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Psychological ownership: The implicit association between self and already-owned versus newly-owned objects

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ABSTRACT

Evidence from explicit measures (e.g. favourability ratings, valuations) has led to the prevalent hypothesis that owned objects become cognitively associated with self-concept. Using a novel version of the Implicit Association Test (self-object IAT), wherein participants categorized objects by colour, we evaluated implicit cognitive associations involving self with already-owned and newly-owned objects. We observed faster responses when self-related words required the same response key as the colour that incidentally corresponded to self-owned objects, irrespective of length of ownership. These findings suggest that participants efficiently form cognitive associations between self and self-owned objects within mere minutes of ownership induction and inspire questions about the extent to which length of ownership drives the strength of this association.

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1. Introduction

Psychological ownership is the sensation that a target object belongs to a specific person (Pierce, Kostova, & Dirks, 2001, 2003). Evidence supporting this phenomenological experience comes from effects such as the mere ownership and endowment effects, wherein participants *explicitly* assess self-owned objects to be qualitatively different (e.g. more attractive, more valuable) from unowned and other-owned objects. The widely accepted mechanism for such effects is the elaboration of a strong cognitive association between the object representation and self-concept (Beggan, 1992; Belk, 1988, 1991; Dittmar, 1989, 1991; Furby, 1978; Pierce et al., 2001, 2003). There are only a few studies that have used *implicit* measures to test this hypothesis (Constable, Kritikos, & Bayliss, 2011; Gawronski, Bodenhausen, & Becker, 2007). The present study makes novel use of the Implicit Association Test (self-object IAT) to (1) measure the proposed cognitive associations between owned objects and self-concepts, and (2) access how an object property (i.e. length of ownership) mediated this association.

1.1. Explicit evidence

Much of the explicit evidence for self-association with owned objects comes from studies of the mere ownership and endowment effects. The mere ownership effect reflects a bias whereby participants rate objects that they own as more *attractive* than objects that they do not own (Beggan, 1992). The magnitude of the mere ownership effect positively

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correlates with the activation elicited by the object in the medial pre-frontal cortex (MPFC), an area of the brain associated with self-reflection (Kim & Johnson, 2014).

The endowment effect is observed when participants are asked to provide valuations of the *prices* at which they would buy or sell various items, and tend to overvalue self-owned objects (Beggan, 1991; Kahneman, Knetsch, & Thaler, 1990, 1991). The endowment effect was traditionally explained by loss aversion: a loss is viewed more negatively than the same sized gain is viewed positively (Beggan, 1991; Kahneman et al., 1991). However, the original endowment effect experiments confounded the role as a buyer or seller with ownership; only the sellers were owners, thus the observation that sellers value the items more than buyers might be due to ownership rather than loss aversion. When this confound was eliminated by including buyers who owned an identical object, the owner-buyers valued the items as much as owner-sellers (Morewedge, Shu, Gilbert, & Wilson, 2009). Moreover, the endowment effect is enhanced when ownership is more salient, for example, when owners write about the object's personal meaning (Maddux et al., 2010) or when the object shares a prior link to self (i.e. a mug displaying the individual's university logo; Dommer & Swaminathan, 2013). These insights support a role for ownership in the endowment effect, leading researchers to question whether the mere ownership and endowment effects could be measuring the same phenomenon in different ways (Gawronski et al., 2007). At the root of these effects, positive self-associations are believed to be transferred onto owned objects in a halo effect (associative self-anchoring; Gawronski et al., 2007).

Much of the research supporting the association between self and owned possessions does so by measuring explicit ratings of the objects rather than implicitly accessing the underlying cognitive organization. Explicit knowledge is subject to validation processes, conscious reflection, contextual factors, and the influence of other related implicit activations (Gawronski & Bodenhausen, 2007; Gawronski, LeBel, & Peters, 2007; Strack & Deutsch, 2004). Our understanding of ownership is improved through the use of implicit measures which tap into a different level of knowledge and awareness. Implicit measures are a proxy for the network activations that are the basis for explicit knowledge, and therefore implicit measures offer a potentially less biased approach to examine the self-object association.

1.2. Implicit evidence

Self-tagging refers to the formation of associations between self and novel arbitrary stimuli or concepts. Evidence for self-tagging helps to support the idea that physical objects in ownership contexts might become quickly and easily associated to self. When words are paired with geometric shapes via associative learning, later match/mismatch testing of these shape-word pairs is faster and more accurate for self- than for other-associated shapes (Sui, He, & Humphreys, 2012). Additionally, consumer research experiments demonstrate enhanced implicit favourability towards brands implicitly associated with self via a categorization task (Perkins & Forehand, 2012; Prestwich, Perugini, Hurling, & Richetin, 2010), as well as an implicit self-association with brands incidentally related to self (i.e. appeared on their Facebook page; Perkins & Forehand, 2012, experiment 3). Though these experiments did not induce ownership, per se, the idea that self is easily associated with abstract stimuli implies that the same may be true for physical stimuli.

When interacting with physical objects, object ownership results in biased grasping actions (e.g. trajectory and acceleration measures) which suggest that the visual-motor system is sensitive to associations between self and the object (Constable et al., 2011). Further, ownership is accompanied by enhanced implicit object-positivity (compared to a rejected object) that correlates with implicit self-positivity (Gawronski et al., 2007). This correlation strongly suggests that ownership leads to the transfer of self-associations onto the owned object through a self-object association. In the present experiment, we used a new design to measure this self-object association within a *single* implicit task.

1.3. The present experiment

Using a self-object Implicit Association Test (self-object IAT) we examined the nature of the cognitive relationship between self-representation and ownership, and whether this measure differed between short-term and long-term owned objects. In the IAT, participants categorize stimuli into four categories, using two response keys (Greenwald, McGhee, & Schwartz, 1998). The categories are paired so that two categories require a left key press, while the other two require a right key press. Speed of response reflects associations. For instance, participants categorizing words into categories representing magnitude of sound (e.g. loud versus quiet) and size (e.g. large versus small) would likely perform faster when the categories are compatibly paired (i.e. loud/large and quiet/small) than when they are incompatibly paired (i.e. loud/small and quiet/large). The IAT effect is calculated as reaction time difference between compatible and incompatible blocks, and represents the strength of association between the categorized concepts.

The ownership IAT developed for this experiment measured the relative strength of association between self-representation and self-owned versus other-owned objects. If self-owned objects are cognitively associated with self-concept, then participants should show faster categorization for the compatible pairing in which self and self-owned objects are paired than the incompatible pairing in which self and other-owned objects are paired.

Length of ownership has positive effects on object valuations and attractiveness ratings for currently-owned possessions (Shu & Peck, 2011; Strahilevitz & Loewenstein, 1998). Further, the endowment effect persists for items owned in the past and is enhanced for longer lengths of past ownership, even when the individual no longer owns them (Strahilevitz & Loewenstein, 1998). This effect on an explicit measure related to ownership leads us to question how such variations are

reflected in the implicit cognitive associations since a longer length of ownership allows more experience with the object for greater elaboration of the memory trace. To test this hypothesis, participants completed two IATs, each assessing the association between self-concept and self-owned/experimenter-owned objects. One IAT was used to measure the association to already-owned objects (e.g. the participant's shoes) and the other to newly-owned objects assigned to the participant within the experimental session (e.g. a notebook). A longer time-frame for enhanced elaboration of the owned object with respect to self-concept could result in a greater IAT effect for the already-owned object than for the newly-owned object.

2. Method

Participants were told that the purpose of the experiment was to examine individual differences in object perception. Demographic information and photos of each participant's already-owned objects (i.e. shoes, keys, wallet, and cell phone) were collected to be used as stimuli for the IAT. Subsequently, ownership was induced for the newly-owned objects (i.e. pencil case, notebook, pencil, and pencil sharpener). Participants then completed 2 IATs (already-owned objects and newly-owned objects) and an explicit measure of object preference.

2.1. Participants

Thirty-five McMaster undergraduate students (5 males, mean age = 18.91, SD = 2.17) participated for course credit. The study was approved by the McMaster Research Ethics Board.

2.2. Stimuli

Each IAT required stimuli for four categories: two self-related categories (i.e. Me and Not me), and two colour categories, which incidentally corresponded to ownership status (i.e. self-owned and experimenter-owned). Self-related category words were used in both IATs and collected via demographic questionnaire (see LeBarr, Grundy, Ali, & Shedden, 2015). From this, 16 words were generated for the Me category and participants confirmed that a corresponding set of responses (i.e. Not Me words) were not self-relevant.

To create the colour-category stimuli for the already-owned object IAT, we took photographs of participants' shoes, keys, wallet, and cell phone and used matched photographs of the experimenter's objects. Two different and randomly selected border colours (i.e. either red, blue, green, or black) were applied to photographs of the subject's and the experimenter's objects, providing the basis for categorization in the IAT. Stimuli in the newly-owned object IAT consisted of photographs of four objects (i.e. pencil case, notebook, pencil, and pencil sharpener) of the same colour (i.e. either red, blue, green, or black) presented to participants at the beginning of the session. There was a corresponding set of photographed objects in a different colour owned by the experimenter. The colours were randomly assigned with the constraint that they did not match the colours already selected for the already-owned object IAT.

Colour was used as the basis for object categorization to avoid recoding in the IAT. Recoding occurs when one of the two response tasks is prioritized over the other, so that the IAT effect is due to response activation conflict, rather than association strength between the categories (De Houwer, 2001, 2003; De Houwer, Geldof, & De Bruycker, 2005; De Houwer, Teige-Mocigemba, Spruyt, & Moors, 2009; Fazio & Olson, 2003; Meissner & Rothermund, 2013; Mierke & Klauer, 2001; Rothermund & Wentura, 2001). For instance, in the compatible block, prioritizing the me/not me categorization task and ignoring the ownership categorization task would allow for fast and accurate performance. In contrast, participants would be unable to use this strategy in the incompatible block and would instead have to perform both categorization tasks, therefore enhancing response conflict. By having participants categorize the ownership items by colour, our design set out to reduce at least some of this inherent response similarity.

The IAT stimuli were presented on a 19-inch colour CRT display (resolution of 1600 × 1200, frame refresh rate = 75 Hz), at a distance of 90 cm in front of the chin rest in a dimly lit room. The experiment was controlled by Presentation experimental software (Version 15.0, www.neuro-bs.com) run on a Pentium 4 computer under the Windows XP operating system. Relevant category labels remained on either side of the screen for the duration of each block (vertical visual angle = 2.9°, horizontal visual angles = ±4° from screen centre). Demographic words and photos of objects appeared at screen centre. The category labels and demographic words were presented in 20-point Helvetica font, with a vertical visual angle of 0.4° (horizontal visual angle varied with word length). Object photographs subtended a vertical visual angle of 4.2° and a horizontal visual angle of 3.2°. All stimuli were presented on a black background.

2.3. Procedure

2.3.1. Ownership induction

To induce ownership for the newly-owned object IAT, participants were told they would view objects that would be used in a subsequent object perception task. The experimenter placed two pencil cases on the table and explained that one belonged to the experimenter and that the other was a thank you gift to the participant. Participants were invited to open their pencil case and to examine the objects inside, which included a notebook, pencil, and a pencil sharpener. At the same

time, the experimenter opened their own pencil case to reveal the same items of a different colour. The experimenter recorded her name and contact information in her notebook and asked the participant to do the same to identify the other notebook as their own. The objects were then removed from the room, with the assurance that they would be returned later.

2.3.2. Implicit Association Test

Participants' task was to categorize words and photographs as quickly and as accurately as possible into categories presented on the left or right side of the display ("z" key = left; "/" key = right). Category labels were presented for the duration of the block, with assignment counterbalanced across participants. On each trial, a demographic word or object photograph appeared at the centre of the screen until a response was made. Following incorrect responses, a red "X" appeared above the centre stimulus and participants were required to make the correct response to continue. Following correct responses, a blank screen was presented for 500 ms before the next trial began.

Participants each completed two 5-block IATs in random order; one IAT tested self-association with the already-owned object and the other with the newly owned object. The first two blocks (64 trials each) served as practice with the individual sets of category mappings that would then be combined in block 3, the first of two IAT blocks. In one practice block, participants categorized 32 demographic words (each presented twice) into the Me/Not me categories, while in the other, participants categorized 8 object photos (each presented 8 times) by object/border colour, which incidentally corresponded to ownership status.

Each IAT contained two critical blocks (i.e. IAT blocks 3 and 5) of 128 randomly ordered trials (32 demographic words presented twice and 8 object photos presented 8 times) where participants categorized stimuli into all 4 categories using the two response keys. The 4 categories could be combined compatibly or incompatibly, the order of which (block 3 or block 5) was counterbalanced. In the compatible block, the Me category was paired with the participant-owned object colour and the Not me category was paired with the experimenter-owned object colour. In the incompatible block, the category pairing was reversed. In block 4, participants were presented with a final single-category practice block for the category set that would reverse in the second IAT block. Table 1 illustrates a summary of the sequence of blocks, and Fig. 1 illustrates an IAT block trial sequence.

2.4. Explicit measures

Participants estimated the length of ownership for each of their already-owned objects, and rated how much they liked their own and the experimenter's objects on a 6-point Likert scale. A final question probed awareness of the experimental manipulation or hypothesis.

3. Results

One of the 35 participants was removed from analyses because they terminated the experiment before the IAT was completed. Eight participants guessed that the experiment was about responses to owned objects; excluding these participants did not change the results, therefore reported analyses include 34 participants. Reaction time analyses were conducted on mean values for correct responses with a 2.5 standard deviation outlier cut off.

3.1. Implicit measures

We performed a 2×2 repeated measures ANOVA on reaction time, using the within-subject factors of length of ownership (already-owned and newly-owned object IATs) and IAT category pairing. This revealed a highly significant effect of IAT pairing, $F(1,33) = 62.491$, $p < 0.001$, $\eta^2 = 0.654$. In line with predictions, reaction time was faster for the compatible than the incompatible pairing for both the already-owned object IAT, $t(33) = -7.092$, $p < 0.001$, $d = 0.796$ (compatible = 635.32 ms, SD = 17.16; incompatible = 730.86 ms, SD = 20.70) and the newly-owned object IAT, $t(33) = -4.534$, $p < 0.001$, $d = 0.675$ (compatible = 651.98 ms, SD = 13.44; incompatible = 719.22 ms, SD = 18.54). There were no significant effects of length of

Table 1
Each participant completed the IAT twice; once using the newly-owned objects as stimuli (as shown in this table) and once using the already-owned objects (IAT order counterbalanced across participants). Within each IAT, block order was counterbalanced so that the compatible pairing was either presented first (as block 3, as shown in this table) or second (as block 5).

Block Order	Categorization Task	Number of trials	Left response key category	Right response key category
1	Practice: newly-owned object photos	64	"My object" colour	"Experimenter's object" colour
2	Practice: demographic words	64	"Me"	"Not-me"
3	Compatible categorization of newly-owned objects and demographics	128	"My object" colour and "Me"	"Experimenter's object" colour and "Not-me"
4	Practice: demographics	64	"Not-me"	"Me"
5	Incompatible categorization of newly-owned objects and demographics	128	"My object" colour and "Not-me"	"Experimenter's object" colour and "Me"

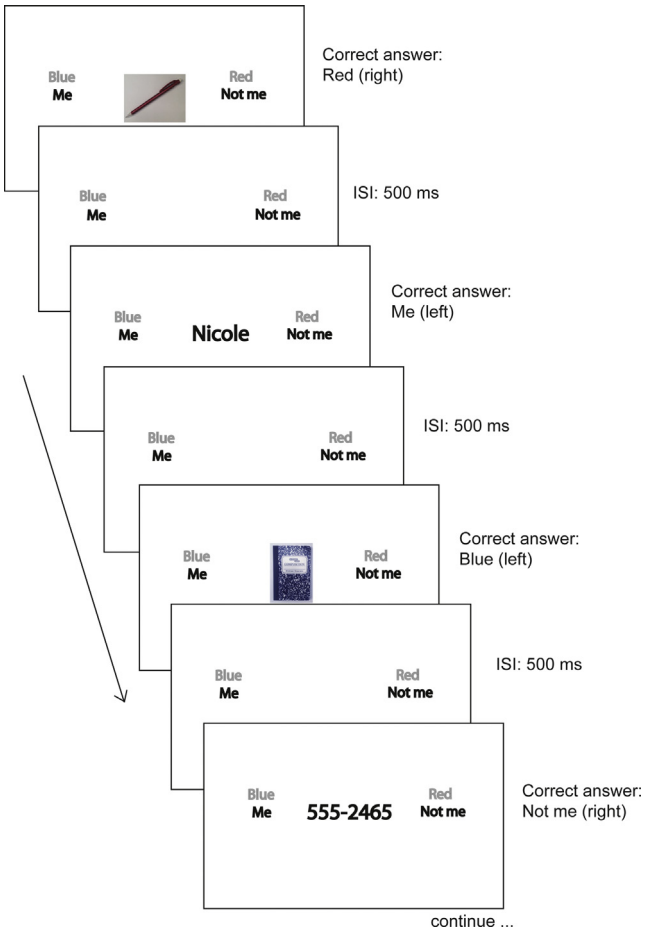

Fig. 1. Sample trial sequence in the self-object IAT.

ownership, F(1,33) = 0.055, p = 0.816, and no interaction between IAT pairing and type, F(1,33) = 2.115, p = 0.155. Proportion accuracy was high for both already-owned (compatible = 0.95; incompatible = 0.95) and newly-owned (compatible = 0.96; incompatible = 0.94) conditions, providing support that there was no speed-accuracy trade-off.

We then asked whether the IAT effect differed for newly-owned and already-owned objects and ruled out order effects. The IAT effect was computed as the difference in reaction time between the incompatible and compatible blocks. We ran a 2×2 mixed model ANOVA on the reaction time IAT effect, using the within-subjects factor of length of ownership and the between-subjects factor of IAT order. We found no significant effects of length of ownership, F(1,32) = 1.944, p = 0.173, of IAT order, F(1,32) = 0.004, p = 0.950, nor the interaction of these two factors, F(1,32) = 0.843, p = 0.365.

As it is common practice in IAT research, effect size, D, was computed as the difference score between compatible and incompatible category pairing conditions divided by the inclusive standard deviation (Greenwald, Nosek, & Banaji, 2003; Lane, Banaji, Nosek, & Greenwald, 2007). The D statistics for both the already-owned (D = 0.598, M = 0.295; sd = 0.272; t(33) = 6.326, $p < 0.001$, d = 1.085) and the newly-owned object IATs (D = 0.515, M = 0.184; sd = 0.312; t(33) = 3.440, $p = 0.002$, d = 0.590) were significantly greater than zero and considered moderate in magnitude. A 2×2 mixed-model ANOVA showed no effect of ownership condition, F(1,32) = 2.5, p = 0.124, of IAT order, F(1,32) = 0.441, p = 0.512, nor the interaction, F(1,32) = 0.155, p = 0.696.

3.2. Explicit measures

Analyses of explicit responses were done by averaging across participants' ratings of the individual objects to obtain mean preference for self-owned and experimenter-owned objects in both the newly-owned and already-owned object conditions. We then created preference scores by subtracting preference for the experimenter-owned objects from preference for the self-owned objects, so that a positive score denoted preference for one's own over the experimenter's objects. Single-sample t-tests revealed that for the already-owned objects this score was significantly greater than zero, t(33) = 4.971, p < 0.001, d = 0.334; participants therefore preferred their own objects over those belonging to the experimenter. This effect

was marginally significant for the newly-owned object condition, $t(33) = 1.950$, $p = 0.06$, $d = 0.853$, indicating that preference for one's own object over the experimenter's object was stronger for a longer length of ownership, $t(33) = -4.077$, $p < 0.001$, $d = 0.807$.

4. Discussion

We used a new version of the IAT to assess the association between self and owned objects within a single implicit task. Specifically, responses were faster when self-related words required the same response as self-owned objects than when they required different responses. This implicit effect reflects the hypothesized internal organization characterized by enhanced cognitive association strength between self-concept and self-owned objects relative to experimenter-owned objects. Within this same group of participants, we replicated the explicit preference for self-owned over other-owned objects (i.e. the mere ownership effect; Beggan, 1992) and the enhanced explicit favourability displayed towards objects owned over a longer span of time (Shu & Peck, 2011; Strahilevitz & Loewenstein, 1998). Importantly, length of ownership did not have an observable effect on the strength of the implicit self-object association. Thus, there is a tentative conclusion that the cognitive association measured by the IAT between self and owned objects is independent of length of ownership. At the very least, we suggest that self-associations are definitely present for the newly-owned objects and may arise simply due to ownership induction.

The instant endowment effect (Kahneman et al., 1990) is just one of many experiments that use explicit measures to reveal the immediate effects of ownership for newly-owned objects (Beggan, 1992; Dommer & Swaminathan, 2013; Gawronski et al., 2007; Kahneman et al., 1990, 1991; Maddux et al., 2010; Morewedge et al., 2009; Strahilevitz & Loewenstein, 1998). These effects occur quickly even when ownership is simply imagined (Cunningham, Brady-Van den Bos, & Turk, 2011; Cunningham, Turk, Macdonald, & Macrae, 2008; Huang, Wang, & Shi, 2009; Kim & Johnson, 2012; Kim & Johnson, 2014; Shi, Zhou, Han, & Liu, 2011; Van den Bos, Cunningham, Conway, & Turk, 2010). The present finding that the cognitive self-object association occurs almost immediately (i.e. within minutes) following ownership induction is consistent with these effects. The strength and automaticity with which associations between self and owned objects are formed has important implications for the real world, as this association is believed to be at the root of psychological feelings of ownership.

We found that longer length of ownership had a positive effect on explicit object preference, but found no significant difference between the size of the IAT effect observed for already-owned and newly-owned objects. Although this is a null effect, it inspires questions about the extent to which length of ownership drives the strength of the self-object association. Note also that this observation was made by comparing effects across separate IATs; to further support the finding that the associations between self and owned objects are independent of length of ownership, an important next step will be to more directly compare association strengths between self and already-owned versus newly-owned objects within the same IAT.

One factor that could have led to the rapidly formed association in the newly-owned object condition was the opportunity during ownership induction to touch one's own objects, but not the experimenter's. Physically touching or using an object is known to produce explicit ownership effects (Belk, 1988; Peck & Shu, 2009; Prelinger, 1959; Wolf, Arkes, & Muhanna, 2008). However, effects observed as a result of imagined ownership (Cunningham et al., 2008, 2011; Huang et al., 2009; Kim & Johnson, 2012, 2014; Shi et al., 2011; Van den Bos et al., 2010) and self-association to non-physical objects (Perkins & Forehand, 2012; Prestwich et al., 2010; Sui et al., 2012) suggest that the observed effect is likely to have occurred in the absence of physical touch. There is, however, a possibility that touching accelerated or strengthened the association formed.

The development and testing of a self-object IAT offers an important contribution to the field of implicit ownership research. Further research should explore variations of the ownership IAT as well as additional implicit measures to assess ownership. Here we tested whether length of ownership affected the ownership IAT; but it would be useful to look at other factors known to produce ownership effects, such as having chosen the object (Belk, 1988; Gawronski et al., 2007; Huang et al., 2009), investing creative labour into the object (Kanngiesser, Gjersoe, & Hood, 2010) and having an existing emotional tie to the object (e.g. family keepsakes). Though our IAT design reduced the opportunity for recoding, we cannot be certain it was removed entirely. As such, replication using implicit techniques that eliminate recoding (e.g. associative priming, Extrinsic Affective Simon Task) would strengthen the present findings and provide important new designs for the implicit study of ownership.

5. Conclusions

A novel adaptation of the IAT (the self-object IAT) found that individuals efficiently form associations between self and owned objects within mere minutes of ownership induction. This is one of the few non self-report studies to provide support for the prominent hypothesis that ownership leads to the formation of self-object associations. Interestingly, newly-owned object associations did not differ from already-owned object associations, therefore it is possible that they do not depend on length of ownership. Therefore, mere ownership appears to be sufficient to forge strong associations between self and owned objects.

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