When Possessions Become Part of the Self:

Ownership and Implicit Self-object Linking

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Abstract

Previous research suggests that ownership influences self-perceptions and behaviors. According to dominant theories in this area, a key to understanding the effects of ownership is the mental association between the owner and the owned object. However, little is known about the formation of such associations. Drawing on principles of associative network theories, the present research investigated the effects of two types of ownership situations, mere-ownership and ownership-by-choice, on implicit self-object linking (i.e., the behavior of automatically connecting a person's self and a given object on an implicit measure). In Study 1, mere-ownership influenced implicit self-object linking for positive, but not for negative, objects. In Study 2, ownership of negative objects influenced implicit self-object linking in ownership-by-choice but not mere-ownership situations. Studies 3 to 5 replicated the effect of ownership-by-choice on implicit self-object linking for negative objects and further demonstrated its independence of pre-existing differences in relevant object properties, ownership expectations, and physical ownership. The findings are discussed with reference to existing theories and research on associative representation, decision-making and choice, and the self.

Keywords: association; choice; implicit measures; ownership; self

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Do you remember your experience when you got to own your first toy, your first trophy, or your first house? What did the experience feel like? The psychological experience of ownership has profound implications for human behavior. On one hand, the gain and loss of ownership are realized through behaviors such as working and trading. On the other hand, ownership influences behaviors towards the possessions. For example, people prefer things they own (Beggan, 1992), attribute human characteristics to material objects (Epley, Waytz, & Cacioppo, 2007), develop trust and loyalty to brands (Chaudhuri & Holbrook, 2001), and get emotionally attached to their possessions (Frost & Hartl, 1996).

A long-standing view about ownership is that it constitutes a relation between the owner's self and his or her possessions. William James defined the self as the "sum of things that the person calls his or hers" (James, 1890, p. 291). Social-identity theory (Tajfel & Turner, 1986) and symbolic self-completion theory (Wicklund & Gollwitzer, 1981) propose that objects, such as possessions, contribute to the symbolic definition of a person's identity and the communication of this identity to other people. Research on conspicuous consumption (Pettit & Sivanathan, 2011) suggests that possessions contribute greatly to one's public self-image. Consistent with these views, Belk (1988) argued that a person's possessions should be viewed as extensions of a person's self, as they help the person maintain a sense of continuity and a sense of the past.

Recent developments in implicit social cognition and the prominence of associative network theories in this area (for an overview, see Gawronski & Payne, 2010) provide researchers with a new approach to studying the relation between the owner's self and his or her

possessions. According to this approach, the proposed relation can be understood as a mental association between the owner's self and the owned object in an associative network of social knowledge (Greenwald, Banaji, Rudman, Farham, Nosek, & Mellott, 2002). To the extent that self-object associations are sufficiently strong, they can have automatic effects on behavior, including responses that automatically connect the self and the object on implicit measures (cf. Gawronski & De Houwer, 2014). Following terminological conventions proposed by De Houwer, Gawronski, and Barnes-Holmes (2013), we use the term *implicit self-object linking* to describe the behavioral phenomenon of automatically connecting the self and a given object on an implicit measure, and the term *self-object association* to describe a particular mental construct that is proposed to explain this behavioral phenomenon. From this perspective, ownership may influence implicit self-object linking by forming (or strengthening) a mental association between the owner's self and the owned object.

The main goal of the present research is to (1) examine the effect of ownership on implicit self-object linking and (2) identify its boundary conditions on the basis of principles proposed by associative network theories. By doing so, we hope to achieve a better understanding of the psychological processes and representational structures underlying ownership effects. Toward this end, we will first outline the theoretical framework that guided our research. We will then present five experimental studies, in which we tested key predictions from the theoretical framework. Finally, the findings will be discussed with reference to previous work on the psychology of ownership, the self, and associative network theories of social cognition.

An Associative Approach to Ownership

The idea that ownership leads to a mental association between the owner's self and the owned object was originally proposed by Beggan (1992) in his work on the mere-ownership effect. Across several studies, participants reported enhanced positive evaluations of an object after they received the object as a gift (compared to before they received the object). The term *mere-ownership* was justified by the setting that the objects individuals received were randomly selected from a larger set of similar objects. Similarly, the endowment effect (Kahneman, Knetsch, & Thaler, 1990) shows that the ownership of objects increases the perceived value of the objects for the owners. Similar effects have also been observed on implicit evaluations (Gawronski, Bodenhausen, & Becker, 2007; Huang, Wang, & Shi, 2009).

According to Beggan (1992), the key to understanding the mere-ownership effect is the mental association between the owner's self and the owned object, as it allows the positive post-ownership evaluation of the owned object to transfer to the self, and thereby function as a means of self-enhancement. On a similar note, Greenwald and Banaji (1995) argued that a mental association between a concept and a person's self should allow for the automatic transfer of valence from the concept to the self or from the self to the concept. From this perspective, the mere-ownership effect is an instance of what Greenwald and Banaji called *implicit self-esteem effects*: the automatic transfer of positive valence from the self to a concept associated with the self. Consistent with this notion, Gawronski et al. (2007) found that participants' implicit evaluation of a chosen object, but not that of a rejected object, depended on participants' implicit evaluations of the self. Similar effects have been observed for 5 year-old children (Cvencek, Greenwald, & Meltzoff, 2016) and for the relation between implicit evaluations of the self and implicit evaluations of ingroups (e.g., Roth & Steffens, 2014).

Greenwald et al. (2002) proposed that such mental associations are part of a larger associative network consisting of interconnected conceptual nodes that are centered around a node representing the self (see Figure 1). Associative links allow for automatic spread of activation between nodes, in that the activation of one node automatically leads to the activation of associated nodes. The strength of associations can therefore be understood as the ease with which activation spreads from one node to another. According to this view, the association between the owner's self and the owned object is a specific case of a general type of association between the self and other concepts. To the extent that such mental associations play a key role in other social psychological phenomena, such as self-esteem, group attitudes, and stereotypes (Greenwald et al., 2002), understanding the effects of ownership on the formation of self-object associations is important not only for understanding the psychology of ownership, but also for gaining deeper insights into other key phenomena in social psychology.

A Theory of Self-Object Association

Most existing models of association formation have focused on the effects of repeated co-occurrence between two stimuli as a source of mental associations (e.g., De Houwer, Thomas, & Baeyens, 2001). Ownership, however, goes beyond the co-occurrence of the owner's self and the owned object, in that it involves a meaningful event in which the owner forms a relation with the owned object. Balanced-identity theory (Cvencek, Greenwald, & Meltzoff, 2012; Greenwald et al., 2002) suggests that such events should lead to adaptive changes in people's associative networks in the form of new associations that reflect the experience. Accordingly, newly established ownership should pressure a person's associative network to form a new association between the person's self and the newly owned object.

The theory further suggests that the formation of associations under the pressure of new experience is constrained by two principles of associative networks. The principle of *balance-congruity* states that, if each of two nodes is linked to the same third node, the two nodes have a "shared first-order link" (Greenwald et al., 2002, p. 6), which facilitates the formation of a new association between the two nodes. The principle of *imbalance-dissonance* states that the associative network should resist forming a new association between two nodes, if such an association would result in each of the two nodes being linked to two bipolar-opposed nodes, defined as nodes with "fewer shared first-order links than expected by chance" (Greenwald et al., 2002, p. 6). Examples of bipolar-opposed nodes can be seen in the associative structure depicted in Figure 1, including the nodes representing positive and negative valence and the nodes representing male and female.

On the basis of these two principles, one can predict whether the formation of a new self-object association should be facilitated or inhibited in ownership situations by examining the associative network structure that includes the self, the object, and the third nodes to which the self and the object are associated. In the example here, we use positive and negative valence as the focal bipolar-opposed nodes. Assuming that both the self and the object are associated with positive valence (i.e., a shared first-order link), the balance-congruity principle implies that the formation of a new self-object association should be facilitated. However, if the self is associated with positive valence and the object is associated with negative valence (i.e., links to two bipolar-opposed nodes), the conjunction of the two principles implies that the formation of a new self-object association should be inhibited. If a self-object association would be formed in the latter case, it would lead to (1) an association between the self and negative valence via their shared first-order link to the object, and (2) an association between the object and positive

valence via their shared first-order link to the self. As a result, the self and the object would be associated with both positive and negative valence. Yet, according to the imbalance-dissonance principle, the associative network should resist forming associations with two bipolar opposite nodes.

In the present research, we use the term *self-object congruity* to describe the degree to which the self and the object share common third nodes. The content of these shared nodes may vary widely, including general features (e.g., positive valence) as well as specific features (e.g., fashionable) that are part of the representation of both the object and the self (e.g., a fashionable product for someone who sees herself as fashionable). Correspondingly, we use the term *self-object incongruity* to describe the degree to which the self and the object are each associated with one of two bipolar-opposed nodes, one of which is part of the representation of the object (e.g., a product with an unfashionable design) while the other is part of an individual's self (e.g., someone who sees herself as fashionable). It follows from the above analysis that, whereas higher degrees of self-object congruity should facilitate the formation of self-object association (see Figure 2), higher degrees of self-object incongruity should inhibit the formation of self-object association (see Figure 3).

Ownership Situations

Two common types of ownership situations have been examined in previous research. In *mere-ownership situations* (e.g., Beggan, 1992), ownership results from a factor that is not under the owner's control. In experimental studies, it is typically realized by random procedures, such as the experimenter rolling a dice or flipping a coin, which determine the object to be received by the owners (e.g., as a gift). In what we call *ownership-by-choice situations* (Brehm, 1956; Shultz, Léveillé, & Lepper, 1999; Gawronski et al., 2007; Huang et al., 2009), ownership results from a

factor that is under the owner's control. That is, individuals are allowed to freely choose the object that they would like to own from multiple alternatives. According to research on cognitive dissonance (Brehm, 1956; Festinger, 1957, 1964; for reviews, see Chen & Risen, 2010; Harmon-Jones, Harmon-Jones, Fearn, Sigelman, & Johnson, 2008), individuals with free choice tend to report stronger preferences for chosen over rejected objects after they make their choice, as compared to before they make their choice (i.e. spreading-of-alternatives effect). This effect has also been observed on implicit evaluations and implicit self-object linking (Gawronski et al., 2007).

Previous research (e.g., Brehm, 1956; Huang et al., 2009) has attempted to dissociate the effect of choice and that of ownership and found that choice has a stronger impact on object evaluations than ownership. A potential reason for this is that choice fulfils important psychological functions, such as self-affirmation and self-verification (Huang et al., 2009). Consistent with this view, some researchers (e.g., Chan, Karbowski, Monty, & Perlmuter, 1986; Tafarodi, Mehranvar, Panton, & Milne, 2002) suggested that choice leads to an elevated sense of control, feeling of autonomy, and enhanced levels of engagement.

More important for the present research, choice involves cognitive processing of information about the alternative objects, which may have implications for the formation of self-object associations. Such information processing may occur at two stages. Before the choice, individuals engage in *pre-decision processing*, which involves comparing all choice alternatives along a series of focal aspects and eliminate unfavorable alternatives until there is a favorite option (Tversky, 1972). Consequently, positive features of the favored alternative as well as negative features of the disliked alternatives are made salient. After the choice, individuals tend to show an enhanced preference for chosen over rejected objects even when the available options

have been evaluated equally before the decision (Brehm, 1954; Jecker, 1964; for a review, see Chen & Risen, 2010). Such spreading-of-alternatives effects have been attributed to biased *post-decision processing*, involving a selective focus on positive features of the chosen alternative and negative features of the rejected alternatives in order to reduce post-decisional dissonance (Festinger, 1957, 1964; Harmon-Jones et al., 2008).

To the extent that (1) the desirable features of an object can be viewed as shared nodes between the owner's self and an object and (2) undesirable features of an object can be viewed as opposed nodes to nodes associated with the owner's self, both pre- and post- decision processing should enhance the levels of self-object congruity for the chosen object and self-object incongruity for the rejected object. This should further facilitate the formation of self-object associations for chosen objects as compared to rejected objects in ownership-by-choice situations. However in mere-ownership situations, due to the lack of control over the outcome, the owners are unlikely to engage in any forms of pre-ownership and post-ownership processing that are similar to the pre-decision and post-decision processing discussed above. In this case, the formation of self-object associations should be primarily driven by situational pressure from the experience of mere-ownership.

Object Valence

We further propose that the formation of self-object associations should be constrained by pre-existing object properties involving self-object congruity and incongruity, and more so in the mere-ownership situation than in the ownership-by-choice situation. In the present research, we focused on one of the most basic object properties: *object valence*. To the extent that the self is associated with positive valence (Cvencek, Greenwald, & Meltzoff, 2016; Sedikides, Gaertner, & Cai, 2015; see also Greenwald & Farnham, 2000; Koole, Dijksterhuis, & Van Knippenberg,

2001), objects of positive or negative valence have pre-existing levels of self-object congruity or incongruity, respectively. Thus, in mere-ownership situations, where the formation of self-object associations is constrained by situational pressures, the process should be facilitated for positive objects and inhibited for negative objects. In contrast, in ownership-by-choice situations, where the formation of self-object associations is driven by changes in the levels of self-object congruity due to decision-related information processing, the proposed moderation by object valence should be attenuated or absent.

A review of previous research suggests that little is known about the effect of object valence in ownership. To our knowledge, all studies on mere-ownership effects included objects of either positive valence (e.g., monetary token and coffee mug in Kahneman et al., 1990; chocolate and candy in Huang et al., 2009; pleasant postcards in Gawronski et al., 2007) or neutral valence (e.g., cold drink insulator in Beggan, 1992; colored flags in Cvencek et al., 2016). Similarly, most studies on choice effects included alternatives of positive valence (e.g., consumer electronics in Brehm, 1956; see also Scheibehenne, Greifeneder, & Todd, 2010; Tversky & Kahneman, 1981). The only exception is a study by Shultz et al. (1999), where participants were asked to choose between two posters that were judged as less desirable than average among a total of eight posters. Yet, the alternatives in this study were not unpleasant in absolute terms (see Shultz et al., 1999, Note 5). Thus, little empirical work has been done on the effects of ownership and choice for negative objects, and we aimed to shed light on these issues with the present research.

Overview of Present Research

In sum, we argue that ownership effects are mediated by the formation of a new mental association between the owner's self and the newly owned object. Drawing on two principles of

balanced identity theory (Cvencek et al., 2012; Greenwald et al., 2002), we propose that the formation of self-object associations depends on the levels of self-object congruity and self-object incongruity, which should be determined by pre-existing properties of the object in mere-ownership situations and by choice-related information processing in ownership-by-choice situations. Hence, the formation of self-object associations should be attenuated by pre-existing object properties involving self-object incongruity (e.g., negative valence) in mere-ownership situations, but not in ownership-by-choice situations.

Study 1 tested the prediction that, in mere-ownership situations, ownership effects on implicit self-object linking should occur for positive, but not negative, objects. Studies 2 and 3 tested the prediction that ownership effects on implicit self-object linking should occur for negative objects in ownership-by-choice, but not mere-ownership, situations. In Study 4, we tested the prediction that contextual factors influencing the degrees of pre- and post-decision processing in ownership-by-choice situations should moderate the degree of ownership effects on implicit self-object linking for negative objects. Finally in Study 5, we examined the independent impacts of pre- and post-decision processing on the effects of choice on implicit self-object linking.

Study 1

The main goals of Study 1 were (1) to examine the effect of mere-ownership on implicit self-object linking and (2) to test the predicted moderation by object valence in mere-ownership situations. To provide further evidence for the proposed transfer of valence from the owner's self to the owned object (e.g., Gawronski et al., 2007), we also tested the effect of ownership on implicit evaluations of owned and non-owned objects. Toward this end, participants gained ownership of an object that was randomly selected from two similar alternatives of either

positive or negative valence. Afterwards, participants completed measures of implicit self-object linking with, as well as implicit evaluations of, the owned object and the non-owned object.

Method

Participants and design. A total of 156 participants[1] (124 women, 32 men) from the subject pool of the Department of Psychology at the University of Western Ontario participated for research credit. The study used a 2 (Object Valence: positive vs. negative, between-Ss) × 2 (Object Status: owned vs. non-owned, within-Ss) × 2 (Order of Measures: implicit self-object linking first vs. implicit evaluation first, between-Ss) mixed-model design. Due to a computer malfunction, data from one participant were incomplete.

Materials. The objects used in the present research were postcard-sized (6 cm × 4 cm) prints of pictures. The pictures were selected from the International Affective Picture System (IAPS; Lang, Bradley, & Cuthbert, 2008) based on normative valence ratings provided by a sample that highly resembles the samples in the present research (i.e., university students taking an introductory psychology course). Based on the normative IAPS ratings, which ranged from 1 (*very unpleasant*) to 9 (*very pleasant*), we selected two pictures with mean ratings > 5.0 and two pictures with mean ratings < 5.0 as positive and negative objects, respectively. When selecting these pictures, we took efforts to ensure that the pictures are similar in terms of their content (i.e., animal) and, at the same time, easily distinguishable. Two pictures of wild animals from the species of cats, a picture of a lion (IAPS No. 1720, $M = 6.79$) and a picture of two tigers (IAPS No. 1721, $M = 7.30$), were selected as positive objects. The two pictures selected as the negative

[1] The sample size for each study was based on the availability of participants in the department's subject pool. In all of the five studies, we aimed to recruit as many participants as our resource allowed, with a minimum sample size of at least 30 participants per cell. The data for each study were collected in one shot without prior statistical analyses. We report all data exclusions, all manipulations, and all measures. All materials and data are available from the authors upon request.

objects showed a snake, which we labeled *Snake A* (IAPS No. 1050, $M = 3.46$) and *Snake B* (IAPS No. 1033, $M = 3.87$) for the readers' convenience. Digital image files of the pictures are available in the Supplementary Online Materials.

Ownership manipulation. Participants were told that they would receive a color print of a picture from a "Nature and Wild Life" collection as a special token of appreciation for their participation. They were told that, in a first step, two pictures would be randomly selected from the collection, and in a second step, a computer program would randomly select one of the two pictures. Participants were then presented with either the two positive pictures or the two negative pictures, which were displayed side by side on the computer screen. Participants were asked to press the space bar to start an animated random selection procedure, which involved a yellow frame appearing around one of the two pictures and skipping from one picture to the other several times before slowing down and settling on a picture. The outcome of the selection was displayed for six seconds, after which the two pictures were replaced by the instruction to find the experimenter in an adjacent room. When contacted by a participant, the experimenter returned to the testing room, made a note on which picture was selected, and told the participant that a print of the selected picture was reserved for them for pick-up after completion of the study.

Measures. Implicit self-object linking was measured with a sequential priming task similar to that used in Gawronski et al. (2007); implicit evaluations were measured with an evaluative priming task (Fazio, Jackson, Dunton, & Williams, 1995). The order of the two measures was counter-balanced across participants. Each priming trial consisted of a blank screen (500ms), a fixation cross (200ms), a picture prime (200ms), and a target word that remained on the screen until participants made a categorization response by pressing either a left-

hand key (*A*) or a right-hand key (*Numpad 5*). Both tasks included three pictures as prime stimuli: the two pictures of the ownership manipulation and a neutral grey rectangle. In the measure of implicit self-object linking, the targets included five self-related words (i.e., *self, me, I, mine,* and *my*) and five other-related words (i.e., *other, them, their, they,* and *it*), which had to be categorized as being related to the self or other. Each of the three primes was presented four times with each of the ten target words, summing up to a total of 120 trials. In the measure of implicit evaluation, the targets included 20 positive words (i.e., *paradise, summer, harmony, freedom, honesty, honor, smile, cheer, pleasure, heaven, friend, sunrise, love, relaxation, peace, holiday, rainbow, luck, miracle, diamond*) and 20 negative words (i.e., *evil, sickness, vomit, bomb, murder, abuse, prison, crash, assault, cancer, pain, accident, grief, tragedy, poverty, pollution, virus, disaster, hatred, terror*), which had to be categorized as either positive or negative. Each of the three primes was presented once with each of the 40 target words, summing up to a total of 120 trials.

Procedure. Participants completed the study in small groups of up to five. They were seated in one of five cubicles in a large room and randomly assigned to one of the four experimental conditions defined by Object Valence and Order of Measures. Participants first went through the mere-ownership manipulation, followed by the two priming tasks in counter-balanced orders. Within each of the two Object Valence conditions, half of the participants received one of the two alternative pictures, while the other half received the other picture. At the end of the study, all participants received a color-print of the picture selected for them and were fully debriefed.

Results

Implicit self-object linking. Following the procedure of Gawronski et al. (2007), latencies from incorrect responses (5.1%) were eliminated and outlier latencies higher than 1500ms (2.9% of the correct responses) were truncated. For each participant, the processed response latencies were averaged and coded according to the primes (i.e., owned object, non-owned object, gray rectangle) and targets (i.e., self-related, other-related). Using the trials with the gray rectangle as a baseline, we calculated baseline-corrected priming scores by subtracting the mean latency on trials with a given object prime from the mean latency on trials with the baseline prime. This procedure resulted in four baseline-corrected priming scores: (1) owned-object/self-related, (2) owned-object/other-related, (3) non-owned object/self-related, and (4) non-owned object/other-related. Higher values on these scores indicate facilitated responses to the respective targets as a function of the primes.[2]

The four baseline-corrected priming scores were submitted to a 2 (Prime: owned object vs. non-owned object, within-Ss) × 2 (Target: self vs. other, within-Ss) × 2 (Object Valence: positive vs. negative, between-Ss) × 2 (Order of Measures: implicit self-object linking first vs. implicit evaluation first, between-Ss) mixed-model analysis of variance (ANOVA), which revealed a marginally significant three-way interaction of Prime, Target, and Object Valence, $F(1, 151) = 3.48$, $p = .064$, $\eta_p^2 = .023$. All other effects were non-significant and irrelevant to our hypotheses, all $F \leq 2.64$, $p \geq .11$, $\eta_p^2 \leq .017$.

To specify this three-way interaction, the four priming scores were further reduced to two indices of implicit self-object linking, one for the owned object and one for the non-owned object.

[2] Analyses using natural-log-transformed response latencies produced similar results for implicit self-object linking and implicit evaluations. For the sake of consistency between reported means and the actual analyses, we report the results of the analyses using untransformed latencies. Preliminary analyses revealed that the results were not affected by the specific object participants received.

Scores of implicit self-object linking were calculated by subtracting the priming scores for other-related target words from the priming scores for self-related target words given a particular prime. Thus, higher scores indicate higher levels of implicit self-object linking. The two indices were submitted to a 2 (Object Status: owned vs. non-owned, within-Ss) × 2 (Objects Valence: positive vs. negative, between-Ss) × 2 (Order of Measures: implicit self-object linking first vs. implicit evaluation first, between-Ss) mixed-model ANOVA, which revealed a marginally significant two-way interaction between Object Status and Object Valence (see Figure 4, left panel), equivalent to the three-way interaction reported above. Tests of simple effects of Object Status at each level of Objects Valence revealed an effect of ownership on implicit self-object linking for positive objects, but not for negative objects. Specifically, for positive objects, scores of implicit self-object linking were significantly larger for the owned object (M = 13.18) than for the non-owned object (M = -9.89), $F(1,151) = 6.06$, $p = .015$, $\eta_p^2 = .039$. For negative objects, scores of implicit self-object linking were not significantly different for the owned object (M = 2.57) and the non-owned object (M = 4.16), $F(1,151) = 0.029$, $p = .86$, $\eta_p^2 < .001$.

Implicit evaluation. The evaluative priming data were processed following the same procedure for the implicit self-object linking measure. Response latencies from incorrect responses (3.2%) were eliminated and outlier latencies higher than 1500ms (2.6% of the correct responses) were truncated. Using the trials with the gray rectangle as a baseline, four baseline-corrected priming scores were obtained: (1) owned-object/positive, (2) owned-object/negative, (3) non-owned object/positive, and (4) non-owned object/negative. Higher values on these scores indicate facilitated responses to the respective targets as a function of the primes. The four priming scores were submitted to a 2 (Prime: owned object vs. non-owned object, within-Ss) × 2 (Target: positive words vs. negative words, within-Ss) × 2 (Objects Valence: positive vs.

negative, between-Ss) × 2 (Order of Measures: implicit self-object linking first vs. implicit evaluation first, between-Ss) mixed-model ANOVA, which revealed a significant three-way interaction between Prime, Target, and Object Valence, $F(1, 151) = 5.49$, $p = .020$, $\eta_p^2 = .035$. All other effects were non-significant and irrelevant to our hypotheses, all $F \leq 2.61$, $p \geq .11$, $\eta_p^2 \leq .017$.

To specify this three-way interaction, the four priming scores were reduced to two indices of implicit evaluation: one for the owned object and one for the non-owned object. Scores of implicit evaluation were calculated by subtracting the priming scores for negative target words from the priming scores for positive target words given a particular prime. Thus, higher scores indicate more favorable implicit evaluations. The two indices were submitted to a 2 (Object Status: owned vs. non-owned, within-Ss) × 2 (Object Valence: positive vs. negative, between-Ss) × 2 (Order of Measurement: affective priming first vs. sequential priming first, between-Ss) mixed-model ANOVA, which revealed a significant two-way interaction between Object Status and Object Valence (see Figure 4, right panel), equivalent to the three-way interaction reported above. Tests of simple effects of Object Status at different levels of Objects Valence revealed an effect of ownership on implicit evaluations for positive objects, but not for negative objects. For positive objects, implicit evaluations were significantly more favorable for the owned object ($M = 8.41$) than the non-owned object ($M = -10.22$), $F(1,151) = 4.09$, $p = .045$, $\eta_p^2 = .026$. For negative objects, implicit evaluations did not significantly differ for the owned object ($M = -8.00$) and non-owned object ($M = 3.80$), $F(1,151) = 1.66$, $p = .20$, $\eta_p^2 = .011$.

Discussion

As predicted, ownership influenced implicit self-object linking for positive objects, but not for negative objects. The obtained effects for positive objects are consistent with the notion

that pre-existing self-object congruity, induced by positive valence shared by the owner's self and the owned object, facilitates the formation of a mental association between the owner's self and the owned object. Moreover, the absence of ownership effects for negative objects is consistent with the notion that pre-existing self-object incongruity, induced by positive valence associated with the self and negative valence associated with the owned object, inhibits the formation of a mental association between the owner's self and the owned object.

A similar pattern emerged for implicit evaluations, which showed more favorable responses to owned compared to non-owned objects when the objects were positive, but not when they were negative. Together with the obtained effects on implicit self-object linking, these findings are consistent with the proposed transfer of valence from the self to the owned object through the newly created association between the owner's self and the owned object (Gawronski et al., 2007; Greenwald & Banaji, 1995).

In addition to offering deeper insights into the mental underpinnings of mere ownership effects, the present findings provide supporting evidence for the two principles proposed by balanced-identity theory, especially the previously untested principle of imbalance-dissonance (Cvencek et al., 2012; Greenwald et al., 2002). The findings also suggest an important boundary condition of the mere-ownership effect (Beggan, 1992): the effect may hold only when the relevant objects are of positive valence but not when they are of negative valence.[3] Thus, an interesting follow-up question is whether there are conditions under which ownership can

[3] A potential concern is that the two objects in the positive condition were more dissimilar to each other (i.e., picture of a tiger vs. picture of a lion) than the two objects in the negative condition (i.e., two pictures of a snake). Hence, the obtained effects might be due to differences in the ease of distinguishing between the two alternative objects rather than their different valence. In response to this concern, it is worth noting that the results in the positive condition replicated earlier findings by Gawronski et al. (2007), who used two positive images of highly similar content (i.e., two pictures of a desert landscape) in a mere-ownership situation. Moreover, Studies 2-5 of the current research showed meaningful ownership-by-choice effects for the two negative objects, effectively ruling out alternative interpretations in terms of differential similarity.

influence implicit self-object linking for negative objects. This question was addressed in Study 2.

Study 2

According to our theoretical framework, it is important to distinguish between two different types of ownership situations: mere-ownership and ownership-by-choice. In mere-ownership situations, self-object association formation is mainly driven by pressure from the situation. In ownership-by-choice situations, decision-related processing should enhance self-object congruity for the chosen object and self-object incongruity for the rejected object, and thereby facilitate the formation of self-object associations for owned objects. Hence, ownership effects should be constrained by pre-existing self-object incongruity (e.g., negative valence) in mere-ownership, but not ownership-by-choice, situations.

The main goal of Study 2 was to test this hypothesis. Toward this end, we compared the effects of ownership of a negative object on implicit self-object linking in mere-ownership and ownership-by-choice situations. We predicted that, for negative objects, ownership should influence implicit self-object linking in ownership-by-choice situations but not in mere-ownership situations. To test this prediction, participants either received a negative object that was selected randomly from a set of two negative objects (mere-ownership) or were free to choose a negative object from the same set of negative objects (ownership-by-choice). Afterwards, all participants completed a measure of implicit self-object linking.[4]

[4] To reduce the complexity of the design, the measure of implicit evaluation was dropped from Study 2 for practical reasons.

Method

Participants and design. A total of 100 participants (65 women, 35 men) were recruited through posters on campus and the summer subject pool mailing list of the Department of Psychology at the University of Western Ontario. Participants received CAD-$10 as a compensation for the completion of a one-hour battery that included two unrelated studies and this study as the third component. The study used a 2 (Ownership Situation: mere-ownership vs. ownership-by-choice, between-Ss) × 2 (Object Status: owned vs. non-owned, within-Ss) mixed-model design. Data from one participant were lost due to a computer malfunction.

Ownership manipulations. As in Study 1, participants were told that they were going to receive a color print of a picture from the "Nature and Wild Life" collection as a special token of appreciation. Participants in both experimental conditions were informed that, as the first step, two alternative pictures would be randomly selected from the collection. In the mere-ownership condition, participants were told that the picture they were about to receive would be selected randomly from the two alternative pictures by a computer program. In the ownership-by-choice condition, participants were told that they could choose the picture that they personally prefer.

In both conditions, participants were then presented with the two snake pictures from Study 1. In the mere-ownership condition, participants were told to press the space bar to start the random selection animation as in Study 1. In the ownership-by-choice condition, participants were told to take a careful look at the two pictures and think about which one they prefer. After 20 seconds, they were told to press either *Numpad 1* or *Numpad 2* on the keyboard to choose the picture on the left or right, respectively. The left-right positions of the two pictures on the screen were counter-balanced across participants. After participants in the ownership-by-choice condition had made their decision, a yellow frame appeared around the chosen picture. In both

conditions, participants were asked to find the experimenter after the selected picture was determined. When contacted by the participant, the experimenter returned to the testing room, made a note on which picture was selected, and told the participant that a print of the selected picture was reserved for them for pick-up after completion of the study.

Measures. In Study 2, we adopted the implicit association test (IAT, Greenwald, McGhee, & Schwartz, 1998) as a measure of implicit self-object linking. This decision was based on the need for a measure that has been shown to be more reliable than the priming tasks in Study 1 (see Gawronski & De Houwer, 2014). Although the IAT does not permit a calculation of separate scores for owned and non-owned objects, its relative nature fits well with a conceptualization of ownership effects as the difference between implicit self-object linking for the owned object as compared to the non-owned object (cf. Greenwald et al., 1998).

In this study, the IAT was introduced as a "quick categorization task." Participants were asked to categorize pictures and words by pressing either a left-hand key (*A*) or a right-hand key (*Numpad 5*). In line with the standard protocol, the IAT consisted of five blocks. Following procedures by Steffens, Kirschbaum, and Glados (2008), we used the two snake pictures as the target categories as well as the target stimuli, which has been shown to reduce the impact of stimulus confounds and increase the validity of the measure. The first block consisted of 20 trials, in which participants were asked to categorize the pictures of Snake A and Snake B (*initial target-concept discrimination task*). The particular key assignment for the two images was indicated by small icons of Snake A and Snake B at the top-left and the top-right corners, respectively. The same two pictures in formats of approximately 400 pixel × 300 pixel were used as targets, each being displayed in the center of the screen on 10 of the 20 trials. The second block consisted of 20 trials, in which participants were asked to categorize ten words as related

to “self” or “other” (*attribute discrimination task*). Five words related to self (i.e., *self, me, I, mine, my*) and five words related to other (i.e., *other, them, their, they, it*) were displayed in the center of the screen, each on two trials. Participants were asked to press a left-hand key (*A*) for self-related words and a right-hand key (*Numpad 5*) for other-related words. The third block consisted of 60 trials in two sub-blocks, one of 20 trials and one of 40 trials, with *Self or Snake A* as the left-hand category and *Other or Snake B* as the right-hand category (*initial combined task*). The targets were the two snake pictures (each on 15 trials) and the ten target words (each on three trials) from the previous two blocks, presented in random order. The fourth block consisted of 20 trials, in which participants were asked to categorize the pictures of Snake A and Snake B with a reversed key assignment (*reversed target-concept discrimination task*). The fifth block consisted of 60 trials in two sub-blocks, one of 20 trials and one of 40 trials, with *Self or Snake B* as the left-hand category and *Other or Snake A* as the right-hand category (*reversed combined task*). The order of the five blocks was held constant for all participants to reduce systematic error variance, which can reduce statistical power to detect existing effects (see Gawronski, Deutsch, & Banse, 2011). Participants were told to respond as quickly as possible without making too many errors. Whenever an incorrect response was made, the word *Error* was displayed in center of the screen for 1000ms before the next trial.

Procedure. The study was run in small groups of up to five. Participants were seated in one of five cubicles in a large room and randomly assigned to one of the two conditions of Ownership Situation. Participants first completed the ownership task, followed by the IAT. In the mere-ownership condition, half of the participants received the picture of Snake A, and the other half received the picture of Snake B. In the ownership-by-choice condition, the picture

participants received was determined by their own choice. At the end of study, all participants received a color-print of the selected picture and were fully debriefed.

Results

Consistent with the presumed equivalence of the two objects, 24 of the 50 participants in the ownership-by-choice condition chose the picture of Snake A; 26 participants chose the picture of Snake B. The response latency data from the IAT were aggregated with the D-600 algorithm (Greenwald, Nosek, & Banaji, 2003), which is the recommended scoring procedure for IAT's in which participants proceed to the next stimulus following an incorrect response without having to provide the correct response (Lane, Banaji, Nosek, & Greenwald, 2007). No participant showed latencies faster than 300ms on 10% or more of the trials in the two combined blocks (cf. Greenwald et al., 2003). Using each participants' selection outcome as a reference, IAT scores were calculated such that higher scores indicate stronger implicit self-object linking for the owned object compared to the non-owned object. To estimate the reliability of the measure, we calculated two IAT scores for each participant using the two sub-blocks of the combined blocks (i.e., the third and the fifth block). Our analysis revealed a Cronbach's α of .69 for combining the two IAT scores in a single score.

Because the display position of two pictures during the ownership and choice procedure did not influence the results, this variable was not included in the following analyses. Submitted to a 2 (Ownership Situation, mere-ownership vs. ownership-by-choice, between-Ss) × 2 (IAT Block Order: the owned object mapped with "self" in the first combined block vs. the owned object mapped with "self" in the second combined block, between-Ss) mixed-model ANOVA, the IAT scores revealed a significant main effect of IAT Block Order, $F(1, 95) = 53.82$, $p < .001$, $\eta_p^2 = .36$, replicating the well-documented order effect of shorter response latencies in the first

combined block than in the second combined block (Nosek, Greenwald, & Banaji, 2005).[5] More importantly, the analysis also revealed a significant main effect of Ownership Situation, $F(1, 95) = 5.86$, $p = .017$, $\eta_p^2 = .058$, indicating a stronger effect of ownership on implicit self-object linking in the ownership-by-choice condition than in the mere-ownership condition (see Figure 5). The 2-way interaction between IAT Block Order and Ownership Situation was non-significant, $F(1, 95) = 0.30$, $p = .58$, $\eta_p^2 = .003$. Further analyses revealed that IAT scores of ownership effects were significantly larger than zero in the ownership-by-choice condition, $M = 0.29$, $t(49) = 4.42$, $p < .001$, 95% C.I. [0.16, 0.42], but not in the mere-ownership condition, $M = 0.064$, $t(48) = 0.97$, $p = .34$, 95% C.I. [-0.07, 0.20].

Discussion

As predicted, Study 2 found that the ownership of a negative object influenced implicit self-object linking in ownership-by-choice, but not in mere-ownership, situations. This finding is consistent with our theoretical framework. In ownership-by-choice situations, decision-related processing of object information is assumed to increase self-object congruity for the chosen object and self-object incongruity for the rejected object. This process should attenuate the moderating effect of pre-existing object properties (e.g., negative valence) on the effects of ownership on implicit self-object linking, as obtained in the current study.

Although the findings are consistent with our prediction, an alternative interpretation is that the effects are due to pre-existing differences between the chosen object and rejected object, rather than induced changes, in self-object congruity (see Chen & Risen, 2010, for a thorough

[5] For those who owned the picture of Snake A during the choice task, the owned object is mapped with "self*"* as one set of combined categories in the first combined block and with other in the second combined block (vice versa for those who owned the picture of Snake B). By keeping the block order in the IAT constant, the obtained block order effect is counterbalanced in the unweighted group means of the IAT index, because some participants owned the picture of Snake A while others owned the picture of Snake B.

analysis of this issue). Specifically, it is possible that participants simply chose the picture that had a higher level of pre-existing self-object congruity instead of increasing the level of self-object congruity through decision-related processing. For positive objects, this alternative interpretation has been ruled out by Gawronski et al. (2007, Experiment 2), who found a significant difference in implicit self-object linking for chosen and rejected objects only after, but not before, participants made their choice. Yet, it is still unclear if these effects generalize to negative objects. Study 3 aimed to address this concern.

Study 3

The main goal of Study 3 was to test whether the ownership effect observed in Study 2's ownership-by-choice condition indeed reflects a causal effect of choice or a methodological artifact caused by pre-existing differences between the chosen and rejected objects in self-object congruity (Chen & Risen, 2010). Toward this end, we adopted a pre-post design (Gawronski et al., 2007), in which implicit self-object linking was measured either before or after the choice task. If the findings of Study 2 were caused by the choice, implicit self-object linking should show an ownership effect only when it is measured after the choice task (*post-choice*) but not when it is measured before the task (*pre-choice*). If, however, the findings of Study 2 reflect pre-existing differences is self-object congruity, implicit self-object linking should show an ownership effect both before and after the choice task.

Method

Participants and design. A total of 90 participants (50 women, 38 men, 2 unspecified) from the subject pool of the Department of Psychology at the University of Western Ontario participated for research credit. Data from three participants were lost due to a computer

malfunction. The study used a 2 (Time of Measurement, pre-choice vs. post-choice, between-Ss) × 2 (Object Status: owned vs. non-owned, within-Ss) mixed-model design.[6]

Procedure. In the pre-choice condition, participants first completed the measure of implicit self-object linking and then the same choice task as in Study 2. In the post-choice condition, participants first completed the choice task and then the measure of implicit self-object linking. The two negative snake pictures from previous studies were included as choice alternatives, with their positions in the choice task being counterbalanced across participants. All measures, materials, and procedures were identical to Study 2.

Results

In the pre-choice condition, 20 participants chose the picture of Snake A and 24 chose the picture of Snake B. In the post-choice condition, 21 participants chose the picture of Snake A and 21 chose the picture of Snake B. As in Study 2, the IAT data were aggregated with the D-600 algorithm (Greenwald et al., 2003). No participant showed latencies faster than 300ms on 10% or more of the trials in the two combined blocks (cf. Greenwald et al., 2003). IAT scores (Cronbach's $\alpha = 71$, estimated using the same procedure as in Study 2) were coded according to each participant's choice outcome, such that higher scores indicate stronger implicit self-object linking for the owned compared to the non-owned object.

As the display position of the two pictures during the choice task did not influence the results, this variable was not included in the following analyses. Submitted to a 2 (Time of Measurement, pre-choice vs. post-choice, between Ss) × 2 (IAT Block Order: the chosen object mapped with "self" in the first combined block vs. the chosen object mapped with "self" in the

[6] Time of Measurement was manipulated between-subjects instead of within-subjects due to the concern that repeated administrations of the IAT within the same session might attenuate the magnitude of the effect (see Nosek, Greenwald, & Banaji, 2007).

second combined block, between Ss) ANOVA, IAT scores revealed a significant effect of IAT Block Order similar to the one obtained in Study 2, $F(1, 83) = 59.90$, $p < .001$, $\eta_p^2 = .42$. More importantly, a significant main effect of Time of Measurement indicated that IAT scores of ownership effects were larger in the post-choice condition than in the pre-choice condition, $F(1, 83) = 4.58$, $p = .035$, $\eta_p^2 = .052$ (see Figure 6). The two-way interaction between Time of Measurement and IAT Block Order was non-significant, $F(1, 83) = 0.48$, $p = .49$, $\eta_p^2 = .006$. Follow-up analyses revealed that the mean ownership effect was significantly different from zero in the post-choice condition, $M = 0.17$, $t(42) = 3.09$, $p = .004$, 95% C.I. [0.06, 0.28], but not in the pre-choice condition, $M = 0.006$, $t(43) = 1.11$, $p = .27$, 95% C.I. [-0.10, 0.11].

Discussion

Ruling out pre-existing differences in self-object congruity as an alternative explanation for the findings of Study 2, Study 3 found a significant ownership effect on implicit self-object linking only after, but not before, participants went through the choice task. The findings support the hypothesis that choice effects on implicit self-object linking in ownership-by-choice situations are caused by choice-related processes (e.g., decision-related information processing) rather than pre-existing differences in self-object congruity between the chosen and rejected objects. In Study 4, we further investigated this hypothesis by exploring the impact of contextual factors that presumably influence the degree of decision-related processing.

Study 4

The findings of Studies 2 and 3 provide evidence for a causal effect of choice on the formation of self-object associations with objects of negative valence. In the following two studies, we aimed to further investigate the psychological processes underlying this effect. As we proposed in our theoretical framework, the obtained choice effects may be driven by enhanced

self-object congruity with chosen objects and self-object incongruity with rejected objects as a result of pre- and post-decision processing. Following this reasoning, enhanced levels of pre- and post-decision processing should result in higher levels of self-object congruity for the chosen object and self-object incongruity for the rejected object, resulting in stronger self-object associations for the chosen object than for the rejected object.

The main goal of Study 4 was to examine the effects of two contextual factors that may influence the degree of decision-related information processing: expectation of ownership before the decision (*ownership expectation*) and physical ownership of the chosen object after the decision (*physical ownership*). We argue that the two factors may influence the degree of decision-related information processing by increasing the self-relevance of the decision, that is, the extent to which the outcomes are personally relevant to the individual (Gendolla, 1999; Schmitz & Johnson, 2007). To the extent that pre-decision expectation of ownership and post-decision physical ownership increases the levels of self-relevance before or after the decision, and to the extent that increased levels of self-relevance lead to higher levels of pre- and post-decision information processing, both factors should enhance ownership effects on implicit self-object linking. To allow for comparison of the present findings with those from classic dissonance research on the effects of free choice on explicit evaluations (e.g., Brehm, 1956; Harmon-Jones et al., 2008; Jecker, 1964), the current study also included a measure of explicit evaluations.

Method

Participants and design. A total of 154 participants (105 women, 43 men, 6 unspecified) from the subject pool of the University of Western Ontario participated for research credit. The study adopted a 2 (Ownership Expectation: with vs. without, between-Ss) × 2 (Physical

Ownership: with vs. without, between-Ss) × 2 (Object Status: owned vs. non-owned, within-Ss) mixed-model design. Due to program malfunctions, five participants did not complete the measure of implicit self-object linking, resulting in an effective sample size of 149.

Ownership expectation. At the beginning of the choice task, participants in the *with-ownership-expectation* condition were told that they would receive a gift as a special token of appreciation; participants in the *without-ownership-expectation* condition were told to evaluate two pictures and indicate which one they personally prefer. As in Studies 2 and 3, all participants then went through the same choice task with the two negative snake pictures as the choice alternatives. When the two pictures were displayed on the screen, those in the with-ownership-expectation condition were asked which one they prefer and would like to receive as a gift, while those in the without-ownership-expectation condition were simply asked to think about the pictures and indicate which one they prefer. After participants indicated their preferences, those in the without-ownership-expectation condition were then informed that they would actually receive a print of the picture they had chosen as a special token of appreciation. Participants in both conditions were then instructed to find the experimenter in an adjacent room.

Physical ownership. When contacted by the participants, the experimenter returned to the testing room, bringing a color-print of each picture. In the *with-physical-ownership* condition, the experimenter asked the participant which one they had chosen and then gave a color-print of the chosen picture to the participant. Participants were asked to put the picture either into their bags or on the computer desk with the picture side facing downwards. In the *without-physical-ownership* condition, the experimenter told the participant that a print of the picture they had chosen would be reserved so that they could get it at the end of the study.

Measures. To measure implicit self-object linking, we used the same IAT that was used in Studies 2 and 3. Explicit evaluations were measured with six-point semantic differentials, using the attribute pairs attractive-unattractive, pleasant-unpleasant, and terrible-great.

Procedure. The study was run as the first component of a three-part battery that included this study and two unrelated components. Participants were randomly assigned to one of the four between-subjects conditions defined by Ownership Expectation and Physical Ownership. Participants first completed the choice task and then the IAT, followed by the explicit evaluation measure. At the end of the study, all participants were fully debriefed. Participants in all conditions received a print of the chosen picture.

Results

Choices. Overall, the numbers of participants who chose the picture of Snake A (Snake B) are, respectively, 69 (80) in the entire sample, which broke down to 18 (19) in the condition with ownership expectation and physical ownership, 22 (19) in the condition with ownership expectation and without physical ownership, 12 (24) in the condition without ownership expectation and with physical ownership, and 17 (18) in the condition without ownership expectation and without physical ownership.[7]

Implicit self-object linking. No participant showed latencies faster than 300ms on 10% or more of the trials in the two combined blocks (cf. Greenwald et al., 2003). IAT scores of ownership effects on implicit self-object linking were calculated in the same way as in previous studies (Cronbach's $\alpha = .63$, estimated using the same procedure as in Study 2). Preliminary analyses indicated that the position of the two pictures did not influence any of the results and

[7] The ANOVA in the present study was performed with Model 1 sum of squares, which is based on unweighted cell means. This procedure eliminates effects of unequal numbers of observations per cell on the results.

was therefore not included in the analyses below. Submitted to a 2 (Ownership Expectation, with vs. without, between Ss) × 2 (Physical Ownership, with vs. without, between Ss) × 2 (IAT Block Order: the chosen object mapped with "self" in the first combined block vs. the chosen object paired mapped with "self" in the second combined block, between Ss) ANOVA, IAT scores yielded a significant effect of IAT Block Order effect similar to the one obtained in previous studies, $F(1, 141) = 84.25$, $p < .001$, $\eta_p^2 = .37$. Counter to our predictions, there was no significant main effect of Ownership Expectation, $F(1, 141) = 1.00$, $p = .32$, $\eta_p^2 = .007$, no significant main effect of Physical Ownership, $F(1, 141) = 0.004$, $p = .95$, $\eta_p^2 < .001$, and no significant interaction between the two factors, $F(1, 141) = 0.88$, $p = .35$, $\eta_p^2 = .006$. The means and standard deviations for this analysis are shown in Table 1.

Follow-up analyses revealed that IAT scores of ownership effects were significantly different from zero in the full sample ($M = 0.20$, $SD = 0.38$), $t(148) = 6.36$, $p < .001$, 95% C.I. [0.14, 0.26], and in each of the four experimental conditions: in the condition with ownership expectation and with physical ownership, $M = 0.26$, $t(36) = 4.12$, $p < .001$, 95% C.I. [0.13, 0.38]; in the condition with ownership expectation and without physical ownership, $M = 0.20$, $t(40) = 3.40$, $p = .002$, 95% C.I. [0.08, 0.32]; in the condition without ownership expectation and with physical ownership, $M = 0.13$, $t(35) = 1.99$, $p = .04$, 95% C.I. [.005, 0.26]; and in the condition without ownership expectation and without physical ownership, $M = 0.20$, $t(34) = 3.08$, $p = .004$, 95% C.I. [0.07, 0.33]. All four group means were in the expected direction, indicating stronger levels of implicit self-object linking for the chosen object compared with the rejected object.

Explicit evaluations. Of the 149 participants included in the analyses for implicit self-object linking, five participants had missing data in the measure of explicit evaluations due to program malfunctions. The Cronbach's αs were .82 for the three items about Snake A and .86 for

the three items about Snake B. Two explicit evaluation indices, one for the chosen object and one for the rejected object, were calculated by averaging the three items for each picture and recoding the resulting scores according to each participant's choice outcome. Preliminary analyses indicated that the position of the two pictures did not influence any of the results and was therefore not included in the analyses reported. Submitted to a 2 (Ownership Expectation, with vs. without, between Ss) × 2 (Physical Ownership, with vs. without, between Ss) × 2 (Object Status, chosen vs. rejected, within Ss) mixed-model ANOVA, explicit evaluation scores yielded a significant main effect of Object Status, $F(1, 136) = 116.04$, $p < .001$, $\eta_p^2 = .46$, and a significant two-way interaction between Object Status and Physical Ownership, $F(1, 136) = 9.70$, $p = .002$, $\eta_p^2 = .067$. All other effects were non-significant, all $F \leq 1.76$, $p \geq .19$, $\eta_p^2 \leq .013$.

The means for the two-way interaction between Object Status and Physical Ownership are depicted in Figure 7. Tests of simple effects indicated that, in the with-physical-ownership condition, explicit evaluations of the chosen object ($M = 3.67$) were significantly more favorable than explicit evaluations of the rejected object ($M = 2.53$), $F(1, 136) = 93.57$, $p < .001$, $d = 0.90$. In the without-physical-ownership condition, explicit evaluations of the chosen object ($M = 3.51$) were also significantly more favorable than explicit evaluations of the rejected object ($M = 2.88$), $F(1, 136) = 30.25$, $p < .001$, $d = 0.51$, but the effect size of this difference was substantially smaller compared to the with-physical-ownership condition. Thus, ownership effects on explicit evaluations were larger in the with-physical-ownership condition than in the without-physical-ownership condition.

Discussion

Counter to the predictions that pre-decision ownership expectation and post-decision physical ownership should lead to larger ownership effects on implicit self-object linking, Study

4 revealed similar levels of ownership effects on implicit self-object linking regardless of whether participants did or did not expect ownership prior to their choice, and regardless of whether participants did or did not physically own the chose object at the time of measurement.

Interestingly, explicit evaluations showed a stronger ownership effect when participants had physical ownership than when they did not. The differential effect of physical ownership on explicit evaluations and implicit self-object linking suggests that explicit evaluations are influenced by factors that go beyond the associative transfer of valence from the self to owned objects. Consistent with the notion of post-decisional dissonance (Brehm, 1956; Festinger, 1957, 1964), it is possible that physical ownership enhanced participants' motivation to justify their choice. Such motivated rationalization may influence explicit evaluations without affecting the strength of self-object associations. Although this pattern conflicts with our predictions, it is consistent with earlier findings by Gawronski and Strack (2004) showing that cognitive dissonance influences explicit, but not implicit, evaluations (see also Wilson, Lindsey, & Schooler, 2000). Nevertheless, the current study revealed consistent ownership effects on implicit self-object linking, suggesting that pre-decision processing played a central role for the obtained effects. Together, these findings indicate that pre-decision processing might have a stronger impact on the formation of self-object associations than post-decision processing.

Also contrary to our predictions, ownership expectation had no effect on implicit self-object linking as well as explicit evaluations. A potential factor that might have contributed to this null effect is that participants in the without-ownership-expectation condition were informed about the upcoming ownership after they expressed their preference. Hence, the new expectation of ownership after the decision might have overridden any effect of ownership expectations prior to the decision. Thus, to provide a more stringent test of the effect of ownership expectations, it

might be important to control for the knowledge of ownership throughout the entire study. This was done in Study 5.

Study 5

Study 5 had two goals. First, we aimed to conduct a more stringent test of the effects of ownership expectation compared to the one in Study 4. Towards this end, we changed the experimental procedure, such that participants in the without-ownership-expectation condition were asked to simply make a choice between two objects, without any knowledge about ownership throughout the procedure. As the term ownership effect no longer applies to this condition, we use the term *choice effect* in the current study. In line with the hypothesis in Study 4, we predicted larger choice effects on implicit self-object linking for participants with ownership expectation compared to those without ownership expectation. Second, we aimed to further clarify the roles of pre- and post-decision processing on the formation of self-object associations. The findings of Study 4 suggest that, for negative objects, pre-decision processing may play a more important role than post-decision processing in self-object association formation. In order to dissociate the effects of pre- vs. post-decision processing, we measured implicit self-object linking (1) after participants had completed the elaboration but before they overtly expressed their decision (*before decision*), and (2) after participants had expressed their decision (*after decision*). Whereas choice effects on implicit self-object linking before decision reflect the impact of pre-decision processing, additional choice effects after decision reflect the impact of post-decision processing.

Method

Participants and design. A total of 139 participants (94 women, 45 men) from the subject pool of the University of Western Ontario participated for research credit. The study

adopted a 2 (Ownership Expectation: with vs. without, between-Ss) × 2 (Time of Measurement: before decision vs. after decision, between-Ss) × 2 (Object Status: chosen vs. non-chosen, within-Ss) mixed-model design.

Ownership expectation. Ownership expectations were manipulated in line with the procedure of Study 4, with a key difference: participants in the without-ownership-expectation condition were simply asked to evaluate the two objects and indicate which one they personally prefer.

Measures. The study included the same IAT and the same measure of explicit evaluation as those in Study 4. All participants completed the IAT first and then the measure of explicit evaluation.

Time of measurement. After participants spent 20 seconds evaluating the two pictures, they were asked if they were ready to indicate their choice. When participants reported that they are ready, those in the before-decision condition were asked to complete the two measures before indicating their choice. Participants in the after-decision condition were asked to indicate their choice and then completed the two measures.

Procedure. After signing informed consent forms, participants were randomly assigned to one of the four conditions and then went through the choice task and the two measures. Different from the previous studies, participants in the with-ownership-expectation condition were not asked to contact the experimenter after they indicated their choice. Instead, they were told to memorize their decision, so that they could receive a copy of the chosen object after they completed the measures. At the end of the study, all participants were fully debriefed. Only participants in the with-ownership-expectation condition received a print of the chosen picture.

Results

Choices. Overall, the numbers of participants who chose the picture of Snake A (Snake B) are, respectively, 69 (66) in the entire sample, which broke down to 17 (17) in the before-decision condition with ownership expectation, 20 (14) in the after-decision condition with ownership expectation, 13 (20) in the before-decision condition without ownership expectation, and 19 (15) in the after-decision condition without ownership expectation and without physical ownership.

Implicit self-object linking. No participant showed latencies faster than 300ms on 10% or more of the trials in the two combined blocks (cf. Greenwald et al., 2003). IAT scores of choice effects on implicit self-object linking were aggregated in the same way as in the previous studies (Cronbach's $\alpha = .62$, estimated using the same procedure as in Study 2).[8] Submitted to a 2 (Ownership Expectation, with vs. without, between Ss) × 2 (Time of Measurement, before decision vs. after-decision, between Ss) × 2 (IAT Block Order: chosen object mapped with "self" in the first combined block vs. chosen object mapped with "self" in the second combined block, between Ss) ANOVA, IAT scores yielded a significant IAT Block Order effect, $F(1, 127) = 87.98$, $p < .001$, $\eta_p^2 = .41$, similar to the block order effect found in previous studies. Counter to our predictions, there was no significant main effect of Ownership Expectation, $F(1, 127) = 0.17$, $p = .69$, $\eta_p^2 = .001$, no significant main effect of Time of Measurement, $F(1, 127) = 0.18$, $p = .67$, $\eta_p^2 = .001$, and no significant interaction between these two factors, $F(1, 127) = 0.12$, $p = .73$, $\eta_p^2 = .001$. The means and standard deviations for this analysis are shown in Table 2.

[8] Preliminary analyses with Displayed Position (left vs. right) included as a factor revealed a significant two-way interaction between Display Position and Time of Measurement, $F(1, 119) = 5.30$. $p = .023$, $\eta_p^2 = .043$, and a marginally significant two-way interaction between Display Position and Ownership Expectation, $F(1, 119) = 3.91$. $p = .050$, $\eta_p^2 = .032$. This was the first time in four studies that such effects were found, and the effects were uninterpretable. The exclusion of Display Position did not change any of the reported results.

Follow-up analyses revealed that IAT scores of choice effects were significantly different from zero in the full sample (M = 0.23, SD = 0.36), $t(134) = 7.52$, $p < .001$, 95% C.I. [0.17, 0.29], and in each of the four experimental conditions: in the before-decision condition with ownership expectation, M = 0.22, $t(33) = 3.65$, $p < .001$, 95% C.I. [0.10, 0.35]; in the after-decision condition with ownership expectation, M = 0.22, $t(33) = 3.59$, $p < .001$, 95% C.I. [0.09, 0.34]; in the before-decision condition without ownership expectation, M = 0.27, $t(32) = 4.36$, $p < .001$, 95% C.I. [0.14, 0.40]; and in the after-decision condition without ownership expectation, M = 0.22, $t(33) = 3.65$, $p < .001$, 95% C.I. [0.10, 0.35]. All means were in the expected direction, indicating stronger levels of implicit self-object linking for the chosen object compared with the rejected object.

Explicit evaluations. The Cronbach's α was .83 for the of the three items about Snake A and .85 for those about Snake B. Explicit evaluation scores were averaged and recoded into two evaluation scores, one for the chosen object and one for the rejected object. Display position of the pictures did not influence any of the results and was therefore not included in the reported analyses. Submitted to a 2 (Ownership Expectation, with vs. without, between Ss) × 2 (Time of Measurement, before decision vs. after decision, between Ss) × 2 (Object Status, chosen vs. rejected, within Ss) mixed-model ANOVA, explicit evaluations yielded a significant main effect of Object Status, $F(1, 131) = 87.11$, $p < .001$, $\eta_p^2 = .40$, indicating that explicit evaluations of the chosen object (M = 3.49, SD = 1.20) were more positive than explicit evaluations of the rejected object (M = 2.60, SD = 1.10). All other effects were non-significant, all $F \leq 0.54$, $p \geq .46$, $\eta_p^2 \leq .004$.

Discussion

To address a methodological limitation of Study 4, the current study employed a cleaner manipulation of ownership expectation. Instead of being informed about their upcoming ownership, participants in the without-ownership-expectation condition did not receive any such information until the end of the study. Nevertheless, pre-decision ownership expectation did not qualify the size of choice effects on either implicit self-object linking or explicit evaluations. Interestingly, in the without-ownership-expectation condition where participants were asked to elaborate on and indicate their preference, we still found a choice effect on implicit self-object linking. This finding provides further support for the contribution of pre-decision processing to the formation of self-object associations, which may occur even in the absence of actual ownership.

Counter to our predictions, Study 5 also revealed no moderating effect of time of measurement. Instead, we found similar levels of choice effects on implicit self-object linking and explicit evaluations regardless of whether the measures were taken (1) after participants completed the pre-decision processing but before they overtly expressed their decision or (2) after participants had expressed their decision. In line with the findings of Studies 3 and 4, these findings further support the notions that self-object associations (1) are formed during pre-decision processing and (2) are not further strengthened by post-decision processing for negative objects.

General Discussion

The present research examined how ownership influences the relation between owners and their possessions. Adopting an associative approach, we conceptualized this relation as a mental association between the node representing the owner's self and the node representing the

owned object. We argued that the strength of this association determines implicit self-object linking, defined as the behavior of automatically connecting the self and a given object on an implicit measure. Drawing on the principles of balance-congruity and imbalance-dissonance proposed by balanced identity theory (Cvencek et al., 2012; Greenwald et al., 2002), we tested several predictions about possible boundary conditions (i.e., type of ownership situations and object valence) for the effects of ownership on implicit self-object linking.

Consistent with the hypothesis that the formation of self-object associations in mere-ownership situations should be moderated by pre-existing object properties involving self-object congruity and incongruity, we found mere-ownership effects on implicit self-object linking only for positive objects, but not for negative objects. Moreover, we found that for negative objects, ownership influenced implicit self-object linking only when ownership resulted from the owner's personal choice (ownership-by-choice), but not when ownership was determined on the basis of a random procedure (mere-ownership). Additional findings suggest that this effect was caused by the choice rather than pre-existing differences in self-object congruity (cf. Chen & Risen, 2010). These finding are consistent with the hypothesis that decision-related processing enhances self-object congruity for chosen objects and self-object incongruity for rejected objects, which should facilitate the formation of self-object associations in ownership-by-choice situations.

Testing the impact of potential moderators, ownership-by-choice effects on implicit self-object linking turned out to be much more resistant to contextual factors we than expected.[9] Counter to our predictions, pre-decision expectancies of ownership and post-decision physical

[9] To examine how strongly our data support the null hypotheses regarding the moderating effects on implicit self-object linking in Studies 4 and 5, we performed Bayesian analyses. Our analyses revealed substantial evidence in favor of the null hypotheses for all moderating effects on implicit self-object linking in Study 4 (for Expectation of Ownership: BF_0 =3.58, for Physical Ownership: BF_0 = 5.66) and in Study 5 (for Expectation of Ownership: BF_0 = 5.04, for Time of Measurement: BF_0 = 4.98).

ownership did not influence the magnitude of ownership effects on implicit self-object linking for negative objects. Nonetheless, we replicated the basic effect across all conditions, showing higher levels of implicit self-object linking regardless of whether participants did or did not expect ownership during pre-decision processing, and regardless of whether participants did or did not have physical ownership. In fact, our findings suggest that neither of the two factors is necessary to create self-object associations, in that we found choice effects on implicit self-object linking even when participants had no physical ownership, no expectation of ownership, and did not yet express a choice. Together, these findings suggest that pre-decision processing play a more important role than post-choice processing in the formation of self-object associations in ownership-by-choice situations involving negative objects.

Implications for Associative Network Theories

To our knowledge, the present research offers the first empirical test of the imbalance-dissonance principle of the balanced identity theory (Cvencek et al., 2012; Greenwald et al., 2002). The principle suggests that associative networks should resist forming a new association between two nodes that are each associated with one of two bipolar-opposed nodes. This principle has never been tested, possibly due to the difficulty in creating a situation that involves meaningful associations involving two bipolar-opposed concepts. The present research successfully addressed this difficulty by creating a mere-ownership situation with objects of negative valence which, for most people, is opposite to the positive valence of the self (Greenwald & Farnham, 2000; Koole et al., 2001). By doing so, the current studies provided direct empirical support for the imbalance-dissonance principle.

Although many theories assume that the formation of new associations in memory is a slow process that requires repeated co-occurrences (e.g., Smith & DeCoster, 2000), some

researchers have rejected this idea in the light of evidence that automatic responses on implicit measures can be acquired and changed relatively quickly on the basis of minimal experiences (e.g., Gawronski & Bodenhausen, 2006, 2011). The present research expands on the latter hypothesis, showing that simple events such as ownership can influence mental associations in memory (see also Gawronski et al., 2007). From this perspective, our research provides valuable insights into how other, similar situations may influence mental associations.

For example, one situation that involves a similarly trivial relation between a person and another entity is the minimal-group paradigm, in which participants are randomly assigned to a group on the basis of arbitrary, sometimes non-existent characteristics (Tajfel, 1970). Similar to the mere-ownership effect, the minimal-group effect is characterized by more favorable evaluations of the ingroup compared to the outgroup. Greenwald, Pickrell, and Farnham (2002) have argued that the minimal group effect is mediated by a mental association between the ingroup and the self. The present findings imply that these effects may be observed only when the ingroup is of positive valence and not when it is of negative valence (e.g., a stigmatized group). Moreover, when people can freely choose between groups to join, minimal-group effects may be observed even when the ingroup has a pre-existing negative valence. Future research may test these predictions to provide deeper insights into the associative underpinnings of ingroup favoritism.

Implications for Decision-Making and Choice

To our knowledge, the present research provides the first empirical examination of choice effects for decisions between two alternatives of negative valence (cf. Shultz & Lepper, 1996). An interesting question in this area is how valence of choice alternatives influences the processing of decision-relevant information. A decision between two positive alternatives may

involve a strategy of maximizing attractive features and a frame of maximizing gains, while a decision between two negative alternatives may involve a strategy of minimizing unattractive features and a frame of avoiding losses (e.g., Tversky & Kahneman, 1986). In line with this idea, Fischer, Jonas, Frey, and Kastenmüller (2008) found that participants who had made a gain-framed decision tended to engage in stronger post-decision information processing than those who had made a loss-framed decision. This finding is consistent with the present research, which found little evidence of post-decision processing affecting implicit self-object linking with negative choice alternatives.

Our finding that neither choice expression nor physical ownership enhanced the effect of choice on implicit self-object linking seem particularly interesting in the context of online purchases on the internet, which inevitably involve a waiting period from the time of purchase to the time of physical ownership. The current research suggests that in-store purchases with immediate physical ownership do not necessarily have a psychological advantage over online purchases with delayed physical ownership in terms of the extent to which the purchased product becomes a part of the buyer's self. Yet, our findings also indicate that physical ownership can enhance explicit evaluations. To our knowledge, there is no research to date that examined potential differences between online and in-store purchases in terms of their effects on consumers' psychological experiences. Thus, in addition to its theoretical contribution, our research suggests some interesting directions for applied research in consumer psychology.

Implications for Research on the Self

The idea that owning an object can lead to changes in the content of one's self-concept is in line with recent theories of self-representation, such as Wheeler, DeMarre, and Petty's (2007) active-self model. Wheeler and colleagues suggest that, while the chronic representation of the

self includes all nodes associated with the self in the associative network, the active representation of the self includes only a subset of nodes that are currently accessible. They further suggest that the active representation of the self can be changed either by activating new content within the chronic representation of the self or by adopting new information from the environment. Together with these assumptions, our findings suggest that the process of introducing new material can be realized through ownership, which may add the owned object as a new component to the active representation of the self.

These considerations help to answer an important question: What are the behavioral consequences of self-object associations? Wheeler et al.'s (2007) theory suggests that new content in the active representation of the self can have behavioral effects that are in line with the new content. Hence, the integration of an object into one's active representation of the self may lead to an assimilation of one's behavior to features of the owned object. Consistent with this idea, previous research by Fitzsimons et al. (2008) found that being primed with the logo of *Apple* increased both the motivation to be creative and actual creative behaviors. According to the active-self model, this prime-to-behavior effect is driven by the activation of the concept *creative* in one's active self-concept, due to the exposure to the *Apple* logo. Based on the present research, it can be predicted that owning an Apple product may lead to similar outcomes, due to the formation of an association between the owner's self and the owned product. Future research may further investigate the behavioral consequences of ownership, focusing particularly on the assimilation of behavior to certain features of the owned objects.

Alternative Accounts

De Houwer and colleagues recently proposed a single-process propositional model, which rejects the idea of associations as entities of mental representation (De Houwer, 2009,

2014; Mitchell, De Houwer, & Lovibond, 2009). According to their model, social knowledge is stored in the form of propositions that capture relations between objects and events. Applied to the present research, one could argue that ownership effects on implicit self-object linking were mediated by propositions that were generated in response to the specific ownership situation (e.g., "I own this object" or "I chose this object"). We fully agree that the consideration of such propositions may contribute to the formation of self-object associations, as suggested by contemporary dual-process theories (e.g., Gawronski & Bodenhausen, 2006, 2011). However, we disagree with the ideas that such propositions (1) function as the proximal causes of implicit self-object liking independent of associative representations and (2) are necessary to produce the obtained effects on implicit self-object linking.

In particular, the first hypothesis is difficult to reconcile with the finding that mere-ownership influenced implicit self-object linking only for positive, but not for negative, objects. If ownership-related propositions function as proximal mediators of mere-ownership effects, they should occur regardless of whether the owned objects are positive or negative. The second hypothesis is inconsistent with our finding that neither physical ownership nor overt expression of a choice was necessary for the obtained effects on implicit self-object linking. These findings are difficult to reconcile with the idea that ownership- or choice-related propositions are necessary to produce the obtained effects on implicit self-object linking. Yet, they can be explained with the hypothesis that pre-decision processing increased self-object congruity for the chosen object and self-object incongruity for the rejected object, which should facilitate the formation of self-object associations for negative objects in ownership-by-choice situations.

In his seminal work on the mere-ownership effect, Beggan (1992) suggested that ownership effects stem from the motivation to maintain a positive sense about self. According to

this account, the effects of ownership on implicit self-object linking might be a function of self-enhancement motivation: stronger effects on self-object linking indicate higher levels of self-enhancement motivation. This hypothesis seems difficult to reconcile with the present findings, showing mere-ownership effects on implicit evaluation and implicit self-object linking only for positive, but not negative, objects. If anything, self-enhancement motivation should lead to stronger ownership effects for negative compared to positive objects, given that ownership of negative objects may pose a threat to one's positive self-views.

Limitations

Despite our conclusion that associative theories are superior in accounting for the obtained effects, it seems appropriate to acknowledge some limitations of the current studies. First, the use of the same materials (e.g., snake pictures) across all studies could limit the generalizability of our findings. It is also possible that our materials included unintended confounds, which may have contributed to the obtained results. For example, exposure to snake pictures could increase mortality salience (Koole & Van den Berg, 2005), which may elicit motivational processes that are different from the ones of regular negative objects (e.g., motivation to suppress death-related thoughts; see Pyszczynski, Greenberg, & Solomon, 1999). Thus, future research should aim to replicate the present findings with different types of objects. In order to provide further evidence for the generality of our findings, future research would also benefit from using dimensions other than valence (e.g., traits) for the manipulation of self-object congruity and incongruity.

A key assumption in our research is that, for most people, the self is associated with positive valence (Greenwald & Farnham, 2000; Koole et al., 2001). Although implicit positivity toward the self has been found across cultures (Sedikides et al., 2015) and in 5-year-old children

(Cvencek et al., 2016), a more stringent test of our theory requires natural or experimentally induced variations in the valence of self. Future research addressing this issue may focus on individuals with chronic negative evaluations of the self (see Gawronski et al., 2007) or induce momentary negative evaluations of the self (e.g., Walther & Trasselli, 2003) with paradigms such as bogus failure feedback (Heatherton, Herman, & Polivy, 1991), memory retrieval (Peters & Gawronski, 2011), or priming (Wheeler et al., 2007).

Another assumption we made is that changes in the levels of self-object congruity and self-object incongruity occur when desirable or undesirable features of the objects become salient during decision-related information processing (e.g., Tversky, 1972). Yet, other than the obtained effects on implicit self-object linking, the current studies do not provide direct evidence in support of this assumption. Thus, it is possible that changes in self-object congruity are mediated by other processes or representations. For example, decision-makers may form preferences on the basis of their gut feelings without thinking about specific features of the alternatives. Consequently, they may feel that they prefer one object without knowing the exact reasons behind their preference. In this case, changes in self-object congruity for the preferred alternative would be mediated by the positive feeling aroused during pre-decision processing instead of any specific features of this alternative. How decision-making changes mental representations of choice alternatives remains an empirical question that should be addressed in future research.

Despite the observation of reliable ownership effects in ownership-by-choice situations, one may question whether the trivial nature of the choices in these situations (i.e., choosing between two postcards) limits the ecological validity of the present research (see Sherif & Sherif, 1967). Although this concern may have contributed to the ineffectiveness of our manipulations in

Studies 4 and 5, it is worth noting that, even with such seemingly trivial choice tasks, reliable ownership effects have been observed in ownership-by-choice situations. Nonetheless, it remains an interesting question if increasing the significance of the choice options would moderate any of the present findings.

Finally, a potential limitation is the relatively low internal consistencies of our IAT measures (Cronbach's αs of .69, .71, .63, and .62 in Studies 2-5, respectively) as compared to those reported in previous research (e.g., Cronbach's αs ranging from .7 to .9, Greenwald & Nosek, 2001; see also Nosek, Greenwald, & Banaji, 2007). Although it is possible that the lower internal consistencies are due to the use of a single target stimulus, instead of multiple stimuli, research by Steffens et al. (2008) found satisfactory internal consistencies using a similar procedure (Cronbach's αs above .9). We suspect that the lower internal consistencies of our IAT measures might be due to the fact that we examined implicit self-object linking with novel objects, instead of implicit evaluations of relatively familiar categories (e.g., insect vs. flowers, minority groups, Greenwald et al., 1998). Yet, if anything, lower internal consistencies should reduce the sensitivity of the IAT to ownership effects, which stands in contrast the reliable ownership effects that have been observed in the current studies.

Conclusions

Ownership is one of the most fundamental concepts in social science. Yet, its significance for human behavior has often been overlooked in social psychology. In the present research, we took an associative approach to studying the psychological effects of ownership. Drawing on balanced-identity theory (Cvencek et al., 2012; Greenwald et al., 2002), we investigated the boundary conditions of ownership effects on implicit self-object linking in two ownership situations: mere-ownership and ownership-by-choice. Our findings have interesting implications

for a variety of research topics in social psychology and raised novel questions for future research. We hope that the present research illustrated the value of ownership research for other important topics in social psychology. After all, there is still much to learn on the psychology of human-object relations.

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References

Beggan, J. K. (1992). On the social nature of nonsocial perception: The mere ownership effect. *Journal of Personality and Social Psychology, 62,* 229-237.

Belk, R. W. (1988). Possessions and the extended self. *Journal of Consumer Research, 15,* 139-168.

Brehm, J. W. (1956). Postdecision changes in the desirability of alternatives. *Journal of Abnormal and Social Psychology, 52,* 384-389.

Brehm, J.W., & Cohen, A. R. (1962). *Explorations in cognitive dissonance*. New York: John Wiley.

Brownstein, A. L. (2003). Biased predecision processing. *Psychological Bulletin, 129, 545-568.*

Chan, F., Karbowski, J., Monty, R. A., & Perlmuter, L. C. (1986). Performance as a source of perceived control. *Motivation and Emotion, 10,* 59-70.

Chaudhuri, A., & Holbrook, M. B. (2001). The chain of effects from brand trust and brand affect to brand performance: the role of brand loyalty. *Journal of Marketing, 65,* 81-93.

Chen, M. K., & Risen, J. L. (2010). How choice affects and reflects preferences: Revisiting the free-choice paradigm. *Journal of Personality and Social Psychology, 99,* 573-594.

Cvencek, D., Greenwald, A. G., & Meltzoff, A. N. (2012). Balanced identity theory: Evidence for implicit consistency in social cognition. In Gawronski, B., & Strack, F. (Eds.), *Cognitive consistency: A unifying concept in social psychology* (pp. 157–177). New York, NY: Guilford Press.

Cvencek, D., Greenwald, A. G., & Meltzoff, A. N. (2016). Implicit measures for preschool children confirm self-esteem's role in maintaining a balanced identity. *Journal of Experimental Social Psychology, 62,* 50–57. .

De Houwer, J. (2009). The propositional approach to associative learning as an alternative for association formation models. *Learning & Behavior, 37*, 1-20.

De Houwer, J. (2014). Why a propositional single-process model of associative learning deserves to be defended. In J.W. Sherman, B. Gawronski, & Y. Trope (Eds.), *Dual processes theories of the social mind* (pp. 530-541). New York, NY: Guilford.

De Houwer, J., Gawronski, B., & Barnes-Holmes, D. (2013). A functional-cognitive framework for attitude research. *European Review of Social Psychology, 24,* 252-287.

De Houwer, J., Thomas, S., & Baeyens, F. (2001). Association learning of likes and dislikes: A review of 25 years of research on human evaluative conditioning. *Psychological Bulletin, 127,* 853-869.

Epley, N., Waytz, A., & Cacioppo, J. T. (2007). On seeing human: A three-factor theory of anthropomorphism. *Psychological Review, 114*, 864-886.

Fazio, R. H., Jackson, J. R., Dunton, B. C., & Williams, C. J. (1995). Variability in automatic activation as an unobtrusive measure of racial attitudes: A bona fide pipeline? J*ournal of Personality and Social Psychology, 69,* 1013-1027.

Festinger, L. (1957). *A theory of cognitive dissonance.* Palo Alto, CA: Stanford University Press.

Festinger, L. (1964). *Conflict, decision, and dissonance.* Palo Alto, CA: Stanford University Press.

Fischer, P., Jonas, E., Frey, D., & Kastenmüller, A. (2008). Selective exposure and decision framing: The impact of gain and loss framing on confirmatory information search after decisions. *Journal of Experimental Social Psychology, 44,* 312-320.

Fitzsimons, G. M., Chartrand, T. L., & Fitzsimons, G. J. (2008). Automatic effects of brand exposure on motivated behavior: how apple makes you "think different". *Journal of Consumer Research, 35,* 21-35.

Frost, R. O., & Hartl, T. L. (1996). A cognitive-behavioral model of compulsive hoarding. *Behavior Research and Therapy, 34,* 341-350.

Gawronski, B., & Bodenhausen, G. V. (2006). Associative and propositional processes in evaluation: An integrative review of implicit and explicit attitude change. *Psychological Bulletin, 132,* 692-731.

Gawronski, B., & Bodenhausen, G. V. (2011). The associative-propositional evaluation model: Theory, evidence, and open questions. *Advances in Experimental Social Psychology, 44,* 59-127.

Gawronski, B., Bodenhausen, G. V., & Becker, A. P. (2007). I like it, because I like myself: Associative self-anchoring and post-decisional change of implicit evaluations. *Journal of Experimental Social Psychology, 43,* 221-232.

Gawronski, B., & De Houwer, J. (2014). Implicit measures in social and personality psychology. In H. T. Reis, & C. M. Judd (Eds.), *Handbook of research methods in social and personality psychology* (2nd ed., pp. 283-310). New York, NY: Cambridge University Press.

Gawronski, B., Deutsch, R., & Banse, R. (2011). Response interference tasks as indirect measures of automatic associations. In K. C. Klauer, A. Voss, & C. Stahl (Eds.), *Cognitive methods in social psychology* (pp. 78-123). New York, NY: Guilford Press.

Gawronski, B., & Payne, B. K. (Eds.). (2010). *Handbook of implicit social cognition: Measurement, theory, and applications*. New York, NY: Guilford Press.

Gawronski, B., & Strack, F. (2004). On the propositional nature of cognitive consistency: Dissonance changes explicit, but not implicit attitudes. *Journal of Experimental Social Psychology, 40,* 535-542.

Gendolla, G. H. (1999). Self-relevance of performance, task difficulty, and task engagement assessed as cardiovascular response. *Motivation and Emotion, 23,* 45-66.

Greenwald, A. G., & Banaji, M. R. (1995). Implicit social cognition: Attitudes, self-esteem, and stereotypes. *Psychological Review, 102,* 4-27.

Greenwald, A. G., Banaji, M. R., Rudman, L. A., Farnham, S. D., Nosek, B. A., & Mellott, D. S. (2002). A unified theory of implicit attitudes, stereotypes, self-esteem, and self-concept. *Psychological Review, 109,* 3-25.

Greenwald, A. G., & Farnham, S. D. (2000). Using the Implicit Association Test to measure self-esteem and self-concept. *Journal of Personality and Social Psychology, 79,* 1022-1038.

Greenwald, A. G., McGhee, D. E., & Schwartz, J. L. K. (1998). Measuring individual differences in implicit cognition: The implicit association test. *Journal of Personality and Social Psychology, 74,* 1464-1480.

Greenwald, A. G., Nosek, B. A., & Banaji, M. R. (2003). Understanding and using the implicit association test: I. An improved scoring algorithm. *Journal of Personality and Social Psychology, 85,* 197-216.

Greenwald, A. G., Pickrell, J. E., & Farnham, S. D. (2002). Implicit partisanship: Taking sides for no reason. *Journal of Personality and Social Psychology, 83,* 367-379.

Harmon-Jones E., Harmon-Jones C., Fearn M., Sigelman J.D., Johnson P. (2008). Left Frontal Cortical Activation and Spreading of Alternatives: Tests of the Action-Based Model of Dissonance. *Journal of Personality and Social Psychology, 94,* 1-15.

Heatherton, T. F., Herman, C. P., & Polivy, J. (1991). Effects of physical threat and ego threat on eating behavior. *Journal of Personality and Social Psychology*, *60*, 138-143.

Huang, Y., Wang, L., & Shi, J. (2009). When do objects become more attractive? The individual and interactive effects of choice and ownership on object evaluation. *Personality and Social Psychology Bulletin*, *35*, 713-722.

James, W. (1890). *The principles of psychology* (Vol. 1). New York, NY: Henry Holt.

Jecker, J. D. (1964). Selective exposure to new information. In L. Festinger (Ed.), *Conflict, decision, and dissonance* (pp. 65–81). Stanford, CA: Stanford University Press.

Jeffreys, H. (1961). *Theory of Probability.* Oxford: Oxford University Press.

Kahneman, D., Knetsch, J. L., & Thaler, R. H. (1990). Experimental tests of the endowment effect and the coase theorem. *Journal of Political Economy*, *98*, 1325-1347.

Koole, S. L., Dijksterhuis, A., & Van Knippenberg, A. (2001). What's in a name: Implicit self-esteem and the automatic self. *Journal of Personality and Social Psychology, 80*, 669-685.

Koole, S. L., & Van den Berg, A. E. (2005). Lost in the wilderness: Terror management, action orientation, and nature evaluation. *Journal of Personality and Social Psychology, 88*, 1014-1028.

Lane, K. A., Banaji, M. R., Nosek, B. A., & Greenwald, A. G. (2007). Understanding and using the Implicit Association Test: IV. What we know (so far) (Pp. 59–102). In B. Wittenbrink & N. S. Schwarz (Eds.). *Implicit measures of attitudes: Procedures and controversies*. New York: Guilford Press.

Lang, P.J., Bradley, M.M., & Cuthbert, B.N. (2008). International affective picture system (IAPS): Affective ratings of pictures and instruction manual. Technical Report A-8. University of Florida, Gainesville, FL.

Mitchell, C. J., De Houwer, J., & Lovibond, P. F. (2009). The propositional nature of human associative learning. *Behavioral and Brain Sciences, 32,* 183-198.

Nosek, B. A., Greenwald, A. G., & Banaji, M. R. (2005). Understanding and using the Implicit Association Test: II. Method variables and construct validity. *Personality and Social Psychology Bulletin, 31,* 166-180.

Nosek, B. A., Greenwald, A. G., & Banaji, M. R. (2007). The Implicit Association Test at age 7: A methodological and conceptual review. In J. A. Bargh (Ed.), *Automatic Processes in Social Thinking and Behavior* (pp. 265-292). New York: Psychology Press.

Peters, K. R., & Gawronski, B. (2011). Mutual influences between the implicit and explicit self-concepts: The role of memory activation and motivated reasoning. *Journal of Experimental Social Psychology, 47,* 436-442.

Pettit, N. C., & Sivanathan, N. (2011). The plastic trap: Self-threat drives credit usage and status consumption. *Social Psychological and Personality Science, 2,* 146-153.

Pyszczynski, T., Greenberg, J., & Solomon, S. (1999). A dual-process model of defense against conscious and unconscious death-related thoughts: An extension of terror management theory. *Psychological Review, 106,* 835-845.

Roth, J. & Steffens, M.C. (2014). When I becomes we: Associative self-anchoring drives implicit intergroup bias in minimal groups. *Social Psychology, 45,* 253-264.

Scheibehenne, B., Greifeneder, R., & Todd, P. M. (2010). Can there ever be too many options? A meta-analytic review of choice overload. *Journal of Consumer Research, 37,* 409-425.

Schmitz, T. W., & Johnson, S. C. (2007). Relevance to self: A brief review and framework of neural systems underlying appraisal. *Neuroscience & Biobehavioral Reviews, 31,* 585-596.

Sedikides, C., Gaertner, L., & Cai, H. (2015). On the panculturality of self-enhancement and self-protection motivation: The case for the universality of self-esteem. *Advances in Motivation Science,* 2, 185-241.

Sherif, M., & Sherif, C. M. (1967). Attitudes as the individual's own categories: The social judgment-involvement approach to attitude and attitude change. In C. W Sherif & M. Sherif (Eds.). *Attitude, ego-involvement, and change* (pp. 105-139). Westport, CT: Greenwood Press.

Shultz, T. R., & Lepper, M. R. (1996). Cognitive dissonance reduction as constraint satisfaction. *Psychological Review, 103,* 219-240.

Shultz, T. R., Léveillé, E., & Lepper, M. R. (1999). Free choice and cognitive dissonance revisited: Choosing "lesser evils" versus "greater goods". *Personality and Social Psychology Bulletin, 25,* 40-48.

Smith, E. R., & DeCoster, J. (2000). Dual-process models in social and cognitive psychology: Conceptual integration and links to underlying memory systems. *Personality and Social Psychology Review, 4,* 108-131.

Steffens, M. C., Kirschbaum, M., & Glados, P. (2008). Avoiding stimulus confounds in Implicit Association Tests by using the concepts as stimuli. *British Journal of Social Psychology, 47,* 217-243.

Tafarodi, R. W., Mehranvar, S., Panton, R. L., & Milne, A. B. (2002). Putting oneself in the task: Choice, personalization, and confidence. *Personality and Social Psychology Bulletin, 28,* 648-658.

Tajfel, H. (1970). Experiments in intergroup discrimination. *Scientific American, 223,* 96-102.

Tajfel, H. & Turner, J. C. (1986). The social identity theory of inter-group behavior. In S. Worchel & L. W. Austin (Eds.), *Psychology of intergroup relations* (pp. 7-24). Chicago, IL: Nelson-Hall.

Tversky, A. (1972). Elimination by aspects: A theory of choice. *Psychological Review, 79,* 281-299.

Tversky, A., & Kahneman, D. (1981). The framing of decisions and the psychology of choice. *Science, 211,* 453-458.

Tversky, A., & Kahneman, D. (1986). Rational choice and the framing of decisions. *Journal of Business, 59,* S251-S278.

Walther, E., & Trasselli, C. (2003). I like her, because I like myself: Self-evaluation as a source of interpersonal attitudes. *Experimental Psychology, 50,* 239-246.

Wheeler, S. C., DeMarree, K. G., & Petty, R. E. (2007). Understanding the role of the self in prime-to-behavior effects: The active-self account. *Personality and Social Psychology Review, 11,* 234-261.

Wilson, T. D., Lindsey, S., & Schooler, T. Y. (2000). A model of dual attitudes. *Psychological Review, 107,* 101-126.

Wicklund, R. A., & Gollwitzer, P. M. (1981). Symbolic self-completion, attempted influence, and self-deprecation. *Basic and Applied Social Psychology, 2,* 89-114.

Table 1. Mean IAT scores reflecting ownership effects as a function of ownership expectation, physical ownership, and IAT block order, Study 4.

Ownership Expectation	Physical Ownership	IAT Block Order		Group Means
		Chosen object-self mapping in first combined block	Chosen object-self mapping in second combined block	
Yes	Yes	0.45 (0.38)	0.062 (0.28)	0.26 (0.37)
	No	0.56 (0.41)	-0.16 (0.36)	0.20 (0.38)
No	Yes	0.41 (0.32)	-0.15 (0.45)	0.13 (0.40)
	No	0.52 (0.31)	-0.11 (0.44)	0.20 (0.38)

Note. Numbers in parentheses depict standard deviations. Group means are unweighted and therefore not influenced by the unequal sample sizes between cells. Standard deviations for cell means are observed, but those for group means are estimated from mean squares.

Table 2. Means and standard deviations of IAT scores reflecting ownership effects as a function of ownership expectation, time of measurement and IAT block order, Study 5.

Ownership Expectation	Time of Measurement	IAT Block Order		Group Means
		Chosen object-self mapping in first combined block	Chosen object-self mapping in second combined block	
Yes	Before decision	0.50 (0.26)	-0.06 (0.34)	0.22 (0.36)
	After decision	0.46 (0.38)	-0.02 (0.31)	0.22 (0.36)
No	Before decision	0.58 (0.44)	-0.04 (0.36)	0.27 (0.37)
	After decision	0.56 (0.39)	-0.12 (0.37)	0.22 (0.36)

Note. Numbers in parentheses depict standard deviations. Group means are unweighted and therefore not influenced by the unequal sample sizes between cells. Standard deviations for cell means are observed, but those for group means are estimated from mean squares.

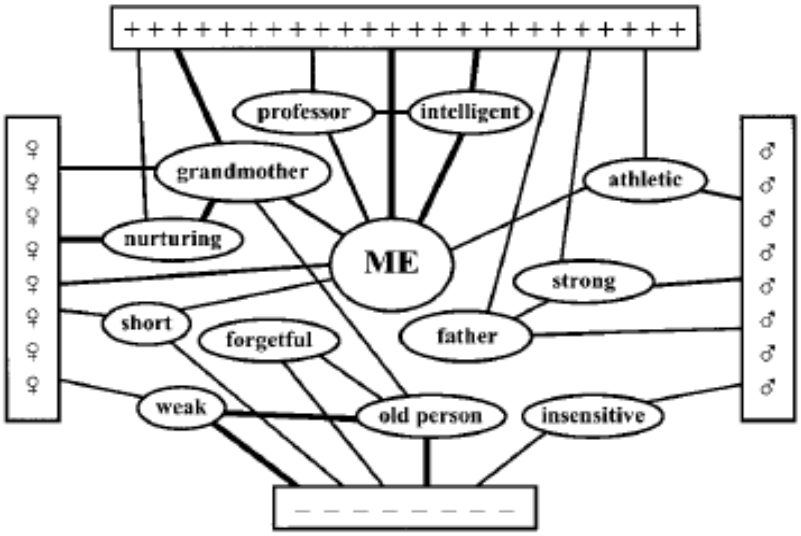

Figure 1. The associative network of social knowledge. Adapted from "A Unified Theory of Implicit Attitudes, Stereotypes, Self-esteem, and Self-concept," by A. G. Greenwald, M. R. Banaji, L. A. Rudman, S. D. Farnham, B. A. Nosek, & D. S. Mellott, 2002, *Psychological Review, 109*, p. 5. Copyright 2002 by the American Psychological Association.

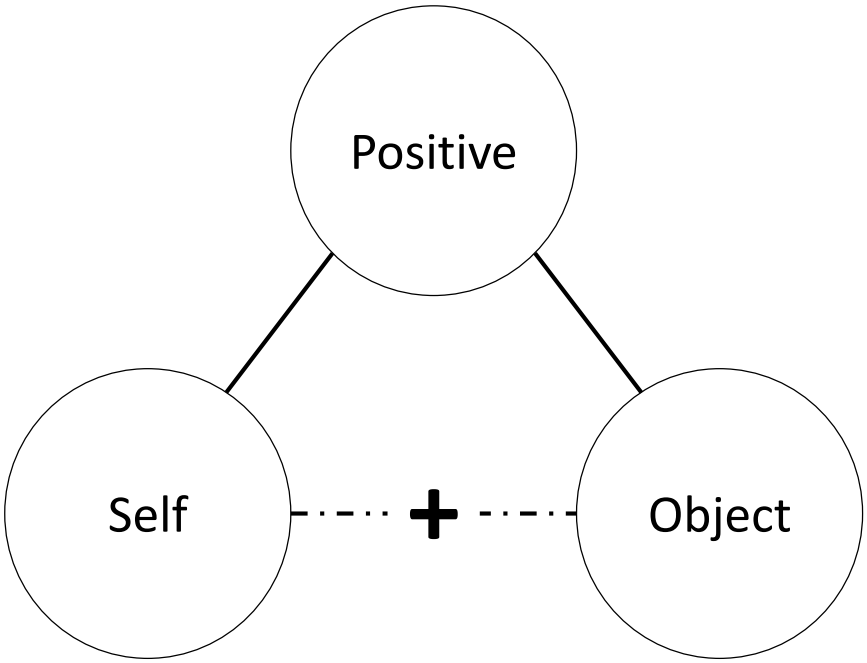

Figure 2. Graphical illustration of the balance-congruity principle. The formation of a new association between a person's self and an object should be facilitated when they share associations to a common third node (i.e., positive valence).

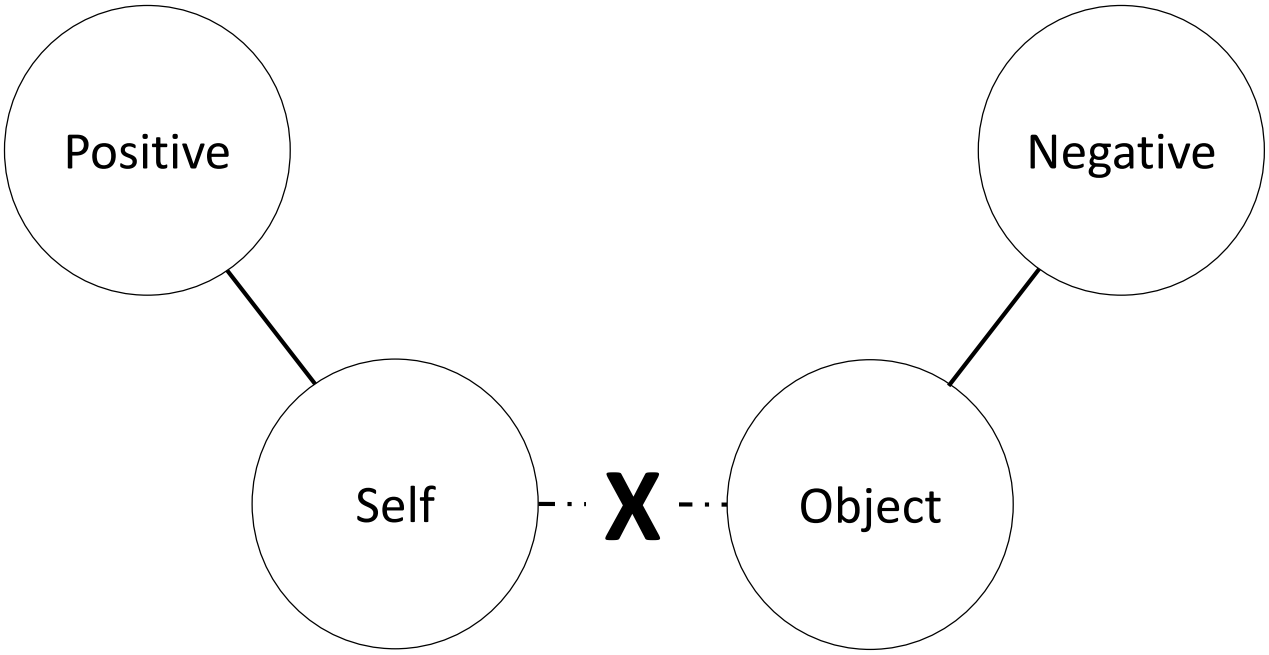

Figure 3. Graphical illustration of the imbalance-dissonance principle. The formation of a new association between a person's self and an object should be inhibited when each of the two nodes is associated to each of two bipolar-opposed nodes (i.e., positive and negative valence).

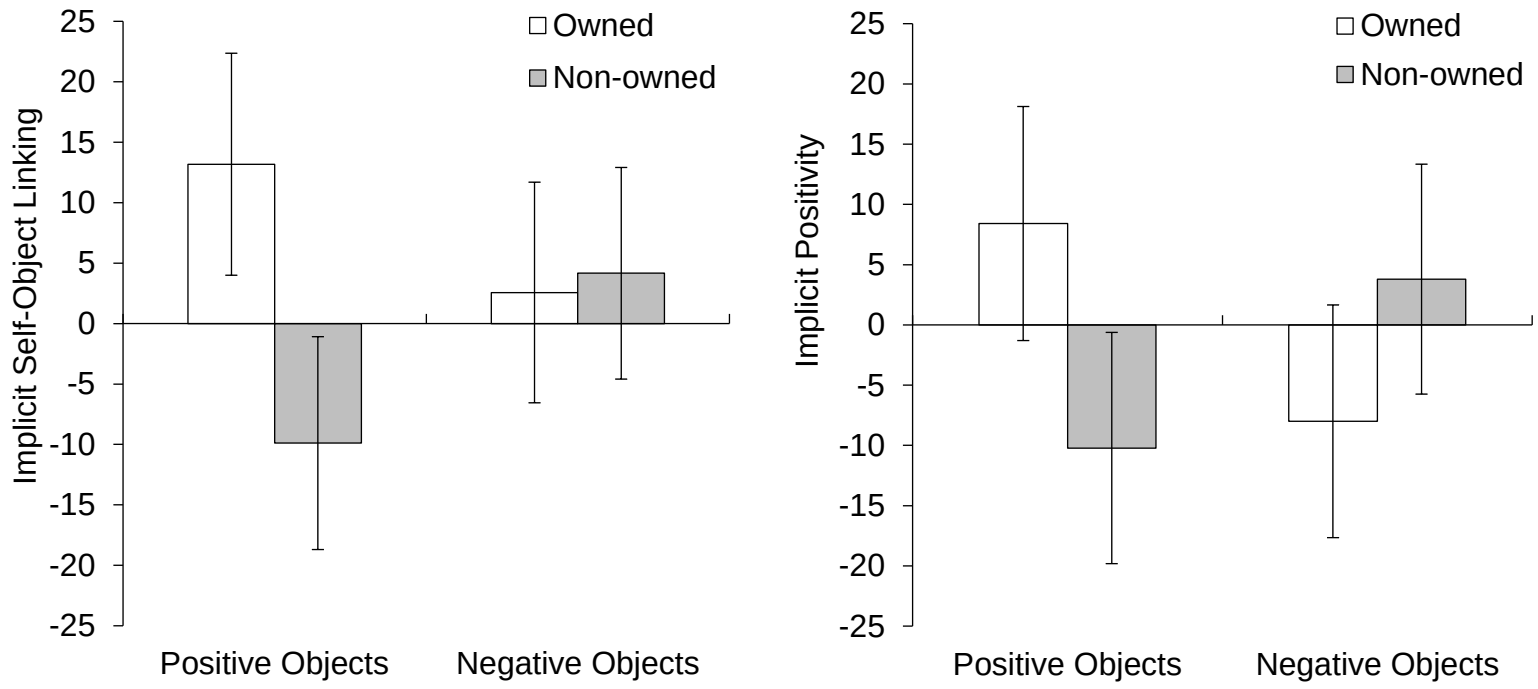

Figure 4. Implicit self-object linking (left panel) and implicit evaluations (right panel) as a function of mere-ownership (owned vs. non-owned) and object valence, Study 1. Error bars represent standard errors.

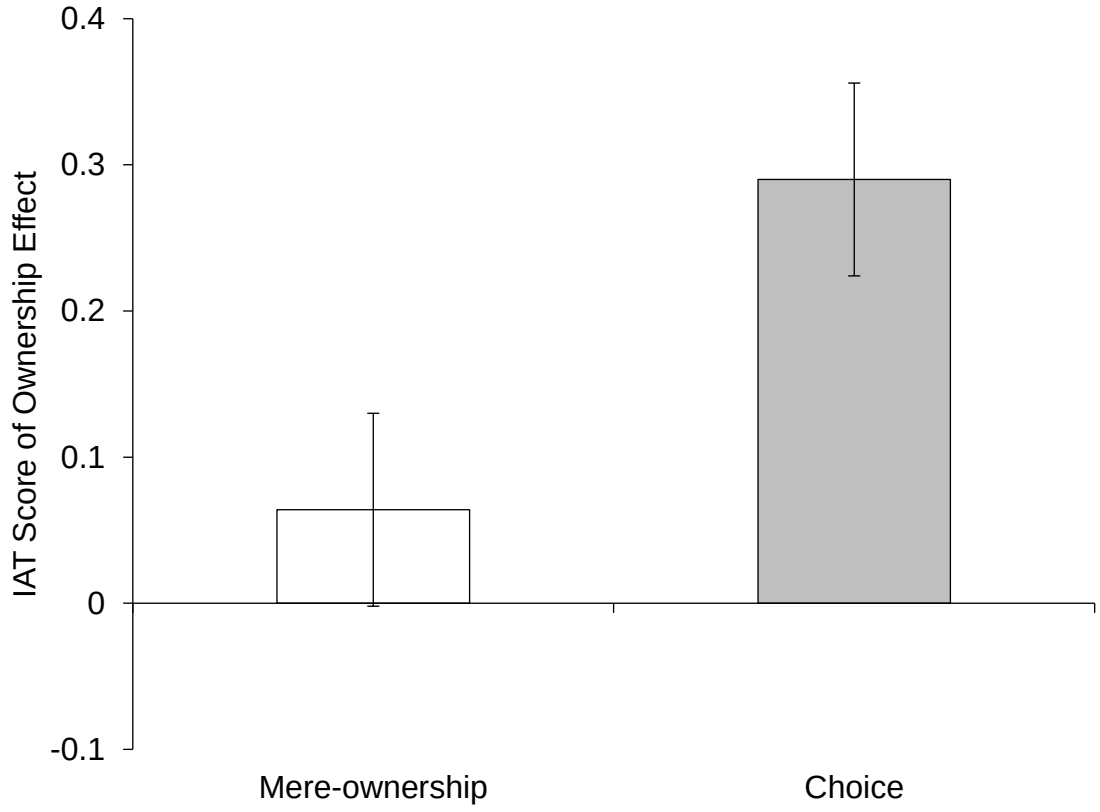

Figure 5. IAT scores of ownership effects on implicit self-object linking as a function of ownership situation (mere-ownership vs. ownership-by-choice), Study 2. Error bars represent standard errors.

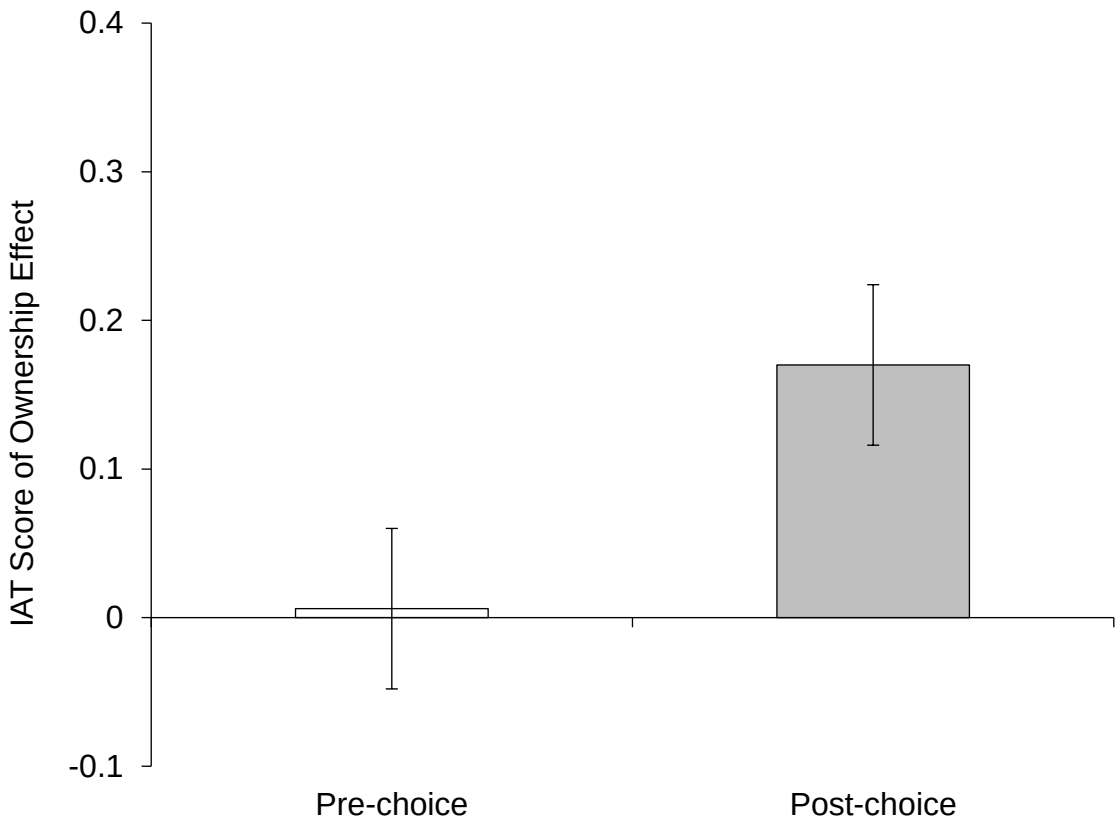

Figure 6. IAT scores of ownership effects on implicit self-object linking as a function of time of measurement (pre-choice vs. post-choice), Study 3. Error bars represent standard errors.

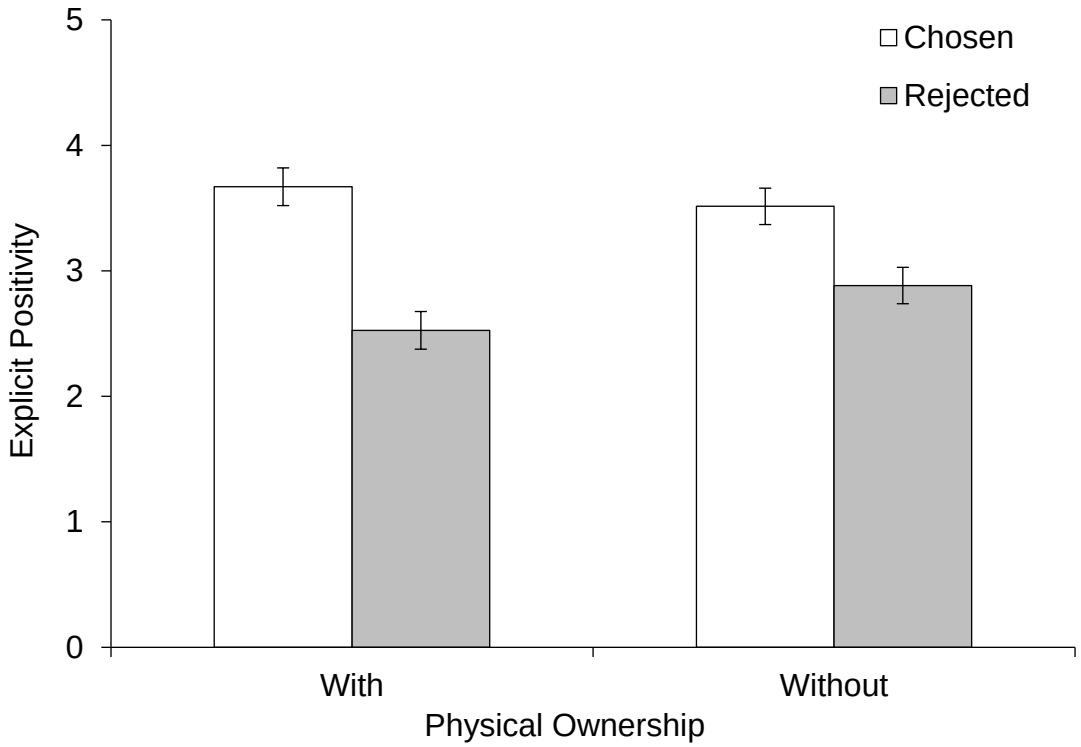

Figure 7. Explicit evaluations of chosen and rejected objects as a function of physical ownership (with vs. without), Study 4. Error bars represent standard errors.