditions differed significantly from the effect of the private self-consciousness prime. Thus, in order to avoid contaminating the sample with potentially unexpected reactions to previously employed “neutral” topics (for example, “What are the most important features of your computer’s hardware/operating system/network environment?”; Eichstaedt & Silvia, 2003, Study 2), I chose to have the control participants move straight to the next part of the survey.

All participants then read about two nutritional supplements and were asked to indicate their relative preference. Participants evaluated one pair of either goods or bads. Those stimuli were the nutritional supplements used in my previous studies described as having (side) effects of heartburn or headaches (i.e., bads), or memory improvement or digestion/gut health (i.e., goods). The specific wording used in each condition described below can be referred to directly in Appendix D.

Owners were “endowed” with one supplement (‘Supplement A’) and then asked their willingness to trade for another supplement of the same valence (‘Supplement B’). In this ownership condition, relative preference (i.e., willingness to trade) was reported on a 7-point scale anchored at (1) Definitely prefer to keep Supplement A and (7) Definitely prefer to trade for Supplement B.

For choosers, the presentation order of the two supplements was counterbalanced within valence condition such that each type of supplement would be labeled “A” and displayed on the left half the time. In this non-ownership (i.e., chooser) condition, relative preference was reported on a 7-point scale anchored at (1) Definitely prefer Supplement A and (7) Definitely prefer Supplement B.

## Results & Discussion

Twenty-nine participants failed the attention check and are thus excluded from subsequent analyses. Relative preference ratings were submitted to a three-way ANCOVA including the specific “default” supplement as a covariate. This covariate accounts for which specific supplement had been presented as “Supplement A,” which was displayed first above “Supplement B,” and appeared on the left side of the relative preference measure. For owners, “Supplement A” was also the endowed stimulus. In other words, across both owners and choosers, participants assigned to the same default Supplement A effectively reported a relative preference for the same supplement.

Relative preference ratings served as the dependent variable across both choosers and owners. Relative preference ratings were submitted to a three-way ANCOVA with valence (good, bad), ownership status (owner, chooser), and private self-consciousness (prime, control)

as between-subjects factors, and default stimulus as a covariate. The effect of the stimulus covariate was significant,  $F(1, 366) = 4.781, p = .029$ . The three-way interaction between valence, ownership, and private self-consciousness was nonsignificant,  $F(1, 366) = .379, p = .539, \eta_p^2 = .001$ . The two-way interaction between ownership and private self-consciousness was marginally significant,  $F(1, 366) = 3.258, p = .072, \eta_p^2 = .009$ . There were no other significant 2-way interactions between stimulus valence and private self-consciousness prime,  $F(1, 366) = .638, p = .425, \eta_p^2 = .002$ , nor stimulus valence and ownership  $F(1, 366) = .920, p = .338, \eta_p^2 = .003$ . The simple main effect of ownership was statistically significant for participants primed with private self-consciousness ( $F(1, 366) = 5.00, p = .026$ ), but not for control participants ( $F(1, 366) = .086, p = .770$ ). Pairwise comparisons were made with a Bonferroni adjustment for participants primed with private self-consciousness: owners primed with private self-consciousness ( $M = 3.29, SD = 1.97$ ) reported a lower willingness to trade than non-owners primed with private self-consciousness ( $M = 4.01, SD = 1.83$ ). Within bads, there was a significant effect of ownership for people primed with private self-consciousness, such that owners ( $M = 3.26, SD = 1.64$ ) were significantly less willing to trade than non-owners ( $M = 4.294, SD = 1.605$ ),  $F(1, 86) = 8.461, p = .005$ . This pattern did not hold across stimulus valence: there was no significant effect of ownership for people primed with private self-consciousness who evaluated goods,  $p = .459$ . There was a significant main effect of default stimulus,  $F(1, 366) = 4.781, p = .029$ . There was a marginal main effect of stimulus valence,  $F(1, 366) = 3.106, p = .079$ .

Overall, I had expected that the private self-consciousness prime would interact with ownership status. For goods, I had expected that owners in the private self-consciousness condition would exhibit a lower willingness to trade than owners in the control condition. For

bad, I had expected that owners in the private self-consciousness condition would exhibit a higher willingness to trade than owners in the control condition.

The results are inconsistent with those previous predictions. For bads, owners primed with private self-consciousness showed a stronger relative preference for their endowed supplement, compared to non-owners primed with private self-consciousness. This pattern is inconsistent with the present self-reference theory, however it is not wholly consistent with alternate theories either. Although self-enhancement theory predicts a standard endowment effect for bads, it does not clearly predict any moderation by private self-consciousness. Thus, self-enhancement does not readily explain why a standard endowment effect emerged for bads when participants were primed with private self-consciousness, but not in the control condition. Similarly, loss aversion does not implicate factors related to the cognitive representation of the self, such as would be evoked by private self-consciousness. Notably, previous work on possession loss aversion for bads finds an endowment effect reversal (Brenner et al., 2007), which was not replicated in the present data. Query theory, which hinges on the status quo, similarly should not implicate any moderation by private self-consciousness.

There are two interpretations of the results, both of which require some degree of speculation. First, it could be the case that loss frames interact with self-reference and create additional boundary conditions beyond the scope of the present theory that might reconcile the fact that a standard endowment effect was observed for bads for PSC participants in Study 5B in a trading paradigm, who were evaluating the same nutritional supplement stimuli which produced an endowment effect reversal in Study 2A and 2B, consistent with the present self-reference theory.

Second, it is possible that there are as yet undiscovered connections between the valence and cognitive structure of the self-concept. Neither of these theories explain why any effect of ownership (or interaction with PSC) would be observed for bads, but not goods. Indeed, the failure to replicate a standard endowment effect for goods, especially in the control condition where participants went straight to the endowment task, is hard to explain within the structure of any of the competing theories discussed in this research program.

Although the private self-consciousness prime used in Study 5B is conceptually distinct from the independent self-construal prime in Study 4, they do bear some similarity in drawing attention to distinct features of the self. Study 5B was intended to complement the results of Study 5A by conceptually replicating the effect of private self-consciousness, both measured as an individual difference, and manipulated transiently. Studies 5A and 5B also contribute by extending results from evaluations (i.e., liking ratings) to decisions more directly linked to market outcomes—willingness to trade and valuations.

## **STUDY 6: MODERATION BY IDENTITY RELEVANCE OF THE OBJECT**

Study 6 was designed to test the third hypothesis of the present self-reference theory: the endowment effect (or reversal) should be stronger for stimuli that are readily associated with the self in memory. Previous endowment studies have considered identity theory in terms of identity-congruence increasing valuations of owned goods. People show an even stronger endowment effect for goods linked to a salient identity, such as a university logo (Dommer & Swaminathan, 2013). This pattern is consistent with both self-enhancement theory and self-reference theory. For bads, however, these two theories make divergent predictions.

## Competing Predictions

Based on the present self-reference theory, I had predicted that people would show a stronger ownership polarization effect (i.e., a stronger standard endowment effect for goods, and a stronger endowment effect reversal for bads) for stimuli high (vs. low) in identity-relevance. From a self-reference perspective, object attributes linked to the self in memory should be especially salient and consequentially given more weight in evaluations. For objects with predominantly positive attributes (i.e., goods), ownership should thus increase evaluations, consistent with a standard endowment effect. For objects with predominantly negative attributes (i.e., bads), however, ownership should decrease evaluations, in the reverse pattern to a standard endowment effect. Across both goods and bads, the effects of ownership should be stronger for objects that are easier to associate with the self in memory, such as objects bearing an identity-relevant logo (vs. generic without logo). Because self-reference theory predicts divergent effects of ownership within goods vs. bads, identity relevance should exacerbate the positive endowment effect for goods, and the reversal of the endowment effect for bads.

### Self-Reference Prediction for BADS

	Non-Owners	Owners
Easily Associated (Identity-relevant logo)	\$\$\$	\$
Difficult to associate (No logo)	\$\$\$	\$\$

DV: Valuation (\$)

### Self-Reference Prediction for GOODS

	Non-Owners	Owners
Easily Associated (Identity-relevant logo)	\$	\$\$\$
Difficult to associate (No logo)	\$	\$\$

DV: Valuation (\$)

From a self-enhancement perspective, objects linked to the self in memory should be more readily associated with the positive self-concept, leading owned objects to be evaluated more positively than non-owned objects. Both good and bads would benefit from this positive self-association. Specifically, for goods, self-enhancement predicts an effect of ownership such that owned goods are evaluated more positively than non-owned goods. For bads, self-enhancement predicts an effect of ownership such that owned bads are evaluated relatively more positively than non-owned bads. Across both goods and bads, the positive effect of ownership on evaluations should be stronger for objects that are easier to associate with the self in memory, such as those bearing an identity-relevant logo.

#### Self-Enhancement Prediction for GOODS

	Non-Owners	Owners
Easily associated (Identity-relevant logo)	\$	\$\$\$
Difficult to associate (No logo)	\$	\$\$

DV: Valuation (\$)

#### Self-Enhancement Prediction for BADS

	Non-Owners	Owners
Easily associated (Identity-relevant logo)	\$	\$\$\$
Difficult to associate (No logo)	\$	\$\$

DV: Valuation (\$)

Loss aversion does not have a basis to predict any effect of mere ownership on evaluations in the absence of a loss cue. For dollar valuations of goods, however, loss aversion predicts that owners (i.e., sellers) will demand more money to give up a good than non-owners



will be willing to pay. Loss aversion also predicts an endowment effect for dollar valuations of bads, with the direction of that endowment effect depending on the specific type of loss aversion: valence loss aversion or possession loss aversion (Brenner, Rottenstreich, Sood, & Bilgin, 2007). There is not a clear basis for either form of loss aversion to predict any effects of identity relevance, however, thus differentiating the valuation predictions of loss aversion from the valuation predictions of self-reference theory.

Query theory predicts that people focus on aspects supporting the status quo. Within the valuation paradigm, this could manifest for owners as a focus either on positive aspects of the object or negative aspects of the money. For non-owners, a focus on aspects supporting the status quo should emphasize positive aspects of the money or negative aspects of the object. Across both goods and bads, query theory predicts a standard endowment effect such that owned stimuli are valued more than non-owned stimuli. Query theory does not directly implicate the self-concept, and thus has no direct basis to predict any effect of identity-relevance.

## Method

### *Participants and Design*

Four hundred four Americans (184 women;  $M_{\text{age}} = 35.69$ ,  $SD = 11.04$ ) participated in a short study on Amazon Mechanical Turk. The study employed a 2 (stimulus valence: good, bad)  $\times$  2 (ownership: owner, non-owner)  $\times$  2 (identity-relevance: high, low) between-subjects design within an imagined endowment paradigm, with liking, valence ratings, and valuations serving as the dependent measures.

### *Procedure*

All participants first selected from a drop-down menu the state they most considered “home.” On the next page, all participants read, “Please imagine that you are participating in a research study about your opinion of products. You are given a mug to inspect and answer questions about.”

*Ownership.* The text that followed varied as a function of ownership condition, with owners being told to imagine the mug was theirs to keep, and non-owners being told to imagine they would be returning the mug. Specifically, the prompt read “You will [keep/return] the mug after the study is over.”

*Stimulus valence.* The text that then followed varied as a function of both stimulus valence condition and ownership condition. For goods, participants read “[Your/This] mug was made using fair trade labor practices.” For bads, participants read “[Your/This] mug was made in a foreign country by a worker paid \$0.13 per hour.”

*Identity-relevance.* All participants viewed an image of a standard white drinking mug that varied according to randomly assigned identity-relevance condition. In the high identity-relevance condition, the white mug had an identity-relevant blue logo depicting the previously selected state and the word “home” (see Figure 4). In the low identity-relevance condition, the same white mug was displayed with in generic form with no logo.

*Liking measure.* Participants were asked “To what extent do you like or dislike [your/this] mug?” and reported their responses on a 7-point scale anchored at (1) Extremely dislike; (4) Neither like nor dislike; (7) Extremely like.

*Valence measure.* Participants were asked “How good or bad is [your/this] mug?” and reported their responses on a 7-point scale anchored at (1) Extremely bad; (4) Neither good nor bad; (7) Extremely good.

*Valuation measure.* On the next page, participants responded to a BDM valuation elicitation (Becker, DeGroot, & Marschak, 1964) in the role of either a seller (i.e., owners) or a chooser (i.e., non-owners). “Now please imagine the following: You now have the opportunity to decide whether you would like to either [keep your mug/receive this mug to keep] OR receive a cash payment. Below is a list of dollar amounts. For each amount, please indicate whether you would choose to [keep your mug/receive the mug] OR receive that amount of money. Broadly, the response scale covered choices in \$0.50 increments from \$0.00 to \$10.00. Because of the negative nature of some stimulus attributes, the scale was further supplemented at the lower end to also include \$0.01, \$0.05, \$0.10, \$0.25, and \$0.75. This modification enables the measure to reflect unique reactions that may result from conducting a BDM with negatively valenced stimuli, such as someone who might rather walk away with no money vs. accept a free mug that was reportedly made using objectionable labor practices.

On the next page, participants responded to two questions related to the “home” state they had selected at the outset of the study which in some cases had served as an identity-

relevance manipulation. Specifically, the questions read “To what extent do you [like/feel connected to] [*piped text displaying selected home state*]?” Responses were recorded on 7-point scales anchored at (1) Not at all; (7) Extremely. Finally, the study concluded with basic demographic measures and an attention check. In order to help interpret results, this page also included an open-ended question asking “Were the instructions to this survey clear and easy to understand?”

## Results & Discussion

Ten participants were excluded from further analysis because their responses on the Becker-DeGroot-Marschak valuation were inconsistent (i.e., jumped back and forth from picking the mug to the money at various dollar amounts) and thus uninterpretable as valuations. An additional six participants failed the attention check, and are thus also excluded from subsequent analyses. Liking and valence ratings were highly correlated ( $r = .803, p < .001$ ) and were thus collapsed into a single evaluation measure. The inclusion of the two covariates at the end of the survey did not substantially alter general results, thus those covariates are not discussed further.

### *Evaluations*

Evaluations were submitted to a 2 (stimulus valence: good, bad) by 2 (ownership: owner, non-owner) by 2 (identity-relevance: high, low) between-subjects ANOVA with evaluation as the outcome measure.

Consistent with a mere ownership effect, there was an overall main effect of ownership on evaluation, such that owners ( $M = 4.30, SD = 1.61$ ) reported more positive evaluations of the object than nonowners ( $M = 3.85, SD = 1.55$ ),  $F(1, 380) = 10.06, p = .002, \eta_p^2 = .026$ . (See

Figure 4; The mere ownership effect was observed considering each of the evaluation rating components separately as well (i.e., liking and valence ratings, see Appendix E).

Additionally, there was an overall main effect of identity-relevance, such that objects high in identity-relevance ( $M = 4.37$ ,  $SD = 1.68$ ) were evaluated more positively than objects low in identity-relevance ( $M = 3.79$ ,  $SD = 1.45$ ),  $F(1, 380) = 18.69$ ,  $p < .001$ ,  $\eta_p^2 = .047$ . There was also an overall main effect of stimulus valence on evaluation, such that goods ( $M = 4.86$ ,  $SD = 1.23$ ) were evaluated more positively than bads ( $M = 3.28$ ,  $SD = 1.53$ ),  $F(1, 380) = 133.51$ ,  $p < .001$ ,  $\eta_p^2 = .260$ . The three-way interaction between ownership, stimulus valence, and identity relevance was non-significant,  $F(1, 380) = 2.13$ ,  $p = .15$ ,  $\eta_p^2 = .006$ . There were no significant two-way interactions between any combination of the three independent variables (ownership  $\times$  identity-relevance,  $F(1, 380) = .05$ ,  $p = .82$ ,  $\eta_p^2 < .001$ ; ownership  $\times$  stimulus valence,  $F(1, 380) = 1.99$ ,  $p = .16$ ,  $\eta_p^2 = .005$ ; stimulus valence  $\times$  identity-relevance,  $F(1, 380) = .922$ ,  $p = .338$ ,  $\eta_p^2 = .002$ ).



Figure 4. The effect of ownership, identity relevance, and stimulus valence (goods vs. bads) on evaluations in Study 6. Error bars represent  $\pm 1$  SE.

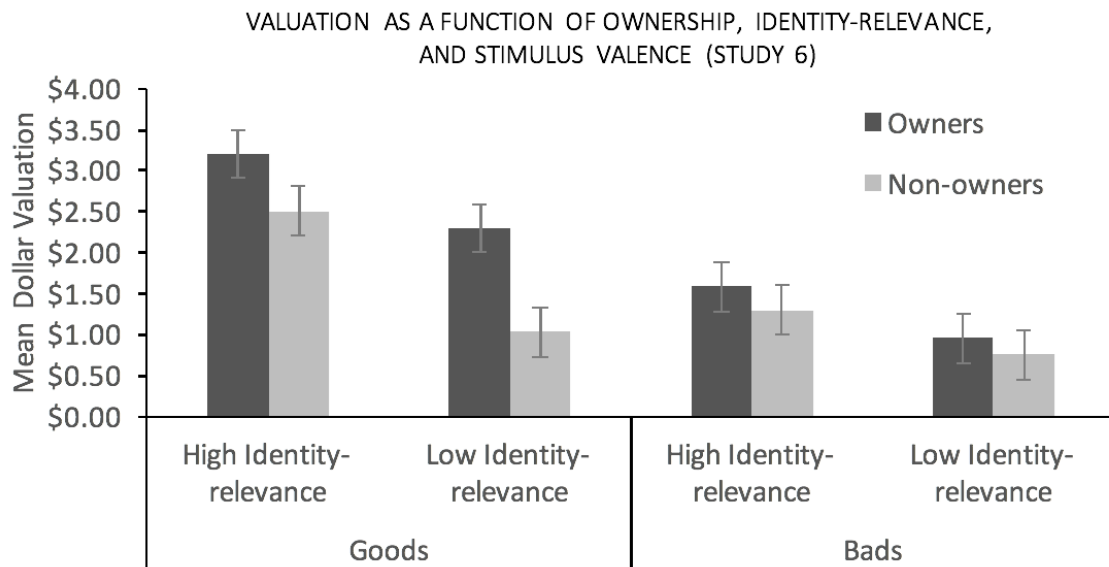
### *Dollar Valuations*

Valuations were submitted to a 3-way ANOVA with ownership, stimulus valence, and identity-relevance all as between-subjects factors.

There was a main effect of ownership such that owned mugs ( $M = \$2.02$ ,  $SD = \$2.49$ ) were valued more than non-owned mugs ( $M = \$1.39$ ,  $SD = \$1.84$ ),  $F(1, 380) = 8.559$ ,  $p = .004$ ,  $\eta_p^2 = .022$  (see Figure 5). There was also a main effect of stimulus valence such that goods ( $M = \$2.26$ ,  $SD = \$2.51$ ) were valued more than bads ( $M = \$1.14$ ,  $SD = \$1.69$ ),  $F(1, 380) = 27.997$ ,  $p < .001$ ,  $\eta_p^2 = .069$ . Additionally, there was a main effect of identity-relevance condition such that participants in the high identity-relevance condition valued the state mug ( $M = \$2.15$ ,  $SD = \$2.51$ ) higher than participants in the control condition valued the generic mug ( $M = \$1.26$ ,  $SD = \$1.76$ ),  $F(1, 380) = 17.964$ ,  $p < .001$ ,  $\eta_p^2 = .045$ .

There was a marginal two-way interaction between stimulus valence and ownership,  $F(1, 380) = 3.132$ ,  $p = .078$ ,  $\eta_p^2 = .008$ , such that the effect of ownership on dollar valuations was trending in the direction of being stronger for goods than for bads.

The interaction between stimulus valence and identity-relevance was non-significant,  $F(1, 380) = 2.096$ ,  $p = .148$ ,  $\eta_p^2 = .005$ , as was the interaction between ownership and identity-relevance,  $F(1, 380) = .325$ ,  $p = .569$ ,  $\eta_p^2 = .001$ . The three-way interaction between ownership, stimulus valence, and identity-relevance was non-significant,  $F(1, 380) = .610$ ,  $p = .435$ ,  $\eta_p^2 = .002$ .



*Figure 5. The effect of ownership, identity relevance, and stimulus valence (goods vs. bads) on dollar valuations in Study 6. Error bars represent  $\pm 1$  SE.*

Overall, participants who imagined owning a mug evaluated it more favorably than participants who did not imagine owning it. This pattern held across both goods and bads, emerging regardless whether evaluations were measured via liking or valence ratings. In other words, whether participants were reporting how much they liked the mug or how good/bad the mug was, owners rated their mugs more positively than did nonowners. Such results are consistent with a standard mere-ownership effect, where ownership alone positively impacts evaluations of goods. Notably, at the time in the experiment that these evaluation ratings were reported, owners had not yet encountered any instruction relating to potentially selling their mugs. Such instruction did not appear until the next page where the valuation measure was introduced. Thus, the overall main effect of ownership is best characterized as a mere ownership effect arising in the absence of loss aversion.

One reason this paradigm may have reproduced a mere ownership effect, in contrast to mixed results from alternate paradigms in my dissertation, is the psychological elaboration required by the instructions. Participants were instructed to imagine they were participating in an experiment and received a mug either to keep or to inspect, and then considered additional information about the mug. While typical of endowment studies, this goes far beyond the level of self-association that has been found to cause self-reference effects in the cognitive psychology literature. Because my theory was premised on an interdisciplinary approach to self-reference effects and the endowment effect, I employed paradigms from both literatures across the studies presented in my dissertation.

The valuation measure clearly did introduce loss aversion, as it asked for owners to contemplate their willingness to relinquish the mug, and for nonowners to contemplate their willingness to pay to acquire the mug. Overall, participants who imagined owning a mug reported that they would require a higher amount of money to give up the mug than nonowners were willing to pay. This pattern held across both goods and bads, consistent with a standard endowment effect.

Overall, the results of Study 6 are most consistent with self-enhancement theory or query theory, which predict a mere ownership effect such that owned objects will be evaluated more positively than nonowned objects, regardless whether those objects are goods or bads.

## **STUDY 7: OWNERSHIP POLARIZATION MECHANISM**

The purpose of Study 7 was two-fold: first, to test the proposed mechanism more directly and second, to further differentiate the present Self-Reference Theory from extant theory,



especially query theory. One of the ways the proposed cognitive mechanism can be tested is through an aspect-listing paradigm, in which participants list their thoughts about an object.

### **Competing Predictions**

The present self-reference theory predicts that ownership polarizes evaluations via biased cognition about the object, such that negative object-related thoughts are more prominent for owned (vs. non-owned) bads, and positive object-related thoughts are more prominent for owned (vs. non-owned) goods. Within an aspect-listing paradigm, this could be reflected across both the frequency and order of differentially valenced aspects. For the frequency of differentially valenced aspects, self-reference theory predicts that self-association (i.e., ownership) should increase the frequency of positive aspects for goods, but increase the frequency of negative aspects for bads.

Overall, the tendency to list one type of aspect before another indicates an increased accessibility of that category of thought. Self-reference theory predicts increased salience of negative cognitions about owned (vs. non-owned) bads, and increased salience of positive cognitions about owned (vs. non-owned) goods. In terms of aspect order specifically, self-reference theory predicts that positive aspects will tend to be listed earlier for owned (vs. non-owned) goods, and that negative aspects will tend to be listed earlier for owned (vs. non-owned) bads.

The above-described patterns in aspect listing should in turn predict object evaluations. For goods, a higher frequency or rank-order of positive aspects for owned (vs. non-owned) goods should predict more positive object evaluations. For bads, a higher frequency or rank-order of negative aspects for owned (vs. non-owned) bads should predict less positive object evaluations.

The above described patterns in aspect listing are in turn expected to mediate the relationship between condition (ownership  $\times$  stimulus valence) and object evaluations.

### *Self-Enhancement Theory Predictions*

Self-enhancement theories differ in their aspect-listing predictions because they emphasize the effect of self-association orienting people towards positive information. Self-enhancement predicts a higher frequency and rank order of positive (vs. negative) aspects across all owned (vs. non-owned) objects, regardless of whether the object itself is characterized overall as a good or a bad.

### *Query Theory Predictions*

Query theory predicts that people first generate supporting reasons to maintain the status quo, followed by reasons supporting the alternative. In the present paradigm, query theory predicts a higher frequency and rank order of positive (vs. negative) aspects of the status quo. For owners, the object is part of the status quo, thus query theory predicts that owners will show a higher frequency and rank order of positive aspects, compared to non-owners. In contrast, the present self-reference theory predicts that self-association is the key variable shaping cognition, and that ownership polarizes evaluations via polarized cognitions (i.e., owners, compared to non-owners, will exhibit increased accessibility of negative cognitions for bads, and positive cognitions for goods).

### *Loss Aversion Predictions*

The query theory paradigm confounded loss and ownership, whereas the present paradigm focuses on the unique effects of mere-ownership. Because there is no form of loss directly implicated in the present experiment, loss aversion would not predict any differences based on ownership condition, nor any ownership  $\times$  stimulus valence interactions.

## Method

### *Participants and Design*

Four hundred seven Americans (198 women;  $M_{\text{age}} = 36.34$  years,  $SD = 10.53$ ) completed a short survey on Amazon Mechanical Turk. The experiment employed a 2 (stimulus valence: good, bad)  $\times$  2 (ownership status: owner, non-owner) mixed design, with stimulus valence as a between-subjects variable and ownership as a within-subjects variable. Within an imagined endowment paradigm, participants completed a thought-listing task adapted from the original query theory work (Johnson, Haubl, & Keinan, 2007) which served to measure the theorized mediating process variable. Stimulus ratings (e.g., liking) served as the dependent measure.

### *Procedure*

Study 7 employed the same basic procedure assigning imagined ownership for nutritional supplements as employed in Study 2B, with the key difference being the addition of a thought-listing task between the assignment of the independent variables (stimulus valence and ownership) and the reporting of dependent measures (liking and valence ratings).

Specifically, the information about the assigned supplement was displayed on screen above the prompt “Share a thought about the supplement” and an open-ended text box labeled

“First thought.” For each thought entered, the next page of the survey displayed a new text box labeled “Additional thought” and an option for the participant to indicate “No additional thoughts,” up to a grand total of ten thoughts. Any previously entered thoughts were displayed on screen via piped text.

Next, participants responded the same two dependent variables employed in previous studies: “To what extent do you like or dislike this nutritional supplement?” “How good or bad is this nutritional supplement?”

Participants were then asked to self-code their previous responses. Instructions read, “To better understand your thought process, please rate the following thought(s) you entered earlier.” Each previously entered thought was displayed one by one, with the question “Do you feel that [*thought*] is positive or negative?” This measure was recorded dichotomously for each previously listed thought, with a forced choice between “Positive” or “Negative.” Once each previously entered thought had been displayed and self-coded, participants moved on to a final demographics block, including the attention check.

## Results and Discussion

Forty-four participants failed the attention check and are excluded from all subsequent analyses. An additional fourteen participants were excluded due to invalid aspect listing content (e.g., typing “no additional thoughts” between other thoughts). Liking and valence ratings were highly correlated ( $r_s > .89$ ,  $p_s < .001$ ), and thus collapsed into a single “evaluation” variable.

### *Evaluations*

Evaluations were submitted to a 2 (stimulus valence: good, bad)  $\times$  2 (ownership status: owner, nonowner) between-subjects ANOVA—the interaction was not significant,  $F(1, 347) = .058, p = .81, \eta_p^2 < .001$ . There was also no significant main effect of ownership  $F(1, 347) = 1.395, p = .238, \eta_p^2 = .004$ . There was, however, a significant effect of stimulus valence,  $F(1, 347) = 470.87, p < .001, \eta_p^2 = .576$ , such that goods were rated more positively than bads.

### *Frequency of Aspects*

Using participants' own self-categorizations of each aspect as either positive or negative, total counts of each type were compiled within both the own and non-own ownership conditions.

*Positive aspect frequency.* Data were submitted to a 2(stimulus valence: good, bad)  $\times$  2(ownership status: owner, nonowner) mixed ANOVA, with ownership as the within-subjects factor, and positive aspect count as the dependent variable. There was a significant ownership  $\times$  stimulus valence interaction,  $F(1, 347) = 3.99, p = .046, \eta_p^2 = .011$ . I next examined the effect of ownership within each level of stimulus valence. For goods, there was no significant effect of ownership  $t(170) = .327, p = .74$ . However, there was a significant effect of ownership for bads,  $t(177) = -3.22, p = .002$ , such that positive aspects were generated significantly less frequently for owned bads ( $M = .17, SD = .52$ ), than for nonowned bads ( $M = .35, SD = .71$ ). This pattern is consistent with the present self-reference theory.

*Negative aspect frequency.* Data were submitted to a 2(stimulus valence: good, bad)  $\times$  2(ownership status: owner, nonowner) mixed ANOVA, with ownership as the within-subjects

factor, and negative aspect count as the dependent variable. There was no significant ownership  $\times$  stimulus valence interaction,  $F(1, 347) = .58, p = .44, \eta_p^2 = .002$ , nor was there any significant main effect of ownership,  $F(1, 347) = .161, p = .69, \eta_p^2 < .001$ . There was, however, a main effect of stimulus valence,  $F(1, 347) = 102.976, p < .001, \eta_p^2 = .229$ , such that the frequency of negative aspects was significantly higher for bads ( $M = 1.40, SD = .81$ ) than for goods ( $M = .59, SD = .69$ ).

*Overall aspect frequency.* Finally, results were examined across both positive and negative aspects, in order to test whether the total aspect counts differed by condition. Data were submitted to a 2(stimulus valence: good, bad)  $\times$  2(ownership status: owner, nonowner) mixed ANOVA, with ownership as the within-subjects factor, and total aspect count as the dependent variable. There was no significant ownership  $\times$  stimulus valence interaction,  $F(1, 347) = .35, p = .56$ , nor were there any significant main effects of ownership,  $F(1, 347) = .63, p = .43$ , nor stimulus valence,  $F(1, 347) = .98, p = .32$ . This means that participants did not tend to generate more thoughts (i.e., aspects) in any particular condition(s) of the experiment.

### *Order of Aspects*

For the relative order of differentially valenced aspects, the present self-reference theory predicts that positive aspects should appear relatively earlier in the aspect listing for owners (vs. non-owners) of goods, and negative aspects should appear relatively earlier in the aspect listing for owners (vs. non-owners) of bads.

Drawing on the methodology from the original query theory paper, (Johnson, Haubl, & Keinan, 2007, p. 465), a score was calculated for each participant reflecting their standardized

median rank difference of aspect types (SMRD; see Appendix F). The resulting score could take on values between -1 and 1, with negative values indicating a tendency to list negative aspects before positive aspects, and positive values indicating a tendency to list positive aspects before negative aspects.

### *Competing predictions for SMRD*

The present self-reference theory predicts that owners of goods will have a significantly higher SMRD score than non-owners, and that owners of bads will have a significantly lower SMRD score than non-owners. Self-enhancement theories predict a focus on positive self-related information, such as would be illustrated with a higher score for owners vs. non-owners, across both goods and bads (i.e., a main effect of ownership condition on SMRD scores). Query theory emphasizes people's tendency to focus on information supporting the status quo (i.e., value-increasing aspects, consisting either of positive attributes of the status quo, or negative attributes of the alternative). Should ownership be construed as the status quo, query theory would make a similar prediction to self-enhancement, that ownership should increase the accessibility of positive aspects across both goods and bads. Loss aversion would have no basis to predict any difference based on mere ownership condition alone.

### *Results for SMRD*

SMRD scores were submitted to a 2(stimulus valence: good, bad)  $\times$  2(ownership status: owner, nonowner) mixed ANOVA, with ownership as the within-subjects factor. Overall, there was no significant ownership  $\times$  stimulus valence interaction,  $F(1, 347) = .54, p = .46, \eta_p^2 = .002$ , nor was there a main effect of ownership on SMRD score,  $F(1, 347) = .09, p = .77, \eta_p^2 < .001$ .

There was, however, a main effect of stimulus valence,  $F(1,347) = 271.43, p < .001, \eta_p^2 = .439$ , such that SMRD scores were significantly higher for goods ( $M = .49, SD = .66$ ) than for bads ( $M = -.66, SD = .64$ ). This pattern can be interpreted as participants having exhibited a tendency, for goods, to list positive aspects before negative aspects, as reflected by the positive SMRD score. For bads, participants exhibited a tendency to list negative aspects before positive aspects, as reflected by the negative SMRD score.

This result does not directly support any of the competing theories of the endowment effect, however it does suggest that participants were indeed responsive to the stimulus valence manipulation, and that subsequent information processing was consistent with a pattern of valence-consistent aspects (i.e., negative aspects for bads and positive aspects for goods) being most cognitively accessible.

## **FOLLOW-UP STUDY: ATTEMPT TO REPLICATE OWNERSHIP POLARIZATION**

Given the mixed results in subsequent studies, an exact replication of Study 2B was recently conducted (in July 2018) with a higher number of participants in order to increase statistical power and examine the robustness of the effect. The competing predictions for Study mirror those outlined (for both goods and bads) in the preamble to Study 1.

### **Method**

#### *Participants and Design*

Two hundred fifty-one Americans (111 women;  $M_{\text{age}} = 35.34, SD = 12.07$ ) completed a short survey on Amazon Mechanical Turk. This exact replication of Study 2B again employed a 2 (stimulus valence: good, bad)  $\times$  2 (ownership: owner, non-owner) mixed design, with stimulus



valence manipulated between-subjects and ownership manipulated within-subjects. As in the previous studies, the dependent measure consisted of two continuous variables: liking and valence ratings.

### *Procedure*

All procedures and stimuli were identical to the original Study 2B.

## Results and Discussion

Thirty-seven participants failed the attention check, and are thus excluded from subsequent analyses. Liking and stimulus valence ratings were highly correlated ( $r_s \geq .915$ ,  $p_s < .001$ ) and were thus collapsed into a single evaluation measure.

Evaluations were submitted to a 2 (stimulus valence: good, bad)  $\times$  2 (ownership: owner, non-owner) mixed ANOVA with stimulus valence as the between-subjects factor and ownership as the within-subjects factor. There was no significant ownership  $\times$  stimulus valence interaction on evaluations,  $F(1, 212) = .615$ ,  $p = .43$ ,  $\eta_p^2 = .003$  (all results are reported at the lower bound). Nor was there any main effect of ownership on evaluations,  $F(1, 212) = .887$ ,  $p = .35$ ,  $\eta_p^2 = .004$ . There was, however, a significant main effect of stimulus valence on evaluations, such that goods ( $M = 5.71$ ,  $SD = .99$ ) were rated more positively than bads ( $M = 2.50$ ,  $SD = 1.41$ ),  $F(1, 212) = 360.50$ ,  $p < .001$ ,  $\eta_p^2 = .630$ .

### *Liking*

A similar pattern emerged when examining the liking measure alone: There was no significant ownership  $\times$  valence interaction,  $F(1, 212) = .218$ ,  $p > .64$ ,  $\eta_p^2 = .001$ , nor was there a

main effect of ownership,  $F(1,212) = 1.23, p > .26, \eta_p^2 = .006$ . There was, however, a significant main effect of stimulus valence on liking, such that goods ( $M = 5.66, SD = 1.09$ ) were liked more than bads ( $M = 2.40, SD = 1.48$ ),  $F(1, 212) = 329.26, p < .001, \eta_p^2 = .608$ .

### *Valence*

Again, a similar pattern emerged when examining the valence measure alone. There was no significant ownership  $\times$  valence interaction,  $F(1, 212) = .957, p = .33, \eta_p^2 = .004$ , nor was there a main effect of ownership,  $F(1,212) = .264, p = .61, \eta_p^2 = .001$ . There was, however, a significant main effect of stimulus valence on valence ratings, such that goods ( $M = 5.76, SD = .98$ ) were rated as relatively more positive than bads ( $M = 2.60, SD = 1.44$ ),  $F(1,212) = 340.12, p < .001, \eta_p^2 = .616$ .

Overall, this follow-up study does not replicate the ownership polarization findings of Study 2B, which had previously been built on for subsequent studies testing more complex hypotheses. This may help explain the mixed results found in this project overall. The persistence of a main effect of stimulus valence supports a minimum level of internal validity, casting doubt on any interpretation that these participants responded entirely randomly. Notably, there was no effect of ownership whatsoever observed in this replication attempt, which is inconsistent with both self-enhancement theory and the present self-reference theory.

## GENERAL DISCUSSION OF MAIN STUDIES

Overall, the evidence from this series of experiments does not consistently support the present self-reference theory. I found evidence of ownership polarization in Study 1 for bads, and in Study 2A and Study 2B across both goods and bads, particularly within the nutrition supplement paradigm. I employed that nutrition supplement paradigm in subsequent experiments (Study 3, Study 4, Study 5B, and Study 7) for conceptual replications extending the research program. I also employed new stimuli extending the range of market goods which my research considered, such as pens in Study 5A, and mugs in Study 6.

Recently, in order to help reconcile the mixed evidence for the basic ownership polarization effect for which I found positive evidence in Study 1, Study 2A, and Study 2B, but no significant differences in Study 3, Study 4, Study 5B, and Study 7, I attempted a simple, direct replication of Study 2B, which is now reported just before the general discussion. This non-replication using the exact same experimental design was designed to gather additional data, in a straightforward and transparent manner, such that I report a more accurate account overall. The null results in this recent replication attempt certainly complicate the overall interpretation of the present evidence. Most importantly, they indicate that the previous positive results that were consistent with hypothesized ownership polarization effect, especially those observed with the same stimuli in Studies 1B and 1C, must be interpreted with caution.

It is certainly not the case that the subset of observations where significant effects of ownership were not observed undermine the basic validity of this entire research program, however. Results consistent with a positive endowment effect for goods were found in Study 2A, Study 2B, Study 5A, and Study 6. A positive endowment effect was additionally predicted, but not found, in Study 3, Study 4, Study 5B, Study 7, and the follow-up replication attempt of Study

2B. In other words, I successfully replicated the standard endowment effect in four out of nine studies.

It is notable that two of the studies in which I did replicate a standard endowment effect implicated dual mechanisms of both loss and ownership. In Study 5A, I found a main effect of ownership on dollar valuations of pens, and in Study 6 I found a main effect of ownership on both liking and dollar valuations of mugs. The inclusion of the valuation paradigm in these studies was intended to allow for me to test the extension of ownership polarization from psychological evaluations (i.e., liking and valence ratings) to dollar valuations more closely approximating intended market behavior. The positive results for Study 5A and Study 6 in favor of self-enhancement theory are very informative in that they indicate that the standard endowment effect appeared most consistently replicable within the valuation paradigm, which implicates both loss and ownership.

In contrast, the endowment effect did not consistently replicate within the mere-ownership paradigm, which implicates self-association, but not loss. In other words, when the experimental design affected self-association (i.e., ownership) alone, those instances seemed less likely to produce a standard endowment effect for goods than experimental designs which also prompted participants to think about the prospect of giving up the object, such as by selling it in a valuation paradigm. The inclusion of these various inductions of the endowment effect (i.e., mere ownership, exchange, and valuation paradigms) across my research program was quite intentional, and was included in my dissertation proposal. The purpose originally was to establish that the ownership polarization effect generalized from evaluation outcomes to market intentions such as willingness to trade (Study 5B) and dollar valuations (willingness to accept/willingness to pay; Study 5A & Study 6). This feature of the proposed (and executed)

experimental design ended up conferring the benefit of allowing us to observe one possible explanation for why results were not entirely consistent across the package of studies: those same paradigms which are considered to approximate market intentions more closely also happen to implicate the loss frame of owners considering giving up the endowment, a common feature of endowment research.

### **Endowment Effect Mechanisms: Implications and Future Directions**

Although the sum of this evidence does not provide clear support for the present self-reference theory, their inclusion in the scientific record is important to help shape the direction of future research. My theory integrated various disparate literatures in a novel manner, using a body of research in cognitive psychology to inform our understanding of multiple iterations of an important market phenomenon, that is, the endowment effect as manifested via the mere ownership paradigm, the exchange paradigm, and the valuation paradigm.

Overall, this pattern of findings supports the notion that the endowment effect is multiply determined, and may indicate that the interaction of loss and ownership is a particularly fruitful line for future research examining the underlying processes and conditions that give rise to the standard endowment effect. Consistent with the idea of a loss by ownership interaction, loss aversion has been found to be attenuated when making decisions for others compared to the self (Polman, 2012). It will be fruitful in the future to test whether those theoretical insights might explain the endowment effect more broadly than previously claimed. The instances where mere ownership has independently caused an endowment effect (e.g., Morewedge, Shu, Gilbert, & Wilson, 2009, Beggan, 1992) with no loss frame may be productively explained in the future by alternate formulations integrating self-enhancement and information processing accounts.

One mechanism by which this interaction between loss frames and ownership frames might occur is through mnemonic neglect—information processing biased to ignore negative attributes due to self-threat, via compromised encoding or recall of that information (Zengel, Wells, & Skowronski, 2018). Although the standard self-reference effect on which I based my theory has been tested across positive and negative stimuli (e.g., Leblond et al, 2016), there are specific exceptions which may be interesting to formulate new theories of endowment in the future. For highly self-diagnostic negative feedback, for example, people can show a reverse self-reference effect, and actually exhibit memory inhibition relative to when such information is associated with another person (Green & Sedikides, 2004; Sedikides & Green, 2000). Other work in the psychological literature related to self-reference finds that people sometimes show neglect for negative self-related attributes that are perceived as more difficult to change, relative to negative self-related attributes perceived as easier to change (Green, Pinter, & Sedikides, 2005). This phenomenon makes sense from a self-threat perspective—it is threatening to acknowledge one’s flaws when it is perceived there’s not much to be done to remedy those flaws. In contrast, feelings of threat arising from the acknowledgement of flaws perceived as more changeable can be more productively dealt with by reassuring oneself of the potential to remedy the source of threat in the future. Those studies were conducted using personality traits as stimuli, but there could be a close analogy in the world of endowment: the extent to which potential loss (i.e., being able to change or get rid of something) is salient might predict people’s readiness to attend to the negative attributes of owned bads. This would be consistent with the reversal of the endowment effect having been found for bads in the exchange paradigm (Brenner et al., 2011; Shu & Peck, 2011). The more plausible or salient an action severing the link between the self and an extreme bad (i.e., selling, exchanging, or otherwise disposing), the less

motivated people may be to engage in motivated information processing enabling them to view the bad less negatively than if they did not own it.

The extent to which object attributes need to be recalled or generated purely from memory, versus being clearly indicated and accessible in the environment, may also play a role. The self-reference effect in memory has been found for both positive and negative stimuli, however, this can vary depending on whether memory is being measured via recollection or recall. For negative personality traits, people have been found in some cases to show an inhibition effect only in recall, not in recognition. In one study, people showed an SRE for both positive and negative traits when making recognition judgments where the stimulus was fully cued. A second study in this series found that the SRE persisted only for positive traits when measured by uncued recall (i.e., simply asking people to list all the words they remembered from the task, following a brief filler task) (D'Argembeau, Comblain, & Van der Linden, 2005). This may indicate that open-ended retrieval processes are more shaped by people's desire to view themselves positively. When an object's full array of features is available in the immediate environment, as is the case for most endowment studies, and many real-life evaluation scenarios, this is more analogous to cued recognition.

Arguably, this could mean that self-reference effects for endowment of bads would be much more likely to emerge when the encoding of object attributes is more distinct from the recall of those attributes, and cued recognition or directed attention to object-relevant information in the environment is no longer a viable information processing strategy. Concretely, such situations arise when consumers experience a product's attributes at one point in time, and then later rely on memory recall at the time of a decision, such as recalling information from a test drive when making a decision about what price to offer inside the car dealership. These ideas

about mnemonic neglect of negative owned-object attributes are at the intersection of self-referential theories of memory and self-enhancement theory. They are a novel perspective in the endowment literature, and arise in part from the insights I have gained analyzing, integrating, and reflecting upon the results of the present dissertation.

Future work might further test competing explanations for the underlying cause of the unexpected (according to the present theory) self-enhancement pattern I observed for bads in Study 5A and Study 6. It could be that self-association simply adds a positive attribute via a cognitive link to the relatively positive self-concept. Alternatively, there could be a more complex mechanism at work. For example, if self-association with a bad causes cognitive dissonance, and people are motivated to reduce that dissonance, they could do so either by severing the connection between the self and the bad, or changing their view of the bad. Severing the connection between the self and the bad could be accomplished by selling or trading it. If that possibility is relatively less plausible or salient, the situation should feel less changeable, and reduced perceptions of changeability make it more likely people will find other ways to reduce cognitive dissonance (Gilbert, & Ebert, 2002), such as generating thoughts justifying a more generous view of the self-associated bad. This could be done by focusing on positive aspects, or instead, by neglecting negative aspects, consistent with the phenomenon of mnemonic neglect described above. If the neglect of self-related attributes is effortful, then we should observe a reduction in this pattern when people are under cognitive load, and their mental resources are too taxed to conduct the psychological processing necessary. Indeed, the mnemonic neglect of self-threatening information, in general, has been found to weaken under cognitive load (Zengel, Wells, & Skowronski, 2018).



### *Valence Extremity*

The stimuli in Study 1 were adapted directly from work on the reversal of the endowment effect in the domain of bads, which previously had only been shown in an exchange paradigm (Brenner et al, 2007). Those stimuli were extreme in valence, and the result of Study 1, a reversal of the standard endowment effect within a mere ownership paradigm, does raise an interesting line of inquiry about the conditions under which such an ownership polarization effect might be most likely to emerge. Future work might examine, for example, whether the extremity of bad attributes determines which of the multiple mechanisms capable of causing an endowment effect would occur. When an extreme bad is associated with the self, one might be inclined to reject it swiftly so as not to integrate that negative entity into the extended self-concept. When, on the other hand, a weakly negative or even ambiguous bad is associated with the self, it might stay below that threshold, and people may be motivated instead to view the bad more positively. Consistent with this conjecture is the evidence from Study 5A wherein owned bads were valued relatively more (in dollars) than non-owned bads. In this case, the standard endowment effect from bads was even significantly stronger than the standard endowment effect for goods. The bads in this paradigm were arguably less extreme than the those in which ownership polarization were first observed in this research program: whereas the traffic court or cash fine punishments in Study 1 were unambiguously negative, Study 5A employed, as a baseline, a market good, a pen, and varied the associated attributes. Perhaps this level of negativity fell below the threshold where people felt the need to reject the object altogether, and instead they went through extra justification for why the self-associated bad perhaps wasn't so bad after all. The fact that an effect emerged for the valuation measure, but not the liking measure that immediately preceded, is perhaps telling as well. Consistent with the points raised in the present discussion about the

evidence pointing to a particular role for ownership by loss interactions, the divergence of results for a mere ownership measure (i.e., evaluation) and a valuation measure within the very same study supports the notion that self-related loss is a particularly viable condition for a standard endowment effect (directionally consistent with self-enhancement) to be triggered. One way to test this would be to manipulate factors affecting defensive-processing and see how they affect ownership polarization vs. self-enhancement in the domain of bads. One such manipulation has been tested for goods, where it has been observed that self-affirmation (i.e., focusing on positive information about the self in an unrelated domain) attenuates a standard endowment effect, purportedly because the self-enhancing function of raising one's valuation of a self-associated object is no longer as acute a need (Chaterjee, Irmak, & Rose, 2013). Relatedly, ego deflation exacerbates mnemonic neglect of negative self-related information, whereas ego inflation attenuates the effect (Green, Sedikides, Gregg, 2008). In other words, the tendency for recall of negative self-attributes to be inhibited is shaped by the temporary need to self-enhance—when people feel good (vs. bad) about themselves, they appear more (less) willing to confront negative self-related information. To the extent this pattern extends to self-associated object attributes via ownership, this could serve as a competing explanation for why self-affirmation might attenuate the endowment effect, because it reduces the ego need to selectively recall positive self-related information. Such a result on evaluations has been found for goods, but the process remains to be investigated for bads. There is already some consistent evidence that sellers (vs. buyers) of objects that are predominately goods focus more on relatively positive attributes and less on relatively negative attributes (Johnson, Haubl, & Keinan, 2007; Nayakankuppam, & Mishra, 2005). Further investigation of the motivational underpinnings of information processing

consistent with mnemonic neglect, particularly for bads, would be a novel contribution further elucidating the mechanisms underlying object evaluations.

### *Mere Self-association*

The present research may also inform researchers seeking to operationalize self-association. I used manipulations adapted closely from the literature most relevant to my theory (i.e., self-reference). Thus, I used a subtle language manipulation which did or did not invoke the term “you.” Although such a manipulation is consistent with the cognitive psychology literature that I drew upon in developing the present theory, it is certainly more subtle than many tests of mere ownership which overtly manipulate legal ownership and/or physical possession of an object (e.g., Beggan, 1992; Reb & Connolly, 2007). The present pattern of results calls into question whether mere ownership effects observed in extant research can readily be extended and interpreted in terms of more basic forms of cognitive self-association as observed in the psychological literature. In other words, the mere-ownership effect might be conditional on an aspect of psychological ownership not captured by mere cognitive self-association alone. Perhaps the mere-ownership effect requires a distinct aspect of self-association than does the self-reference effect, which has been found to emerge even under incidental self-relevant encoding (e.g., does the word appear above or below [your name], Turk, Cunningham, & Macrae, 2008). This is a promising distinction to investigate the boundaries of self-association going forward, learning what conditions are sufficient to produce a mere ownership effect on evaluations and valuations. Notably, the resolution study which replicated the mere ownership effect utilized an imagined ownership paradigm that was more elaborate than the basic self-

association engendered by the classic self-reference paradigm in which participants view words paired either with self- or other- related stimuli.

## **RESOLUTION STUDY**

Due to mixed results in the main studies, a Resolution Study was designed to help reassess the experimental paradigm. The first goal was to replicate the mere ownership effect for goods in a pilot study. Once I piloted stimuli that replicated the mere ownership for goods, I ran a pretest to find appropriate “bads” to pair with those goods. In the final Resolution Study, I tested for moderation of a mere ownership effect across both goods and bads. Thus, the present report includes a pilot study for goods, a pretest for bads, and a final Resolution Study including both goods and bads.

### **PILOT STUDY FOR GOODS**

The purpose of this study was to pretest stimuli for three positive stimuli (or “goods”) in order to replicate the endowment effect under mere ownership conditions. A replication of the mere-ownership effect would entail a main effect of ownership on liking, such that owners like their object more so than do non-owners. A replication of the endowment effect more generally would also entail a main effect of ownership on valuation, such that owners value their object more so than do non-owners.

Including both of these dependent variables (DVs) (liking and valuation) enables me to speak directly to any concerns as to whether loss is required to reliably produce an endowment effect. Specifically, I will be able to test whether there is an overall effect of ownership on liking, and whether that effect depends on DV order. If the effect of ownership on liking only emerges when liking is measured after valuation, this will be strong evidence that a loss cue is needed to reliably reproduce the endowment effect under these conditions.

## Method

### *Participants*

Six hundred thirty-two participants (42% female;  $M_{\text{age}} = 36.84$ ,  $SD = 11.2$ ) completed a survey posted on Amazon Mechanical Turk. The following preregistered exclusion criteria were applied to the analyses reported below. Forty-nine participants were excluded for failing the attention check. An additional twenty-five participants were excluded because their valuation responses were uninterpretable (i.e., jumping back and forth from indicating that they would prefer the object vs. the money). Three additional participants were excluded due to failing the Qualtrics recaptcha (score  $< .5$ ), and eight additional participants were excluded due to being flagged as fraudulent by Qualtrics (score  $> 50$ ).

### *Procedure*

Participants were randomly assigned, between-subjects, to view one of three stimuli: a highlighter set, a pen, or a mug. All participants read the following introduction prompt: “Please imagine that you are participating in a research study about your opinion of products. You are given a [mug/pen/pack of highlighters] to inspect and answer questions about.”

*Ownership.* The text that followed varied as a function of ownership condition, with owners being told to imagine the object was theirs to keep, and non-owners being told to imagine they would be returning the object. Specifically, the prompt read “You will [keep/return] the [mug/pen/highlighters] after the study is over.”

All participants responded to two dependent variables, the order of which was counterbalanced.

*Liking measure.* Participants were asked “To what extent do you like or [your/this] [mug/pen/highlighters]?” and reported their responses on a 7-point scale anchored at (1) Not at all ... (7) Extremely.

*Valuation measure.* Participants responded to a BDM (Becker, DeGroot, & Marschak, 1964) in the role of either a seller (i.e., owners) or a chooser (i.e., non-owners). “Now please imagine the following: You now have the opportunity to decide whether you would like to either [keep your (mug/pen/highlighters); receive (this mug/this pen/these highlighters) to keep] OR receive a cash payment. Below is a list of dollar amounts. For each amount, please indicate whether you would choose to [keep your (mug/pen/highlighters); receive the (mug/pen/highlighters)] OR receive that amount of money. Broadly, the response scale covered choices in \$0.50 increments from \$0.00 to \$10.00.

Finally, the study concluded with basic demographic measures and an attention check consisting of the following question, also employed in subsequent studies, “To gauge your attention to the instructions of this survey, please do not click on any of the values in the scale below.”

## Results and Discussion

### **Liking Ratings**

Liking ratings were submitted to a 2 (Ownership: owner, nonowner)  $\times$  2 (DV order: liking first, valuation first)  $\times$  3 (Stimulus: highlighter, pen, mug) ANOVA with each variable manipulated between-subjects. Most importantly, there was a main effect of ownership such that owners ( $M = 4.28$ ,  $SD = 1.52$ ) reported liking the good more than did nonowners ( $M = 3.94$ ,  $SD = 1.49$ ),  $F(1, 522) = 9.22$ ,  $p = .003$ ,  $\eta_p^2 = .017$  (see Figure 6).

There was also a main effect of stimulus, such that liking ratings differed across the three objects studied,  $F(2, 522) = 24.84, p < .001, \eta_p^2 = .087$ . Further comparisons revealed that mugs ( $M = 3.53, SD = 1.54$ ) were liked significantly less than the other two objects, highlighters ( $M = 4.57, SD = 1.48$ ) and pens ( $M = 4.24, SD = 1.35$ ),  $ps < .001$ , and the difference between highlighters and pens was marginally significant,  $p = .063$  (with Bonferroni corrections applied). However, there was no significant interaction between ownership and stimulus,  $F(2,522) = .689, p = .502, \eta_p^2 = .003$ . The fact that there was no significant ownership by stimulus interaction indicates that the effect of ownership did not significantly differ across the three objects tested.

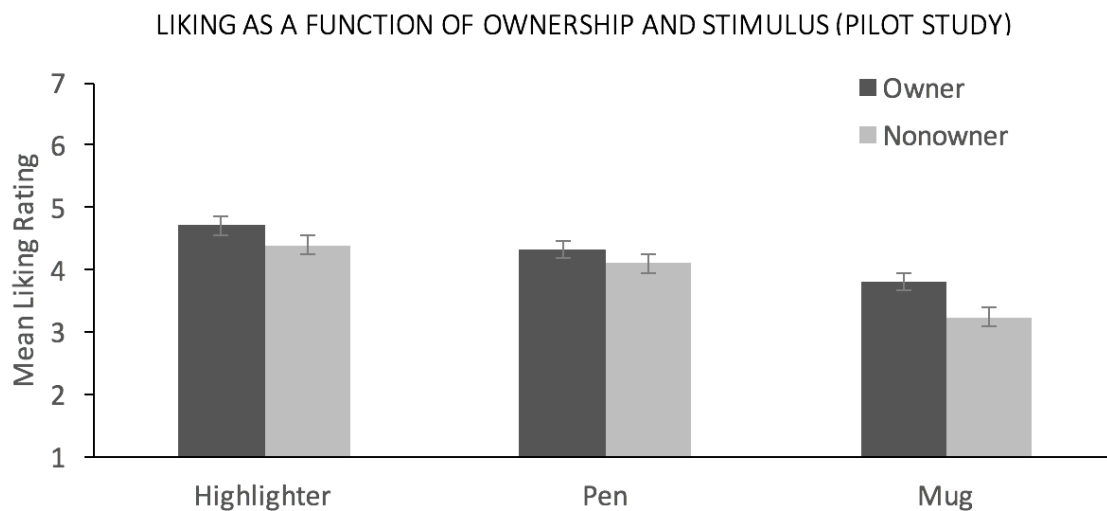


Figure 6. The effect of ownership and stimulus type on liking ratings in the pilot study. Error bars represent  $\pm 1 SE$ .

### Exploratory Analyses

Exploratory analyses examining pairwise comparisons within each stimulus, however, did indicate that that effect of ownership was most evident within one stimulus in particular: mugs. Specifically, pairwise comparisons with Bonferroni corrections applied revealed that the effect of ownership on liking was significant within mugs,  $F(1, 522) = 7.184, p = .008, \eta_p^2 =$



.014, but did not reach significance for pens,  $F(1, 522) = 1.166, p = .281, \eta_p^2 = .002$ , nor highlighters,  $F(1, 522) = 2.246, p = .135, \eta_p^2 = .004$ .

There was a main effect of DV order, such that liking ratings measured before valuations ( $M = 4.46, SD = 1.42$ ) were significantly higher than liking ratings measured after valuations ( $M = 3.74, SD = 1.53$ ),  $F(1, 522) = 35.88, p < .001, \eta_p^2 = .064$ . However, there was no significant interaction between ownership and DV order,  $F(1, 522) = .303, p = .582, \eta_p^2 = .001$ . There were no other significant interactions. Specifically, the three-way interaction between ownership, stimulus, and DV order was non-significant,  $F(2, 522) = 1.069, p = .344, \eta_p^2 = .004$ . There was no significant interaction between stimulus and DV order,  $F(2, 522) = .349, p = .705, \eta_p^2 = .001$ .

Overall, the results support a mere ownership effect on liking. Critically, this mere ownership effect was not qualified by any interactions. Importantly, whether participants first rated liking or valuation did not affect the results. Because the valuation measure can be construed as a loss cue (i.e., making participants imagine giving the object up), the evidence does not support theorizing that loss-related cognition is essential for the mere ownership effect to emerge. Indeed, a mere ownership effect emerged regardless whether it was measured before or after the introduction of a loss cue (i.e., the valuation measure). The main effect observed for DV Order was not predicted a priori, however, the results seem to indicate that participants respond to the liking measure in a more exaggerated fashion when that measure comes first.

### **Valuations**

Valuations were submitted to a 2 (Ownership: owner, nonowner)  $\times$  2 (DV order: liking first, valuation first)  $\times$  3 (Stimulus: highlighter, pen, mug) ANOVA with each variable manipulated between-subjects. Most importantly, there was a main effect of ownership on dollar

valuations, such that owners ( $M = \$1.16$ ,  $SD = 1.61$ ) valued the object more than nonowners ( $M = \$0.92$ ,  $SD = 1.39$ ),  $F(1, 522) = 4.25$ ,  $p = .040$ ,  $\eta_p^2 = .008$  (see Figure 7).

There was also a main effect of stimulus, such that valuations differed across the three objects studied,  $F(2, 522) = 7.21$ ,  $p = .001$ ,  $\eta_p^2 = .027$ . Specifically, taking into account a Bonferroni adjustment for multiple comparisons, highlighters were valued significantly more ( $M = \$1.32$ ,  $SD = 1.58$ ) than pens ( $M = \$0.72$ ,  $SD = 1.20$ ),  $p = .001$ . Mugs were valued marginally more ( $M = \$1.08$ ,  $SD = 1.65$ ) than pens ( $p = .071$ ), and not significantly less than highlighters ( $p = .400$ ). However, there was no significant interaction between ownership and stimulus,  $F(2, 522) = 1.224$ ,  $p = .295$ ,  $\eta_p^2 = .005$ . The fact there was no significant ownership by stimulus interaction indicates that the effect of ownership did not significantly differ across the three objects tested.

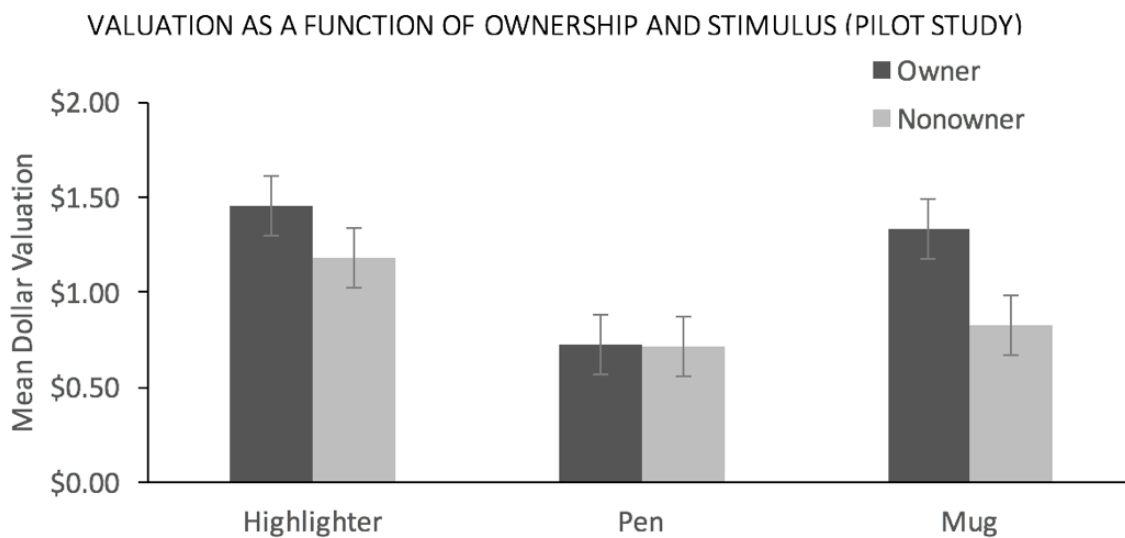


Figure 7. The effect of ownership and stimulus type on dollar valuations in the pilot study. Error bars represent  $\pm 1$  SE.

### *Exploratory Analyses*

Exploratory analyses examining pairwise comparisons within each stimulus, however, did indicate that that effect of ownership was most evident within one stimulus in particular: mugs. Specifically, pairwise comparisons with Bonferroni corrections applied revealed that the effect of ownership on valuation was significant within mugs,  $F(1, 522) = 5.197, p = .023, \eta_p^2 = .01$ , but did not reach significance for pens,  $F(1, 522) = .005, p = .945, \eta_p^2 < .001$ , nor highlighters,  $F(1, 522) = 1.49, p = .223, \eta_p^2 = .003$ .

There was no main effect of DV order,  $F(1, 522) = .088, p = .767, \eta_p^2 < .001$ , nor was there a significant interaction between DV order and stimulus,  $F(2, 522) = .284, p = .753, \eta_p^2 = .001$ . The three-way interaction between ownership, DV order, and stimulus was non-significant,  $F(2, 522) = .772, p = .462, \eta_p^2 = .002$ . However, there was a significant interaction between ownership and DV order,  $F(1, 522) = 4.38, p = .037, \eta_p^2 = .008$ , such that the effect of ownership on valuation was stronger when valuation was measured first ( $M_{\text{own}} = 1.28, SD = 1.76; M_{\text{non}} = .76, SD = 1.08$ ), versus when liking was measured first ( $M_{\text{own}} = 1.05, SD = 1.44; M_{\text{non}} = 1.06, SD = 1.61$ ).

Overall, the results support an endowment effect for valuations. The interaction between DV Order and ownership was not predicted a priori, however, the results seem to indicate that the endowment effect on valuations is stronger when valuations are measured before liking ratings.

### **PRETEST FOR BADS**

The purpose of this pretest was to identify a negative stimulus (i.e., a “bad”) for use in the Resolution Study. The goal was to identify a bad that could be matched to the blank mug used in

the pilot study. Thus, this pretest examined variations of different mugs in order to identify a mug rated as being a bad.

## Method

### *Participants*

One hundred fifty-three participants (43% female;  $M_{\text{age}} = 37.68$ ,  $SD = 11.27$ ) completed a survey posted on Amazon Mechanical Turk. Three participants were excluded for failing the attention check. Two additional participants were excluded due to failing the Qualtrics recaptcha (score  $< .5$ ), and three additional participants were excluded due to being flagged as fraudulent by Qualtrics (score  $> 50$ ).

### *Procedure*

Participants were randomly presented one of the following five objects in a between-subjects design: blank generic mug, mug with a picture of a cockroach, mug with a picture of a confederate flag, mug described as having carcinogenic properties, or mug described as being made by a worker in a foreign country paid \$0.13 per hour. All participants then responded to the same question, “Overall, in your assessment, to what extent is this object good or bad?”

Responses were recorded on a 7-point scale anchored at (-3) Extremely Bad ... (0) Neither Good Nor Bad ... (3) Extremely Good.

## Results and Discussion

Ratings for each object were submitted to one-sample t-tests comparing the values to 0 (neutral; “Neither Good Nor Bad”). Overall, the blank mug was rated significantly more positively than zero, as might be expected for a regular consumer good,  $M = 0.80$ ,  $SD = 1.22$ ,  $t(29) = 3.61$ ,  $p = .001$ . The confederate mug was rated no differently than zero, exhibiting a mix

of positive and negative ratings,  $M = -0.67$ ,  $SD = 2.11$ ,  $t(26) = -1.64$ ,  $p = .113$ . The rest of the intended “bads” were rated significantly more negatively than zero. The most negatively rated object was the mug described as having carcinogenic properties,  $M = -1.90$ ,  $SD = 1.40$ ,  $t(28) = -7.31$ ,  $p < .001$ . The second most negatively rated object was the mug depicting a photo of a cockroach,  $M = -1.27$ ,  $SD = 1.62$ ,  $t(29) = -4.29$ ,  $p < .001$ , followed by the mug described as being made by a worker in a foreign country paid \$0.13 per hour,  $M = -0.76$ ,  $SD = 1.38$ ,  $t(28) = -2.96$ ,  $p = .006$ .

The stimulus rated most “bad,” the carcinogenic mug, was chosen as the target for the next study after confirming it was not subject to a floor effect: the carcinogenic mug was still rated significantly differently from -3 (the lower extreme of the scale),  $t(28) = 4.25$ ,  $p < .001$ , thus mitigating concerns of a potential floor effect.

## RESOLUTION STUDY FOR GOODS AND BADS

The purpose of this Resolution Study was to simultaneously test the endowment effect for goods and for bads under mere ownership conditions. The key predictions were the direction of the mere ownership effect for negative stimuli, which differed between theories, as follows:

**Self-enhancement theory** predicts an overall main effect of ownership on liking, such that owned objects are liked more than non-owned objects, regardless whether those objects are goods or bads. In contrast, the present **self-reference theory** predicts an ownership by stimulus valence interaction, such that the direction of the effect of ownership on liking depends on the stimulus valence. For goods, self-reference predicts that owned goods will be liked more than nonowned goods. For bads, self-reference predicts that owned bads will be liked less than nonowned bads. Hence, self-reference theory predicts a reversal of the mere ownership effect for

bad. **Loss aversion** has no basis to predict any mere ownership effect in the absence of a loss cue. **Query theory** predicts a focus on value increasing aspects (i.e., positive attributes) of the status quo. To the extent that the object itself is the status quo for owners, query theory, like self-enhancement theory, thus predicts a main effect of ownership across both goods and bads, such that owned objects are liked more than non-owned objects.

## Method

### *Participants*

One thousand five hundred seven participants (49% female;  $M_{\text{age}} = 39.21$ ,  $SD = 12.78$ ) completed a preregistered survey posted on Amazon Mechanical Turk. Sample size was determined a priori based on a power analysis employing the effect size found in the pilot study reported above. The following preregistered exclusion criteria were applied to the analyses reported below. Seventy-eight participants were excluded for failing the attention check. An additional nineteen participants were excluded because their valuation responses were uninterpretable (i.e., jumping back and forth from indicating that they would prefer the object vs. the money). Fourteen additional participants were excluded due to failing the Qualtrics recaptcha (score  $< .5$ ), and sixteen additional participants were excluded due to being flagged as fraudulent by Qualtrics (score  $> 50$ ).

### *Procedure*

Participants were randomly assigned between-subjects to be either owners or nonowners. They were also randomly assigned between-subjects to consider either “goods” or “bads.” All participants responded to two dependent variables presented in counterbalanced order: liking ratings and valuations.

Specifically, this Resolution Study was identical to the pilot study run for goods, with three exceptions: First, participants only considered mugs (no pens or highlighters). Second, in addition to the “good” mugs previously tested, I added a “bads” condition with the addition of the following statement, varying depending on ownership condition, “[Your/This] mug has carcinogenic properties.” This text appeared at the end of the introductory prompt. Third, the only other change from the pilot was the following addition to the valuation measure. Broadly, the response scale covered choices in \$0.50 increments from \$0.00 to \$10.00. Because of the negative nature of the bad stimulus attributes, the scale was further supplemented at the lower end to also include \$0.01, \$0.05, \$0.10, \$0.25, and \$0.75. This modification enables the measure to reflect unique reactions that may result from conducting a BDM with negatively valenced stimuli, such as someone who might rather walk away with no money vs. accept a free mug that has negative attributes.

## Results and Discussion

### **Liking Ratings**

Liking ratings were submitted to a 2 (Ownership: owner, nonowner)  $\times$  2 (Stimulus valence: good, bad)  $\times$  2 (DV order: liking first, valuation first) ANOVA with each variable manipulated between-subjects. Most importantly, the analysis revealed a main effect of ownership such that owners ( $M = 2.91$ ,  $SD = 1.71$ ) reported liking the object more than did nonowners ( $M = 2.75$ ,  $SD = 1.62$ ),  $F(1, 1388) = 4.06$ ,  $p = .044$ ,  $\eta_p^2 = .003$ . There was also a main effect of stimulus valence such that goods ( $M = 3.62$ ,  $SD = 1.47$ ) were liked more than bads ( $M = 2.04$ ,  $SD = 1.48$ ),  $F(1, 1338) = 403.113$ ,  $p < .001$ ,  $\eta_p^2 = .232$ . However, the analysis did not reveal the predicted ownership by stimulus valence interaction,  $F(1, 1338) = .069$ ,  $p = .793$ ,  $\eta_p^2 <$

.001. The lack of a significant ownership by stimulus valence interaction indicates that the effect of ownership did not significantly differ across goods vs. bads (see Figure 8).

LIKING AS A FUNCTION OF OWNERSHIP AND STIMULUS VALENCE (RESOLUTION STUDY)

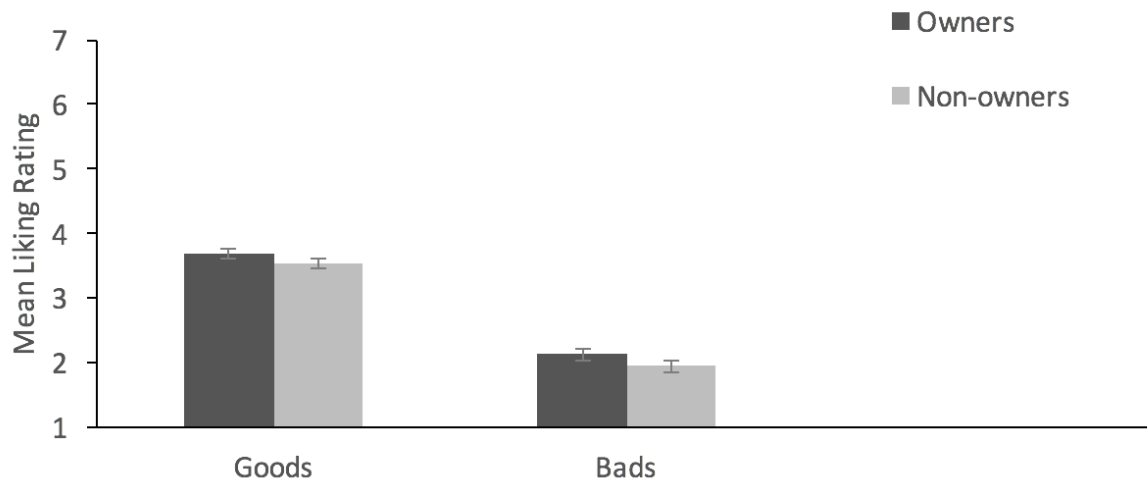


Figure 8. The effect of ownership and stimulus valence (goods vs. bads) on liking ratings in the Resolution Study. Error bars represent  $\pm 1$  SE.

### Exploratory Analyses

Exploratory pairwise comparisons with Bonferroni adjustments revealed that the effect of ownership was directionally consistent with the mere ownership effect observed above, but not significant within both goods,  $F(1,1338) = 1.530$ ,  $p = .216$ ,  $\eta_p^2 = .001$ , and bads  $F(1,1338) = 2.60$ ,  $p = .107$ ,  $\eta_p^2 = .002$ .

Additional analyses revealed a significant main effect of DV order, such that liking ratings measured before valuations ( $M = 3.03$ ,  $SD = 1.74$ ) were significantly higher than liking ratings measured after valuations ( $M = 2.63$ ,  $SD = 1.57$ ),  $F(1, 1338) = 48.89$ ,  $p < .001$ ,  $\eta_p^2 = .017$ . Additionally, there was a significant interaction between stimulus valence and DV order,  $F(1, 1338) = 28.99$ ,  $p < .001$ ,  $\eta_p^2 = .021$ , such that the effect of DV order appeared stronger for goods than for bads. In other words, participants reported liking the object more when liking was



measured before valuations—this was consistent with the pilot study, and especially true for participants evaluating a good (vs. bad) (see Figure 9). Further pairwise comparisons with Bonferroni adjustments revealed that the effect of DV order was significant for goods,  $F(1,1338) = 52.19, p < .001, \eta_p^2 = .038$ , but not significant for bads,  $F(1,1338) = .144, p = .704, \eta_p^2 < .001$ . All other effects were non-significant. Since there was an order effect (main effect and interaction), I also report below on all of the key results instead treating DV order as a covariate.

LIKING AS A FUNCTION OF DV ORDER AND STIMULUS VALENCE (RESOLUTION STUDY)

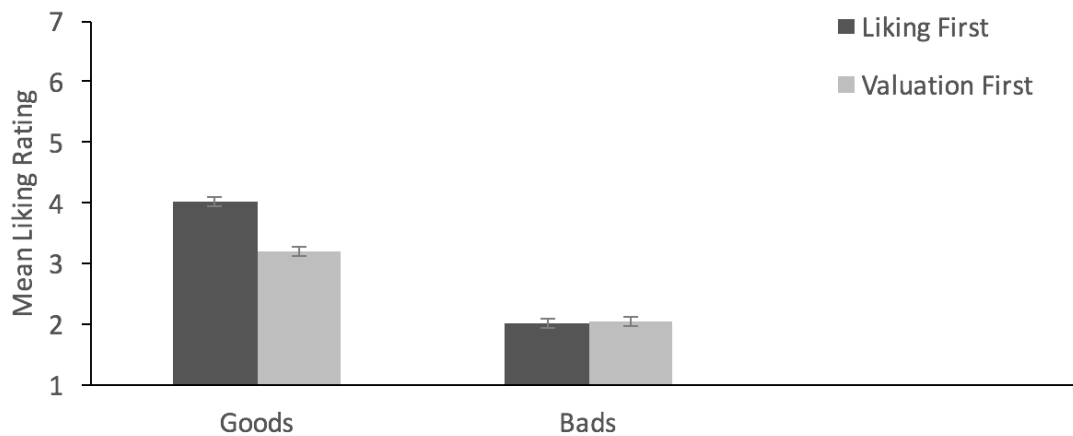


Figure 9. The effect of DV order (liking first vs. valuation first) and stimulus valence (goods vs. bads) on liking ratings in the Resolution Study. Error bars represent  $\pm 1$  SE.

#### ANCOVA including DV Order as a Covariate

A 2 (Ownership: owner, nonowner)  $\times$  2 (Stimulus valence: good, bad) between-subjects ANCOVA with DV Order as a covariate revealed a significant effect of DV order as a covariate,  $F(1, 1341) = 23.097, p < .001, \eta_p^2 = .017$ . More important, there was a significant main effect of ownership,  $F(1, 1341) = 4.071, p = .044, \eta_p^2 = .003$ , such that owners ( $M = 2.91, SD = 1.71$ ) liked the object more than nonowners ( $M = 2.74, SD = 1.62$ ). There was a significant main effect of stimulus valence,  $F(1, 1341) = 393.258, p < .001, \eta_p^2 = .227$ , such that goods ( $M = 3.62, SD =$

1.47) were liked more than bads ( $M = 2.04$ ,  $SD = 1.48$ ). However, there was no significant interaction between ownership and stimulus valence,  $F(1, 1341) = .066$ ,  $p = .797$ ,  $\eta_p^2 < .001$ . Overall, key results were not substantively different treating DV order as a covariate versus a fixed factor (see analyses above).

#### *Results for Subset of Participants – Liking First*

Below I also report the results with the subsample of participants who did the liking measure first (i.e., whose ‘liking’ responses could not have possibly been contaminated by the valuation measure that followed).

A 2 (Ownership: owner, nonowner)  $\times$  2 (Stimulus valence: good, bad) between-subjects ANOVA revealed a main effect of ownership such that objects were liked more when they were owned ( $M = 3.15$ ,  $SD = 1.79$ ), versus nonowned ( $M = 2.90$ ,  $SD = 1.68$ ),  $F(1, 663) = 4.24$ ,  $p = .040$ ,  $\eta_p^2 = .006$ . There was a main effect of stimulus valence such that goods ( $M = 4.02$ ,  $SD = 1.33$ ) were liked more than bads ( $M = 2.02$ ,  $SD = 1.51$ ),  $F(1, 663) = 331.60$ ,  $p < .001$ ,  $\eta_p^2 = .333$ . However, there was no significant ownership by stimulus valence interaction,  $F(1, 663)$ ,  $p = .676$ ,  $\eta_p^2 < .001$ .

#### *Results for Subset of Participants – Liking Second*

A 2 (Ownership: owner, nonowner)  $\times$  2 (Stimulus valence: good, bad) between-subjects ANOVA revealed a main effect of stimulus valence such that goods ( $M = 3.21$ ,  $SD = 1.49$ ) were liked more than bads ( $M = 2.06$ ,  $SD = 1.44$ ),  $F(1, 675) = 105.69$ ,  $p < .001$ ,  $\eta_p^2 = .135$ . There was no significant effect of ownership,  $F(1, 675) = .644$ ,  $p = .423$ ,  $\eta_p^2 = .001$ . There was no

significant interaction between ownership and stimulus valence,  $F(1,675) = .602$ ,  $p = .438$ ,  $\eta_p^2 = .001$ .

Overall, results were similar for participants who saw liking second (versus first), except there was no significant effect of ownership. This result indicates that the effect of ownership on liking only manifested when liking was measured first, before valuations.

### **Valuations**

In order to test whether the data were normally distributed, valuations were submitted to a Shapiro-Wilkes test which indicated a significant deviation from normality,  $W(1346) < .001$ . Valuations were first transformed by adding a constant of 1 (to address zero values) and then underwent a log transformation. Results do not substantively differ with transformed and raw means—the only significant effect was that of stimulus valence,  $F(1, 1338) = 263.66$ ,  $p < .001$ ,  $\eta_p^2 = .165$ , such that goods ( $M = .335$ ,  $SD = .247$ ) were valued more than bads ( $M = .1318$ ,  $SD = .212$ ). For the purpose of clarity, raw means are used in the analyses below.

Reported WTP for the object was submitted to a 2 (Ownership: owner, nonowner)  $\times$  2 (Stimulus valence: good, bad)  $\times$  2 (DV order: liking first, valuation first) ANOVA with each variable manipulated between-subjects. There was a main effect of stimulus valence such that goods ( $M = \$1.58$ ,  $SD = 1.73$ ) were valued more than bads ( $M = $.59$ ,  $SD = 1.26$ ),  $F(1, 1338) = 144.27$ ,  $p < .001$ ,  $\eta_p^2 = .097$ . There was no significant effect of ownership on valuations,  $F(1, 1338) = 1.193$ ,  $p = .275$ ,  $\eta_p^2 = .001$ . Nor was there any significant interaction between ownership and stimulus valence,  $F(1,1338) = .621$ ,  $p = .431$  (see Figure 10).

### Exploratory Analyses

Further exploratory pairwise comparisons with Bonferroni adjustments revealed that there was no significant difference between owned goods and non-owned goods,  $F(1, 1338) = .046, p = .83, \eta_p^2 < .001$ . Nor was there a significant difference between owned bads and non-owned bads,  $F(1, 1338) = 1.773, p = .183, \eta_p^2 = .001$ .

VALUATION AS A FUNCTION OF OWNERSHIP AND STIMULUS VALENCE (RESOLUTION STUDY)

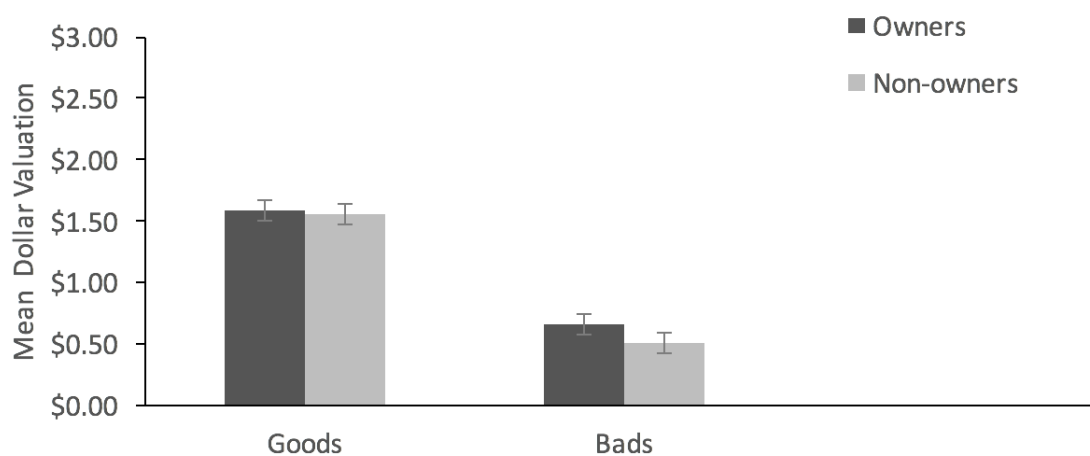


Figure 10. The effect of ownership and stimulus valence (goods vs. bads) on valuations in the Resolution Study. Error bars represent  $\pm 1$  SE.

### Resolution Study Conclusion

Overall, the results of the Resolution Study show a mere ownership effect on liking, across both goods and bads. There was no evidence of the predicted reversal of the mere ownership effect for bads. This pattern is only partially consistent with self-reference theory, which predicts a reversal of the mere ownership effect for bads. The observed pattern is more consistent with self-enhancement theory or query theory, which predict a standard mere ownership effect across goods and bads. Notably, the effect of ownership on liking was not dependent on valuation being measured first before liking. Because the valuation measure itself

implicates loss, this means that loss cues were not necessary to produce an overall mere ownership effect across both goods and bads. The results are thus inconsistent with loss aversion.

There was no effect of ownership on valuations, however, and thus no endowment effect on valuations. For goods, valuations thus failed to replicate the observed endowment effect from the pilot study (described above). The addition of lower values to the response scale (i.e., \$0.01, \$0.05, \$0.10, \$0.25, \$0.75) was the only difference between these experimental paradigms within the goods condition. It is thus possible that the presence of such low values affected responses in a manner which suppressed the effects of ownership.

## Overall Conclusion

In this dissertation, I reviewed evidence of the various instantiations of the endowment effect, as well as evidence for and against leading process theories (i.e., loss aversion, psychological ownership, and biased information processing). I then developed a new *ownership polarization* theory of the endowment effect based on research on self-referential biases. I mapped out the three key propositions of this theory, and subsequently tested this theory empirically over the course of nine main experiments designed to differentiate the present self-reference theory from extant explanations. After reflecting in a General Discussion, I conducted an additional Resolution Study specifically designed to test the replicability of the mere ownership effect. I also was able to test the role of loss cues in mere ownership paradigm (i.e., whether loss is strictly necessary to engender a mere ownership effect). Indeed, I found that loss was not necessary to replicate a mere ownership effect for goods. I found no evidence in the Resolution Study for a reversal of the effect for bads, which may indicate that previous findings (Brenner et al., 2007) are less generalizable than initially presumed.

In the General Discussion of the initial empirical work, I had speculated (based on those mixed results) that the endowment effect might be more likely to arise in the presence of loss cues. The Resolution Study allowed me to test this speculation directly. Specifically, I counterbalanced the order of the two dependent variables: liking and valuation. This allowed me to test whether a mere ownership effect only emerged on liking when liking was measured after valuations (i.e., a loss cue), which would have been evidence that loss might be required to produce the effect. However, there was no such evidence in the Resolution Study. Indeed, the Resolution Study demonstrates the replicability of the mere ownership effect (for goods) in the absence of any loss cue.

The Resolution Study also demonstrates the replicability of the basic mere ownership effect for goods, even in an imagined ownership paradigm. Furthermore, the results suggest that this mere ownership effect is the same across goods and bads. This result for bads is inconsistent with the present self-reference theory, and more consistent with self-enhancement or query theory. A fruitful avenue for future research will be to reconcile conditions under which the endowment effect reverses for bads or not. In particular, the present research has been generative for new ideas about more nuanced patterns at the intersection of self-enhancement and information processing, such as self-threat and mnemonic neglect (see General Discussion for Main Studies).

In terms of interpreting the successful replication of the mere ownership effect in the Resolution Study, there are two features which may be informative. First, the imagined ownership instructions were relatively elaborate compared to the more subtle types of manipulations used in the cognitive psychology (i.e., self-reference) literature. Rather than simply saying “your mug” or even “imagine this is yours,” the ownership condition of the Resolution Study gave participants richer context, asking them to imagine they were given an object as part of an experiment, and would be allowed to keep it. Second, the Resolution Study was well-powered, indicating that larger sample sizes may be needed to study the mere ownership effect than were initially employed in the main studies of the present research.

Although work on the endowment effect generally examines goods, it is clear that throughout our daily lives, we find ourselves associated, to some degree, with negative events and entities, as well as positive. The present research aimed to study people’s evaluations across both goods and bads, and the present research has helped gather initial evidence of the nature of the endowment effect for bads. The effects of ownership (i.e., self-association) on our evaluation

of bads is an important realm of research because it stands to help us more fully comprehend the mechanisms underlying the full range of judgments people make across life's ups and downs.



## PART 3: SUPPLEMENTAL MATERIALS

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## APPENDICES

### Appendix A: Additional Results from Study 1

The results of Study 1 hold if the two dependent variables (liking and valence) are analyzed separately rather than collapsed into a single evaluation measure. Six participants who entered a value over 100 (e.g., 500, 800, 1000) for their age are not included in the age figure so as to avoid skewing the demographics. The direction and significance level of all tests reported do not change if these groups of participants who either failed the attention check or entered an invalid age are included, all  $ps$  remain  $\leq .001$ .

#### *Liking*

There was a main effect of ownership on liking ratings,  $F(1, 200) = 23.97, p < .001, \eta_p^2 = .107$ , such that owners ( $M = 2.30, SD = 1.39$ ) reported liking the object significantly less than non-owners ( $M = 3.45, SD = 1.93$ ). There was no main effect of object,  $F(1, 200) = 1.54, p = .216, \eta_p^2 = .008$ , nor was the interaction between ownership and object significant,  $F(1, 200) = .324, p = .570, \eta_p^2 = .002$ .

#### *Valence*

There was a main effect of ownership on valence ratings,  $F(1, 200) = 12.47, p = .001, \eta_p^2 = .059$  such that owners ( $M = 3.05, SD = 1.52$ ) reported liking the object significantly less than non-owners ( $M = 3.89, SD = 1.88$ ). There was no main effect of object,  $F(1, 200) = .68, p = .411, \eta_p^2 = .003$  nor was the interaction between ownership and object significant,  $F(1, 200) = 1.978, p = .161, \eta_p^2 = .010$ .



### Appendix B: Additional Results from Study 2A

The pattern of results for Study 2A in the supplements category was similar whether looking at the collapsed evaluation measure (as previously reported) or the separate liking and valence measures.

#### *Liking*

For goods, owned supplements ( $M = 5.93$ ,  $SD = 1.05$ ) were liked more than non-owned supplements ( $M = 5.64$ ,  $SD = 1.09$ ),  $t(58) = 2.66$ ,  $p = .010$ .

For bads, owned supplements ( $M = 2.51$ ,  $SD = 1.23$ ) were liked less than non-owned supplements ( $M = 2.74$ ,  $SD = 1.13$ ), however this pattern was only marginally significant  $t(57) = -1.64$ ,  $p = .107$ .

#### *Valence*

For goods, owned supplements were rated higher (i.e., more “good”,  $M = 5.92$ ,  $SD = 1.06$ ) than non-owned supplements ( $M = 5.61$ ,  $SD = 1.13$ ),  $t(58) = -2.68$ ,  $p = .010$ .

For bads, owned supplements were rated lower (i.e., more “bad”,  $M = 2.74$ ,  $SD = 1.13$ ) than non-owned supplements ( $M = 3.09$ ,  $SD = 1.11$ ),  $t(57) = 2.77$ ,  $p = .007$ .

### Appendix C: Private Self-Consciousness Measure (Study 5A; Item 4 Reverse-Coded)

Please be as honest and as accurate as possible when answering these questions. Try not to let your answer to one question influence your answers to other questions. *There are no correct or incorrect answers.*

For each question, please indicate the extent to which each statement is like you by circling a number from 0 to 3.

1. I'm always trying to figure myself out.

0	1	2	3
Not at all like me	A little like me	Somewhat like me	A lot like me

2. I think about myself a lot.

0	1	2	3
Not at all like me	A little like me	Somewhat like me	A lot like me

3. I often daydream about myself.

0	1	2	3
Not at all like me	A little like me	Somewhat like me	A lot like me

4. I never take a hard look at myself.

0	1	2	3
Not at all like me	A little like me	Somewhat like me	A lot like me

5. I generally pay attention to my inner feelings.

0	1	2	3
Not at all like me	A little like me	Somewhat like me	A lot like me

6. I'm constantly thinking about my reason for doing things.

0	1	2	3
Not at all like me	A little like me	Somewhat like me	A lot like me

7. I sometimes step back (in my mind) in order to examine myself from a distance.

0	1	2	3
Not at all like me	A little like me	Somewhat like me	A lot like me

8. I'm quick to notice changes in my mood.

0	1	2	3
Not at all like me	A little like me	Somewhat like me	A lot like me

9. I know the way my mind works when I work through a problem.

0	1	2	3
Not at all like me	A little like me	Somewhat like me	A lot like me

**Appendix D: Study 5B Prompts – Willingness to Trade for a Nutritional Supplement****GOOD/OWN/MEMORY**

Imagine that you need to take a nutritional supplement.

You are given Supplement A. It improves memory.

You can switch to another supplement: Supplement B. It improves digestion and gut health.

To what extent would you be willing to trade your supplement?

**GOOD/OWN/DIGESTION**

Imagine that you need to take a nutritional supplement.

You are given Supplement A. It improves digestion and gut health.

You can switch to another supplement: Supplement B. It improves memory.

To what extent would you be willing to trade your supplement?

**BAD/OWN/HEARTBURN**

Imagine that you need to take a nutritional supplement.

You are given Supplement A. It causes mild heartburn and indigestion as a side effect.

You can switch to another supplement: Supplement B. It causes mild headaches as a side effect.

To what extent would you be willing to trade your supplement?

**BAD/OWN/HEADACHE**

Imagine that you need to take a nutritional supplement.

You are given Supplement A. It causes mild headaches as a side effect.

You can switch to another supplement: Supplement B. It causes mild heartburn and indigestion as a side effect.

To what extent would you be willing to trade your supplement?

**GOOD/CHOOSE/MEMORY**

Imagine that you need to take a nutritional supplement.

You are given the choice between two possible nutritional supplements:

Supplement A: improves memory.

Supplement B: improves digestion and gut health.

To what extent do you prefer one supplement over the other?

### **GOOD/CHOOSE/DIGESTION**

Imagine that you need to take a nutritional supplement.

You are given the choice between two possible nutritional supplements:

Supplement A: improves digestion and gut health.

Supplement B: improves memory.

To what extent do you prefer one supplement over the other?

### **BAD/CHOOSE/HEARTBURN**

Imagine that you need to take a nutritional supplement.

You are given the choice between two possible nutritional supplements:

Supplement A: causes mild heartburn and indigestion as a side effect.

Supplement B: causes mild headaches as a side effect.

To what extent do you prefer one supplement over the other?

### **BAD/CHOOSE/HEADACHE**

Imagine that you need to take a nutritional supplement.

You are given the choice between two possible nutritional supplements:

Supplement A: causes mild headaches as a side effect.

Supplement B: causes mild heartburn and indigestion as a side effect.

To what extent do you prefer one supplement over the other?



## Appendix E: Additional Results from Study 6

### *Liking Ratings*

Liking ratings were submitted to a 2 (stimulus valence: good, bad) by 2 (ownership: owner, non-owner) by 2 (identity-relevance: high, low) between-subjects ANOVA with liking ratings as the outcome measure.

Consistent with a mere ownership effect, there was an overall main effect of ownership on liking, such that owners ( $M = 4.36$ ,  $SD = 1.63$ ) reported liking the object more than nonowners ( $M = 3.84$ ,  $SD = 1.59$ ),  $F(1, 380) = 11.621$ ,  $p = .001$ ,  $\eta_p^2 = .03$ .

Additionally, there was an overall main effect of identity-relevance, such that objects high in identity-relevance ( $M = 4.34$ ,  $SD = 1.75$ ) were liked more than objects low in identity-relevance ( $M = 3.87$ ,  $SD = 1.47$ ),  $F(1, 380) = 10.188$ ,  $p = .002$ ,  $\eta_p^2 = .026$ . There was also an overall main effect of stimulus valence on liking, such that goods ( $M = 4.77$ ,  $SD = 1.28$ ) were liked more than bads ( $M = 3.43$ ,  $SD = 1.67$ ),  $F(1, 380) = 80.558$ ,  $p < .001$ ,  $\eta_p^2 = .175$ .

The three-way interaction between ownership, stimulus valence, and identity relevance was non-significant,  $F(1, 380) = 2.789$ ,  $p = .096$ ,  $\eta_p^2 = .007$ . There were no significant two-way interactions between any combination of the three independent variables (ownership  $\times$  identity-relevance,  $F(1, 380) = .036$ ,  $p = .849$ ,  $\eta_p^2 < .001$ ; ownership  $\times$  stimulus valence,  $F(1, 380) = .437$ ,  $p = .509$ ,  $\eta_p^2 = .001$ ; stimulus valence  $\times$  identity-relevance,  $F < .001$ ,  $p = .983$ ,  $\eta_p^2 < .001$ ).

### *Valence Ratings*

Valence ratings were submitted to a 2 (stimulus valence: good, bad) by 2 (ownership: owner, non-owner) by 2 (identity-relevance: high, low) between-subjects ANOVA with valence rating as the outcome measure.

Consistent with a mere ownership effect, there was an overall main effect of ownership on valence ratings, such that owners ( $M = 4.24$ ,  $SD = 1.77$ ) reported more positive evaluations of the object than nonowners ( $M = 3.86$ ,  $SD = 1.66$ ),  $F(1,380) = 6.295$ ,  $p = .013$ ,  $\eta_p^2 = .016$ .

Additionally, there was an overall main effect of identity-relevance, such that objects high in identity-relevance ( $M = 4.40$ ,  $SD = 1.77$ ) were evaluated more positively than objects low in identity-relevance ( $M = 3.70$ ,  $SD = 1.61$ ),  $F(1,380) = 24.24$ ,  $p < .001$ ,  $\eta_p^2 = .060$ . There was also an overall main effect of stimulus valence on valence rating, such that goods ( $M = 4.95$ ,  $SD = 1.29$ ) were evaluated more positively than bads ( $M = 3.13$ ,  $SD = 1.63$ ),  $F(1, 380) = 161.34$ ,  $p < .001$ ,  $\eta_p^2 = .298$ .

There was a significant two-way interaction between ownership and stimulus valence,  $F(1, 380) = 3.997$ ,  $p = .046$ ,  $\eta_p^2 = .010$ , such that the effect of ownership on valence ratings was stronger for goods than for bads. There was a marginal interaction between stimulus valence and identity-relevance,  $F(1, 380) = 3.414$ ,  $p = .065$ ,  $\eta_p^2 = .009$ , such that the effect of identity relevance on valence ratings was trending in the direction of being stronger for bads than for goods.

There was no significant interaction between ownership and identity-relevance,  $F(1, 380) = .394$ ,  $p = .531$ ,  $\eta_p^2 = .001$ . The three-way interaction between ownership, stimulus valence, and identity relevance was non-significant,  $F(1, 380) = 1.096$ ,  $p = .296$ ,  $\eta_p^2 = .003$ .

## **Appendix F: Additional Methods for Study 7**

The following methodology for analyzing aspect order in Study 7 is adapted directly from the original query theory paper (Johnson, Haubl, & Keinan, 2007, p. 465), with any modifications for the present research paradigm indicated in brackets.

“Because participants listed different numbers of aspects, we tested this prediction by calculating, for each participant, a score that reflects his or her tendency to produce [positive] aspects before [negative] ones. This score, the standardized median rank difference of aspect types (SMRD), is defined as  $[-]2(MR_{[pos]} - MR_{[neg]})/n$ , where  $MR_{[pos]}$  = median rank of [positive] aspects in a participant’s sequence,  $MR_{[neg]}$  = median rank of [negative] aspects in a participant’s sequence, and  $n$  = total number of aspects in a participant’s sequence.”

“Note that for any sequence (of length  $s$ ) in which only one of the two response categories of interest (i.e., [positive] aspects or [negative] aspects) appears, the median rank of the unobserved response category is set to  $s + 1$ , which is a conservative way of representing the low level of accessibility of thoughts of that type. In addition, for the purpose of calculating SMRD score,  $n = s + 1$  for such single category sequences. For sequences that include responses from both categories,  $n = s$ .”