Impact of ownership on liking and value: Replications and extensions of three ownership effect experiments

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Yajing worked under the supervision of Gilad at Maastricht University for conducting the pre-registered replication and meta-analysis on ownership effect as part of Yajing's masters thesis. Yajing wrote the pre-registration of the first data collection, with verification and registration by Gilad. Yajing summarized the methods and results and wrote an initial draft. Donna Yao and Gilad wrote the first journal submission draft, with verification of analyses and results, and write-up of the relevant literature and implications. Following review, second data collection was designed, pre-registered, and conducted by Gilad. Ignazio analyzed the results, ran additional analyses, and revised the manuscript for submission, addressing all review comments, twice. Gilad coordinated the efforts, and finalized the manuscript for submission.

Abstract

The ownership effect is the phenomenon that owning an object increases liking and perceived value of that object (Beggan, 1992). We conducted close replications of three ownership effect experiments using different paradigms in two data collections (MTurk, total n = 1312). We successfully replicated Nuttin's (1987) name-letter effect with participants rating a higher liking for letters of the alphabet included in their first names (vs. letters not included) (Study 1: d = 1.08 to 1.42). We found partial support for Mandel (2002), with participants indicating higher price for an object when they were the owners (vs. non-owners) (original: d = 0.50; Study 3a: d = 0.65; Study 3b: d = 0.49), but mixed findings regarding the hypothesized moderator. Finally, we failed to find support for Irmak, Wakslak, and Trope's (2013) study that showed differences in prices set by sellers/owners and buyers (original: d = 0.99; Study 2a: d = 0.10; Study 2b: d = 0.01 to 0.06). Our results suggest that ownership effects may depend on the paradigm of choice. We discuss potential moderators of the ownership effect and suggest future research directions. Materials, datasets, and code are available on https://osf.io/2cg3e/ .

Keywords: ownership; ownership effect; subjective valuation; judgment and decision-making; replication

Impact of ownership on liking and value: Replications and extensions of three ownership effect experiments

The ownership effect is the phenomenon that people tend to value what they perceive to own more than what they perceive not to own (Beggan, 1992). The ownership effect has, over the past four decades, received substantial scholarly attention across several disciplines including but not limited to psychology, management, economics, consumer behavior, and law. The effect suggests that human beings are not fully rational in object valuation (Kahneman, 2003) and that valuations may be biased depending on the perceiver's thoughts and feelings towards the object (Beggan, 1992). In wider economic transactions, ownership effects may lead to market inefficiency and reluctance to trade (Morewedge & Giblin, 2015).

Nuttin (1987) was among the first to demonstrate that people preferred letters that appear in their names more than letters that do not. Later, Beggan (1992) extended the paradigm to demonstrate the importance of psychological ownership by differentiating the ownership effect from the exposure effect (Zajonc, 1968) and the endowment effect (Thaler, 1980). Ownership effects have been demonstrated on a variety of objects, both material and immaterial (e.g., Baer & Brown, 2012; Barone, Shimp, & Sprott, 1997; Beggan, 1992; Morewedge, Shu, Gilbert, & Wilson, 2009), yet the generalizability and robustness of the effect remains unclear. For example, in an attempt to replicate and extend Beggan's (1992) studies, Barone et al. (1997) found weak to no support for the effect. They suggested that this effect might "simply represent a form of experimenter bias" (Barone et al., 1997, p. 257). In

addition, in a series of studies Baer and Brown (2012) found that the effect size of the ownership effect varied considerably across paradigms and contexts.

The inconsistent findings in the literature may arise from two main issues. The first issue concerns statistical power and its impact on the observed effect size and null hypothesis significance testing. Several studies with small sample sizes observed moderate-to-strong effects (e.g., Nesselroade, Beggan, & Allison, 1999; Study 3; $N = 22$, $d = 1.19$; Nikander, Liikkanen, & Laakso, 2014; Study 1; $N = 18$, $d = .94$), whereas other studies with larger sample sizes reported relatively weak to null effects (e.g., Barone et al., 1997; Study 1; $N = 149$, $d = .007$; Peck & Shu, 2009; Study 1; $N = 231$, $d = .39$). Small samples generally produce noisy effect size estimates, thus they may both fail to detect weak effects and overestimate effect sizes. Well-powered replications are needed in order to evaluate the robustness of original findings.

The second issue concerns the various paradigms used in examining ownership effects. For example, ownership effects are sometimes confused with the endowment effect (Thaler, 1980). The endowment effect traditionally examines endowment through selling-buying paradigms, assesses economic monetary valuations as outcomes, and demonstrates an asymmetry between a seller's willingness to accept valuations and a buyer's willingness to pay. Ownership effects extend beyond monetary value to broader psychological evaluations and attitude (valence, liking, affiliation; Beggan, 1992) and do not necessarily involve a change in status from owning to not-owning associated with loss aversion (Kahneman & Tversky, 1979; Thaler, 1980). Ownership seems to be one of the core mechanisms that drives

the endowment effect (Barone et al., 1997; Morewedge & Giblin, 2015), by increasing liking of objects (and subsequent willingness to pay/accept) for sellers compared to buyers. Following this line of reasoning, all studies of the endowment effect can be regarded as studies of ownership, but not all studies of ownership can be regarded as studies of the endowment effect. However, endowment effect studies introduce several additional factors to ownership effects (e.g., monetary evaluation, buyer and seller conditions), which may introduce inconsistency and variation in the observed effect size (in a way akin to changes in stimulus; cf. Westfall, Judd, and Kenny, 2015).

Replicated studies and extensions

This work served two main goals. First, we examined the robustness of the ownership effect with regard to different relevant outcomes (e.g., price, liking, valuation). Second, we tested the robustness of specific moderators of the ownership effect. To achieve these goals, we employed two well-powered samples to conduct very close replications and extensions of three studies of ownership effects using different paradigms. The three chosen targets for replications were: (1) Nuttin's (1987) name-letter study, and (2) Irmak, Wakslak, and Trope's (2013; Study 2) and (3) Mandel's (2002; Study 1) studies on the ownership effect.

We chose Nuttin's (1987) study because it is considered as one of the first experimental tests for ownership effects (Beggan, 1992). This is a test of mere psychological ownership, since it does not involve "buyer" and "seller" conditions or a monetary dependent variable. In the original experiment, 2047 participants using 12 different languages were instructed to spontaneously select six letters of the alphabet that they found the most

attractive, and to rank these letters in their order of preference. Participants generally preferred letters that were in their names (probability = .30) to letters that were not in their names (probability = .20). This effect was particularly strong for letters included in participants' first names (probability = .33). The name-letter paradigm demonstrated that ownership effects can apply to intangible assets that involve little to no personal choice. Over the years it has served as an implicit self-esteem tool used to assess implicit positive feelings attached to the self (e.g., Kitayama & Rarasawa, 1997; also see Hoorens, 2014).

We chose the Irmak et al. (2013; Study 2) and Mandel (2002; Experiment 1) studies because of three reasons. First, following Morewedge and Giblin (2015), being tests of the endowment effect, they are also tests of ownership effects (since ownership is one of the factors of the endowment effect), and both employ scenario wording implying ownership of the goods in question. Second, they both include theoretically meaningful moderators that can elucidate the nature of ownership effects. Third, they employ simple designs and straightforward stimuli. As a primary goal, Irmak et al. (2013) examined price discrepancy between a seller/owner's willingness-to-accept and a buyer's willingness-to-pay. Further, in their Study 2, Irmak et al. (2013) explored whether the different construal levels adopted by sellers/owners versus buyers served as a boundary condition of the endowment effect. They argued that sellers tend to think of products at a higher (more abstract) level, and therefore focus more on goal-relevant product features, which are more consistent with the goals for which the product is used (e.g., artistic features of a camera are relevant for the goal of taking artistic pictures), than goal-irrelevant, secondary ones (e.g., the bulk and size of the camera).

Buyers, on the contrary, are more likely to see themselves as using products. This leads buyers to construe products at a lower (more concrete) level, and to give goal-relevant and goal-irrelevant features similar weight. Manipulating the role of the participants (buyer/owner vs. seller) and the superiority of goal-relevant product features over goal-irrelevant ones, Irmak et al. (2013) found that American undergraduate participants (n = 60) set a higher price when they were sellers/owners compared to when they were buyers. They also found an interaction effect between role and feature on price, such that sellers/owners set higher prices than buyers did when the goal-relevant features were superior, but not when goal-irrelevant features were. So far, to our knowledge, there have been no direct replications of this study.

Mandel (2002) showed that the ownership effect was moderated by interest in the transaction of one of the two parties involved (termed "transaction demand"). In his Experiment 1, Mandel (2002) used the classic “wine problem” (Frisch, 1993; Thaler, 1980), and manipulated ownership (participant owns the product vs. merchant owns the product) and transaction demand (participant seeks to buy/sell vs. merchant seeks to buy/sell). Findings from 80 British undergraduate participants found support for the main effect of ownership, such that participants offered a higher price when they owned the product than when the merchant owned the product. More importantly, there was a significant interaction between ownership and transaction demand on price: when participants owned the wine bottle, participants offered a lower price if the they wanted to sell the product (high transaction demand of the participant) than when the merchant wanted to buy the product. Conversely, when the merchant owned the wine bottle, participants offered a higher price when they

wanted to purchase (high transaction demand of the participant) than when the merchant wanted to sell. That is, when transaction demand was high, the decrease of sellers' willingness to accept and the increase of buyers' willingness to pay mitigated the endowment effect. To the best of our knowledge, there have been no direct replications of this study.

Method overview

Participants and Data Collection

The present investigation included two data collection waves. For the first wave, a total of 311 Americans from MTurk were recruited using TurkPrime.com (Litman, Robinson, & Abberbock, 2017) (146 males, 165 females; M_{age} = 39.65, SD_{age} = 12.82). The first data collection included Studies 1, 2a, and 3a, which all participants completed in the following order: Study 1 was a replication of Nuttin (1987)'s experiment, Study 2a was a replication of Irmak et al. (2013) Study 2, and Study 3a was a replication of Mandel (2002) Experiment 1.

We conducted a second wave data collection, meant to address feedback received on the first data collection, examining the robustness of our first findings and adding extensions that tested factors which may affect replicability. We provide an overview of the changes from the first to the second data collection in Table 1 and Table 2. The time-gap between the two data collections was about two years. The second data collection included a total of 1001 Americans from MTurk, recruited using TurkPrime.com (503 males, 494 females, 4 other/rather not disclose; M_{age} = 37.41, SD_{age} = 12.01). This wave included Study 2b and Study 3b. Study 2b was a replication and extension of Study 2a above, and Study 3b was a replication and extension of Study 3a also above. All participants answered both parts, which

were presented in randomized order to address any possible order effects in the first wave. Participants who participated in the first data collection were not allowed to participate in the second data collection.

Adjustments to experiments

We aimed to follow the original designs as closely as possible, yet made several adjustments to suit online data collection with MTurk and related survey administration issues. First, we aimed to ensure response quality by adding comprehension checks to some of the studies to ensure that participants carefully read and understood the scenarios. To ensure these had no effect, in the second data collection we tested whether comprehension checks had any impact on the replications. Second, since MTurk guidelines prohibit the use of identifiable personal details of MTurk workers, we were unable to obtain full-range information needed for Nuttin's (1987) name-letter study. Thus, we merely asked workers about their first names, notified participants clearly before and during the survey that this detail would be requested, and specified that the provision would be optional (more details provided below). We also tested extensions to examine (1) the link between Nuttin's name letter effect and the ownership effect, and (2) the consistency across the two ownership effect studies.

Pre-registration and Open-Science

In both data collections, we first pre-registered the experiments on the Open Science Framework and data collections were launched soon after. The pre-registration for the second data collection also included planned code for data analysis. Pre-registration, power analyses,

and all materials used in the experiments are available in the supplementary materials. These together with the data and code were shared on the Open Science Framework - Project: https://osf.io/2cg3e/ ; First data collection pre-registration: https://osf.io/96aw7; Extensions pre-registration: https://osf.io/zya9n; Second data collection pre-registration: https://osf.io/9kxye/.

Outline

We present our studies in a sequence that reflects the original experiments we aimed to replicate. Study 1 is a replication of Nuttin (1987); Study 2a and Study 2b are replications of Irmak et al. (2013); Study 3a and Study 3b are replications of Mandel (2002).

Study 1: Replication of Nuttin (1987)

Method

The study began with a brief introduction of the task:

> In the first part you will be presented with the letters of the alphabet. You will be asked to choose the six letters of the alphabet which you like the most. After choosing your favorite six letters, we will ask you to rank them in order of preference, from your most liked letter to your least liked letter.

The 26 English letters were then presented in alphabetical order. Participants were asked to choose six favorite letters. After participants selected the letters, they were asked to rank them:

> Below are the six letters you indicated are your favorite. We now ask that you rank them from the most liked (rank #1) to the least liked (rank #6). Simply write 1 next to your favorite letter, 2 next to your second most favorite letter, and so on till 6 next to your least favorite letters in this selection.

Participants then proceeded to the other experiments, and were asked to report their first name in the demographics section at the end of the study:

> As explained in the study recruitment and the consent form presented to you at the beginning, at this final part of the questionnaire **we are asking you to write down your first name**. First name only, no need to give us your last name.
>
> Note: This field is -**optional**-, and we will explain why we are asking for this detail in the next page. This detail is related to a specific research hypothesis we have for this study. For the study to be successful, it is important that you report this honestly and accurately. Answering this incorrectly will invalidate our results, so if you don't feel comfortable answering this, please don't answer this question at all.
>
> Importantly, your answers will be kept 100% confidential and will only be used for research purposes to test a specific research question.

Participants who reported their first name were provided with an explanation of the research question and ownership effect, and were asked to verify whether the name they provided was indeed their real name:

> Now that you understand the purpose of the question, please indicate - did you write down your real name? It's okay if you didn't, but we need to know so that your answer would not bias our findings.

Measures

Liking. Participants were asked to select six favorite letters out of the 26 letters in the alphabet. For each participant's response, we assigned 1 point to a selected letter and 0 point

to an unselected letter. For each letter, we calculated its average likelihood of being selected when it was in the participant's first name and when it was not, respectively.

Ranking. Participants ranked their six favorite letters from 1 (the most liked) to 6 (the least liked). We reversed the rankings to align with importance (0 = *not ranked*; 1 = *lowest*; 6 = *highest*). We calculated the mean ranking of a selected letter when it was in the participant's first name and when it was not, respectively.

Results

Liking. Results for liking are summarized in Table 3, and plotted in Figure 1. Consistent with the original findings, a two-sample Chi-Square test for equality of proportions revealed that letters in first names (M = .40, SD = .21) were liked more than letters not in first names (M = .20, SD = .12; χ^2 (1) = 11, p = .001; $t(25) = 5.48$, $p < .001$, d = 1.08 [0.59, 1.58])

Ranking. Results for ranking are summarized in Table 4, and plotted in Figure 1. For ease of interpretation and alignment with the liking measure, rankings were reversed so that higher ranking indicated higher liking. A student t-test for unequal variances revealed that, as expected, the average ranking of letters in first names (M = 1.80, SD = .92) were higher than letters not in first name (M = .67, SD = .44; $t(24) = 6.93$, $p < .001$, d = 1.42 [0.84, 1.97]).

We concluded that these findings represent a successful replication of Nuttin (1987).

Study 2a: First Replication of Irmak, Wakslak, and Trope (2013) Study 2

Participants were randomly assigned to one of four conditions in a 2 (ownership: buyer vs. seller) X 2 (superior features: goal-relevant vs. goal-irrelevant) between-participants design. In each condition, participants first read a brief scenario as follows (bold and italics not displayed to participants and only meant to highlight the differences between conditions):

> Ownership and goal-relevant condition (seller/relevant superior): Imagine that you *want to sell* an advanced camera for taking artistic pictures. Your camera has **all of the sophisticated features** that an art photographer needs. However, the camera is a little **bulky and heavy**, so it is not easy to carry around with you.
>
> Ownership and goal-irrelevant condition (seller/irrelevant superior): Imagine that you *want to sell* an advanced camera for taking artistic pictures. Your camera **has only some of the sophisticated features** that an art photographer needs. However, the camera is **compact and light**, so it is easy to carry around with you.
>
> No-ownership and goal-relevant condition (buyer/relevant superior): Imagine that you *want to buy* an advanced camera for taking artistic pictures. You have been offered a camera, which has **all of the sophisticated features** that an art photographer needs. However, the camera is a **little bulky and heavy**, so it is not easy to carry around with you.
>
> No-ownership and goal irrelevant condition (buyer/irrelevant superior): Imagine that you *want to buy* an advanced camera for taking artistic pictures. You have been offered a camera, which **only has some of the sophisticated features** that an art photographer needs. However, the camera is **compact and light**, so it is easy to carry around with you.

The scenario was followed by two comprehension questions – "who is selling the camera?" and "who is buying the camera?" (options in both: someone else / you).

Measures

Consideration. Participants were asked to indicate the extent to which the selling/buying price they set was affected by the goal-relevant primary features of the camera ("how much was the price you set affected by the features of the camera?"), and the extent to which the price was affected by the goal irrelevant secondary features of the camera ("how much was the price you set affected by the weight and size of the camera?") (both on 10-point Likert scale: 1 = *not at all*, 10 = *very much*).

Pricing. Participants provided camera price estimates: "considering that similar cameras are sold in the range of $400–$1000". Participants in the seller conditions were asked, "if someone who is looking to take artistic pictures wants to buy your camera, what would your minimum price be?". Participants in the buyers conditions were asked, "if you want to buy this camera, what would your maximum price be?".

Results

We first tested whether participants considered goal-relevant features (artistic) more than goal-irrelevant features (weight and size), and then proceeded to test liking.

Consideration. Means, standard deviations, and Cohen's *d*s for consideration are presented in Table 5. In a mixed ANOVA, we found an effect for within-subjects goal relevance ($F(1, 309) = 313.65$, $p < .001$, $\eta_p^2 = .24$), very weak to no effect for between-subjects ownership ($F(1, 309) = 0.12$, $p = .73$, $\eta_p^2 < .001$) and very weak to no effect for an

interaction between ownership by goal-relevance ($F(1, 309) = 0.56$, $p = .46$, $\eta_p^2 = .002$). Overall, as expected, participants were more likely to consider artistic features as goal relevant ($M = 7.48$, $SD = 2.14$) than weight and size ($M = 6.15$, $SD = 2.68$; $d = .41$) when deciding on a price, and this (unlike in the original finding) did not vary much across condition.

Key Results: Pricing. Means, standard deviations, and Cohen's *d*s for the liking ratings are presented in Table 6, and plotted on Figure 2. We conducted an independent samples t-test and failed to find support for a main effect of ownership on price (seller: $M = 537.04$, $SD = 153.90$; buyer: $M = 521.98$, $SD = 157.97$, $t(309) = .85$, $p = .395$, $d = 0.10$), inconsistent with the target article's findings. Another independent samples t-test revealed a weak main effect of goal relevance on price, such that the price was higher when the superior features of the object were goal-relevant ($M = 547.02$, $SD = 161.52$) than goal-irrelevant ($M = 512.17$, $SD = 148.54$, $t(309) = 1.98$, $p = .048$, $d = .22$). A two-way analysis of variance (ANOVA) failed to find support for an interaction between ownership and goal relevance on price ($F(1, 308) = .46$, $p = .501$, $\eta_p^2 = .001$), inconsistent with the target article's findings.

We concluded that these findings represent a failed replication of both the ownership effect and the moderation of the ownership effect by goal relevance.

Study 2b: Second Replication of Irmak, Wakslak, and Trope (2013), Study 2

Method

Design and Procedures

We added several extensions to the second replication of Irmak et al. (2013), outlined in Table 1. Participants were randomly assigned to one of twelve conditions in a 3 (ownership: seller vs. owner vs. buyer) X 2 (superior features: goal-relevant vs. goal-irrelevant) X 2 (price range vs. no price range) between-participants design. In each condition, participants first read a brief scenario as follows (bold and italics not displayed to participants and only meant to highlight the differences between conditions):

> Ownership and goal-relevant condition (owner/relevant superior): Imagine that you *have* an advanced digital single-lens reflex camera (DSLR) camera for taking artistic pictures. Your DSLR camera has **all of the sophisticated features** that an art photographer needs. However, the camera is **a little bulky and heavy**, so it is not easy to carry around with you.
> Someone who is looking to take artistic pictures wants to buy your camera.
>
> Ownership and goal-irrelevant condition (owner/irrelevant superior): Imagine that you *have* an advanced digital single-lens reflex camera (DSLR) camera for taking artistic pictures. Your DSLR camera has **only has some of the sophisticated features** that an art photographer needs. However, the camera is compact and light, so it is easy to carry around with you.
>
> Someone who is looking to take artistic pictures wants to buy your camera.
>
> Seller and goal-relevant condition (seller/relevant superior): Imagine that you *want to sell* an advanced digital single-lens reflex camera (DSLR) camera for taking artistic pictures. Your DSLR camera has **all of the sophisticated**

features that an art photographer needs. However, the camera is **a little bulky and heavy**, so it is not easy to carry around with you.
Someone who is looking to take artistic pictures wants to buy your camera.

Seller and goal-irrelevant condition (seller/irrelevant superior): Imagine that you *want to sell* an advanced digital single-lens reflex camera (DSLR) camera for taking artistic pictures. Your DSLR camera has **only has some of the sophisticated features** that an art photographer needs. However, the camera is **compact and light,** so it is easy to carry around with you.

Someone who is looking to take artistic pictures wants to buy your camera.

No-ownership and goal-relevant condition (buyer/relevant superior): Imagine that you *want to buy* an advanced digital single-lens reflex camera (DSLR) for taking artistic pictures. You have been offered a camera, which has **all of the sophisticated features** that an art photographer needs. However, the camera is a **little bulky and heavy**, so it is not easy to carry around with you.

No-ownership and goal irrelevant condition (buyer/irrelevant superior): Imagine that you *want to buy* an advanced digital single-lens reflex camera (DSLR) for taking artistic pictures. You have been offered a camera, which **only has some of the sophisticated features** that an art photographer needs. However, the camera is **compact and light**, so it is easy to carry around with you.

We note that “seller” and the “owner” conditions both imply ownership and – at different points in the experimental procedure – being involved in a potential sale. We decided to name these conditions as "seller" and "owner" for simplicity differentiating desire and/or intent in making the sale.

The scenario was followed by five comprehension questions in random order: “who is selling

the camera?" and "who is the potential buyer of the camera?" (both: someone else/you), "what type of camera is the scenario about?" ("a mobile phone camera"/"an advanced DSLR camera for taking artistic picture"), "which of the following best describes the camera in the scenario?" ("has all of the sophisticated features an art photographer needs" / "has only some of the sophisticated features an art photographer needs"), "which of the following best describes the camera in the scenario?" ("little bulky and heavy and not easy to carry around" / "compact and light so easy to carry around"). Participants had to answer these questions correctly before proceeding to the measures on the next page.

Measures

Consideration. Participants were presented with the same consideration questions as in the first data collection, in random order (both on a 10-point Likert scale: 1 = *not at all*, 10 = *very much*).

In addition, in this data collection participants were also asked to indicate "Which of the two features is more important for an art photographer who is looking to buy an advanced camera for taking artistic pictures" ("DSLR camera has all of the sophisticated features that an art photographer needs" / "DSLR camera is compact and light so easy to carry around"). The added measure was meant to further test whether participants indeed understood the manipulations as intended.

Pricing. Participants were randomly assigned to one of two versions of pricing questions, asked for either a price without providing a range or asked to answer in the original $400–$1000 range ("considering that similar cameras are sold in the range of $400–

$1000”). This was meant to test whether the range displayed in the first data collection affected the results.

Participants in seller and owner conditions were asked, “if someone who is looking to take artistic pictures wants to buy your camera, what would your minimum price be?”. Participants in the buyer conditions were asked, “if you want to buy this camera, what would your maximum price be?”.

Results

We first tested whether participants considered goal-relevant features (artistic) more than goal-irrelevant features (weight and size), and then proceeded to test liking.

Consideration ratings. Means and standard deviations for consideration ratings, serving as the manipulation checks, are presented in Table 8.

In a repeated-measures ANOVA with considered features (artistic vs. weight and size) as the within-subjects factor and ownership as the between-subjects factor we found an effect for features ($F(1, 998) = 313.65$, $p < .001$, $\eta_p^2 = .239$), an effect for ownership ($F(2, 998) = 6.65$, $p = .001$, $\eta_p^2 = .013$), and an effect for an interaction of ownership and feature ($F(2,998) = 4.27$, $p = .014$, $\eta_p^2 = .008$). Participants were more likely to indicate that they based their pricing decisions on the artistic features of the camera than on the weight and size of the camera ($d = .56$). This difference was weaker, but still statistically significant and in the same direction in the buyer condition (buyer $d = .43$: owner $d = .65$; seller $d = .60$; all $ps < .001$) compared the other conditions. Results relative to the dichotomous choice between features are reported in the supplementary materials.

Key Results: Pricing. Means and standard deviations are provided in Table 9 and plotted in Figure 4.

We conducted an independent t-test to test goal relevance and failed to find support for a main effect on pricing (goal-relevant features: M = 516.17, SD = 379.76; goal-irrelevant features: M = 461.99, SD = 890.60; $t(999) = 1.25$, $p = .21$, $d = .08$).

We conducted a one-way ANOVA and found no support for a main effect of ownership ($F(2, 998) = .68$, $p = .51$, $\eta_p^2 = .001$). Planned contrasts correcting for multiple comparisons using Tukey's method showed no support for differences between buyer (M = 503.48, SD = 1072.82) and owner conditions (M = 510.22, SD = 412.78; t (998) = - .13, p = .99, d = .01), differences between buyer and seller conditions (M = 453.66, SD = 311.38; $t(998) = .94$, $p = .62$, $d = .06$), and for differences between owner and seller conditions ($t(998) = 1.07$, $p = .54$, $d = .16$).

An ANOVA of ownership, goal relevance, and pricing range as between-subjects factors showed only a very weak two-way interaction between ownership and goal relevance ($F(2, 989) = 3.15$, $p = .043$, $\eta_p^2 = .006$), which was driven by the difference between the owner and the buyer condition. Due to the very weak effect (less than one-tenth of the original one, $\eta_p^2 = .072$), we suggest caution in overinterpreting these findings. See supplementary materials for further analyses.

Conclusion

In line with our findings in the first data collection Study 2a, we also conclude that the second data collection was a failed replication of the ownership effect, and an inconclusive replication of the interaction between ownership effect and goal relevance.

Study 3a: First Replication of Mandel (2002), Experiment 1

Participants were randomly assigned to one of the four conditions in a 2 (ownership: seller vs. buyer) X 2 (transaction demand: participant vs. merchant seeks to buy/sell) between-participants design. In each condition, participants read a brief scenario as follows (bold and italics not displayed to participants and only meant to highlight the differences between conditions):

> Seller & other party is interested in buying: A decade ago, *you purchased* a case of good wine for £5 per bottle. **A wine merchant is now interested in buying** the case. How much would you be willing to sell it for per bottle?
>
> Seller & interested in selling: A decade ago, *you purchased* a case of good wine for £5 per bottle. **You are now interested in selling** the case to a wine merchant. How much would you be willing to sell it for per bottle?
>
> Buyer & other party is interested in selling: A decade ago, *a wine merchant purchased* a case of good wine for £5 per bottle. **He is now interested in selling** the case. How much would you be willing to buy it for per bottle?
>
> Buyer & interested in buying: A decade ago, *a wine merchant purchased* a case of good wine for £5 per bottle. **You are now interested in buying** the case. How much would you be willing to buy it for per bottle?

The scenario was followed by three comprehension questions – "who is the potential seller?", "who is the potential buyer?", "who is more interested in making this deal happen?" (choices in all: merchant / you).

Measures

Price. Participants in the seller condition were asked, "considering that you purchased the wine for £5 per bottle, how much would you be willing to sell it for per bottle?". Participants in the buyer condition were asked, "considering that the merchant purchased the wine for £5 per bottle, how much would you be willing to buy it for per bottle?". Following Mandel (2002) and our pre-registered data analyses plan, we log-transformed the prices to reduce the skewness of this measure. Results with prices that were not transformed were available in the supplementary information.

Results

Means, standard deviations, and Cohen's *d*s are summarized in Table 7 and plotted in Figure 3.

In an independent samples t-test we found a medium to strong ownership effect, with sellers' mean log price (M = 2.71, SD = .85) higher than buyers' mean log price (M = 2.21, SD = .68; $t(295.06) = 5.71$, $p < .001$, $d = .65$). This is consistent with the ownership effect hypothesis. Another independent samples t-test found no support for a main effect of transaction demand on mean log price (merchant interested: M = 2.53, SD = .87; participant interested: M = 2.40, SD = .74; $t(309) = 1.36$, $p = .175$, $d = .16$).

In a two-way ANOVA we found a weak interaction between ownership and transaction demand on mean log price ($F(1, 307) = 5.87$, $p = .016$, $\eta_p^2 = .019$). Ownership effects were found in both conditions, but the effect was weaker when the merchant was interested in the transaction ($t(153) = 2.10$, $p = .037$, $d = .34$) than when the participant was ($t(154) = 6.77$, $p < .001$, $d = 1.08$). These findings were consistent with the target article hypotheses and findings.

We concluded that these findings represent a successful replication of both the ownership effect and the moderation effect of transaction demand.

Study 3b: Second Replication of Mandel (2002), Experiment 1

We made adjustments and added extensions to the design of the first data collection as summarized in Table 10 (e.g., comprehension checks presentation; currency in US dollar, etc.).

Participants were randomly assigned to one of the eight conditions in a 2 (ownership: owner vs. non-owner) X 2 (transaction demand: interested vs. not interested) X 2 (comprehension checks presented vs. not presented) between-participants design.

Measures

We used the same materials as in Study 3a to manipulate ownership and transaction demand.

Comprehension checks. Half of the participants were randomly selected to complete three comprehension questions – "who is the potential seller?", "who is the potential buyer?", "who is more interested in making this deal happen?" (choices for all three questions:

merchant / you). The other half participants did not read any comprehension questions. The version with comprehension questions was similar to the design of Study 3a in the first data collection. The version without comprehension questions was closer in design to the original Mandel (2002).

Price. Participants in the seller conditions were asked, "considering that you purchased the wine for $5 per bottle a decade ago, how much would you be willing to sell it for per bottle (in US$)?". Participants in the buyer conditions were asked, "considering that the merchant purchased the wine for $5 per bottle a decade ago, how much would you be willing to buy it for per bottle (in US$)?".

Results

Means, standard deviations, and Cohens *d*s are presented in Table 10 and plotted in Figure 5.

Key results: Price. An independent t-test found an effect of ownership, as participants in the seller condition indicated higher log-prices (M = 3.05, SD = 0.99) compared to participants in the buyer condition (M = 2.60, SD = 0.84; Welch's $t(976.24) = -7.69$, $p < .001$, $d = .49$). We found no support for a transaction demand effect on prices (merchant interested: M = 2.83, SD = 0.96; participant interested: M = 2.82, SD = 0.93; $t(999) = .213$, $p = .83$, $d = .01$). We found no support for a two-way interaction between ownership and transaction demand ($F(1, 997) = 1.56$, $p = .21$, $\eta_p^2 = .002$). We again found a moderate ownership effect (d = 0.49) in line with the original one (d = 0.50) and our Study 3a (d = 0.65). Unlike the original study and our Study 3a, here we failed to find support for the moderating effect of

transaction demand on ownership effect. We conclude that these results are a successful replication of ownership effect and a failed replication of the moderating effect of transaction demand on the ownership effect.

Comprehension checks. We conducted an independent t-test and found no support for differences in log-transformed prices due to inclusion of comprehensions checks (with: M = 2.84, SD = .90; without: M = 2.81, SD = .99; $t(999) = -.54$, $p = .59$, $d = .03$). Therefore, we conducted all preregistered analyses collapsing across this factor. Additional analyses investigating the interaction of comprehension checks presentation with ownership and transaction demand found no significant effects and are presented in detail in the supplementary materials.

Links between Studies 1, 2a, and 3a

We pre-registered tests examining associations between the name-letter effect in Study 1 and ownership effects in Studies 2a and 3a.

We found no support for link between name-letter and pricing in Study 2a among sellers ($r = -.16$, $p = .170$), yet a weak positive correlation among buyers ($r = .25$, $p = .034$). A one-way ANCOVA showed no support for a main effect ($F(1, 307) = .04$, $p = .851$, $\eta_p^2 < .001$) nor an interaction ($F(1, 307) = .54$, $p = .463$, $\eta_p^2 = .002$).

We also failed to find support for a link of the name-letter effect (Study 1) with pricing differences in Study 3a (sellers: $r = .02$, $p = .896$; buyers: $r = -.15$, $p = .196$; ANCOVA main effect: $F(1, 307) = .73$, $p = .394$, $\eta_p^2 = .002$; interaction: $F(1, 307) = .19$, $p = .667$, $\eta_p^2 = .001$).

Therefore, we failed to support the prediction that name-letter, now a common measure of implicit self-esteem, is associated with larger price difference between sellers and buyers.

We also found no support for moderators goal relevance in Study 2a nor for transaction interest in Study 3a in a two-way interaction between name-letter and price (study 2a: $F(1, 303) = 1.70$, $p = .193$, $\eta_p^2 = .006$; study 3a: $F(1, 303) = .80$, $p = .371$, $\eta_p^2 = .003$).

In addition, we examined whether the effects were consistent across Studies 2a and 3a using correlations between price estimates in Studies 2a and 3a among participants who were assigned to the same condition. The correlations were negative and weak for both sellers ($r = -.09$, $p = .431$, $n = 76$) and buyers ($r = -.18$, $p = .123$, $n = 75$). One-way repeated measures ANOVA showed no support for a main effect of ownership on price across parts 2a and 3a ($F(1, 149) = 2.64$, $p = .107$, $\eta_p^2 = .017$). Controlling for the effect of name-letter in Study 1 had little effect. Thus, we failed to find support for the prediction that ownership effects would be consistent (i.e. positively correlated) across Studies 2a and 3a.

General Discussion

We conclude a successful replication of Nuttin (1987) name-letter effect, mixed findings for replications of Mandel (2002) with support for an ownership effect but inconsistent support for the moderating effect of transaction demand, and a mostly failed replication of Irmak et al. (2013) with no support for ownership effects and very weak support for the moderating effect of goal-relevance. Our findings are summarized and compared to the original findings in Table 11.

Successful and Unsuccessful Replications of Ownership Effects

In Study 1, we reported a successful replication of the name-letter effect reported in Nuttin (1987). It seems that despite the passage of time (about thirty years) and the different participant pool (American MTurk workers rather than students from several European countries), the name-letter effect is alive and well. Given the large amount of literature about psychological ownership based on this empirical finding (which had 448 Google Scholar citations at the time of writing), it is important to know that this result is replicable and that can produce large and statistically significant effects.

In both Study 2a and Study 2b, in contrast to Irmak et al. (2013), ownership did not produce a statistically significant effect on price. However, in Study 3a and 3b, we successfully replicated the ownership effect found in Mandel (2002). In this section, we discuss potential reasons for this puzzling difference, given that the study designs (endowment effect) and materials (scenarios) were relatively similar.

Differential effects of time on stimuli. Stimuli selection, and specifically the differential effect of time on prices of cameras (the stimuli used by Irmak et al. 2013) and wines (used by Mandel, 2002), may have affected the replication results. After the first data collection, we considered changes in the camera market forces and participants' internal anchor of a camera's price (Thaler, 1985). Unlike wine, cameras tend to be sold by a limited number of brands and have relatively low price variability. In recent years since Irmak et al.'s publication in 2013, the camera market has changed considerably. Due to the popularity of new substitutes (e.g., smartphone cameras), there has been a significant decrease in camera

prices. It was suggested to us that the price range set by Irmak et al. (2013) (i.e. $400 - $1000) may have shifted and would deviate from what is perceived as a normal range of camera price nowadays.

We addressed this in our second data collection. Specifically, in Study 3b, we randomly assigned participants to either a condition where they were exposed to a $400-$1,000 range or to a condition where they were not exposed to any pricing range. We also modified the product description to adjust it better to the original scenario (from "camera" to "DSLR camera", to rule out mobile cameras, which are becoming increasingly popular due to the evolution of the camera market). We added a condition in which participants were explicitly told that they owned the camera, addressing possible differences between the original Irmak et al. (2013) scenario and the first data collection. We found that setting the range indeed had a main effect, but had no impact on the pattern of results.

Factors related to stimuli selection (the product on sale, price range, wording to describe owners/sellers), therefore, do not seem likely explanations for the two failures to replicate Irmak et al. (2013). Of course, we cannot exclude the possibility that a different scenario using different wording strategies may yield an ownership effect using cameras, but this is outside of the scope of our investigation.

Ownership length. Whereas Irmak et al. (2013) did not specify for how long the owner has owned the camera, in Mandel (2002) the owner has owned the wine for a long time (a decade). It is possible that psychological ownership grows as time passes, with the object becoming part of an "extended self" (Belk, 1988). We note that, while this would explain

why Mandel (2002) found an ownership effect whereas Irmak et al. (2013) did not, it can hardly explain the difference in replication success. Further, this is a post-hoc explanation which would require different wording and stimuli compared to the original articles we aimed to replicate.

Moderations of Ownership Effects

We found very weak support for the interaction between ownership and goal relevance found by Irmak et al. (2013), and mixed support for the interaction between ownership and transaction demand found by Mandel (2002). In our first replication, we could not find a significant interaction between ownership and superiority of goal-relevant features, and the effect size was much smaller.

Mixed results for the moderation in Irmak et al. (2013). We could only find support for an ownership by goal-relevance interaction in Study 2b, which was driven by the comparison between the buyer and owner condition. The effect we found (η_p^2 = .006) was more than ten times smaller than the original one (η_p^2 = .072; calculated with Lakens (2013) spreadsheet), and we therefore caution against interpreting this as a successful replication.

Also, Irmak et al. (2013) proposed that buyers consider goal-relevant and goal-irrelevant features equally and sellers considered goal-relevant features more than goal-irrelevant ones when deciding price. They tested this proposition by directly asking participants which features they considered more when deciding their price, and they found the expected (albeit marginally significant) interaction between ownership and goal relevance (η_p^2 = .047, p = .07). In this replication, we could not find such a significant interaction in

Study 2a (η_p^2 = .002, p = .46) and we found a significant, but much smaller interaction than the original in Study 2b (η_p^2 = .008, p = .013), with a much less pronounced difference in the pattern of means. It is therefore possible that we could not replicate the original effect on price because we could not replicate the original interaction between ownership and goal relevance on consideration.

Mixed results for the moderation in Mandel (2002). We were surprised to find mixed support for the interaction between ownership and transaction demand on price hypothesized by Mandel (2002): we found a significant interaction effect as reported in the target paper in Study 3a, but not in the higher-powered Study 3b. While we added another factor of presenting comprehension checks or not in Study 3b, the interaction between ownership and transaction demand was not statistically significant with or without comprehension checks. Also, using non-transformed or log-transformed price did not make a difference (all interactions *p*s > .29; see supplementary materials for further analyses). Our replication results regarding the moderating effect of transaction demand must therefore be considered carefully and not be interpreted as being in support of one direction or the other.

Extensions, moderators, and future directions

Ownership effects have been demonstrated on both material objects such as insulators and mugs (e.g., Barone et al., 1997; Morewedge et al., 2009), and immaterial objects such as arguments (De Dreu & van Knippenberg, 2005), letters and symbols (Feys, 1991; Nuttin, 1987). However, there is only little research that directly examined whether ownership effects are affected by the nature of the object. In the current replication, we found a large

effect of ownership on immaterial objects in Study 1 (d = 1.08 - 1.42), and medium effects of ownership on material objects in Study 3a (d = .65; d = .49). Yet, given the differences in research design and the existence of potential moderators, it is presumptive to draw any conclusions on whether object materiality (vs. immateriality) moderates the ownership effect.

We examined interrelatedness of the ownership effects across the three replications. We found no support for an association between the name-letter effect in Study 1, used as proxy for implicit self-esteem, and effects in either Study 2a or Study 3a. We also did not find support for consistency of the effects across Studies 2a and 3a.

If we were to accept the replication results, a possible explanation for differences between the Studies 2a and 3a is that they employed different experimental paradigms. Factors such as ownership duration may also offer a partial explanation for the inconsistency in effects between the two parts. Future research may examine how variation in experimental paradigms affects the strength of the ownership effects, for example, through conducting a meta-analysis (e.g., Gao, Yao, & Feldman, 2020).

Limitations

We note several possible caveats. We made adjustments to the original experimental designs to match online data collection. Compared with the three original experiments, which relied on student samples, our experiment tested the effects with an older and more diverse sample. There is considerable empirical evidence that effects in judgment and decision-making literature generalize and replicate well in these samples (e.g., Klein et al., 2018),

especially so in judgment and decision making (e.g., Chandrashekar et al, 2020, Chen et al., 2020), yet the differences in samples should be noted.

Specifically, we made several changes in the experimental designs to ensure response quality of online data collection, such as adding comprehension check questions to test participants' understanding of the scenarios and the manipulation. The successful replication of two out of three of these experiments twice suggests that our adjustments were not the cause of the failures to replicate. Specific tests conducted in the second data collection to examine the impact of order, range display, and comprehension checks showed that these had little to no impact on the results, with very consistent results across the two data collections.

We note that Nuttin (1987) originally considered name letters as owned objects to test ownership effects, yet the name letter effect has throughout the years been adopted as one of the most common measures of implicit self-esteem (Buhrmester, Blanton, & Swann Jr, 2011; Hoorens, 2014). The name-letter paradigm has since been extended to other elements that might be associated with the self, such as birthdates (Kitayama & Rarasawa, 1997; Nickell, Pederson, & Rossow, 2003). One may argue that the name-letter effect does not constitute an ownership effect, as letters and date numbers are not chosen and are not exclusively "owned" by a person. They are different from other material objects that can be possessed and exclusively owned, or from other immaterial objects such as papers and patents that can be defined as someone's intellectual property. It is unclear whether these associations at all entail psychological ownership, and it is unknown whether people think of their names and

birthdates as something they own. Psychological ownership may therefore be one of the many concurrent causes of the name-letter effect and should be investigated further.

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Tables

Table 1

Irmak et al. (2013) replications: Summary of changes in second data collection

Change from first to second data collection	Reasoning behind the change	Differences with previous data collection
Increased sample size and statistical power from n = 311 to n = 1001	Higher power produces more accurate effect size estimates	Results were consistent with our previous data collection
Added owner condition	Unclear reporting of the wording in the original paper	Weak to no difference between owner and buyer condition
Randomized price range presentation between-subjects ($400-$1,000 range vs. n orange)	Price range presentation may differentially affect pricing across conditions	Presenting a $400-$1,000 range increases pricing across the board, but not differentially across conditions.
Comprehension questions	Newly worded comprehension questions	Results were consistent with our previous data collection
	Comprehension questions are now randomized across participants	Results were consistent with our previous data collection
	Participants had to answer comprehension checks correctly to proceed to the DV	
Stimuli	The design now explicitly refers to DSLR camera, to distinguish from a regular camera which are now common in various other techs like mobiles and made the scenario potentially unnecessarily complicated	Results were consistent with our previous data collection
Goal relevance ratings	New goal relevance rating asking participants to directly select which features are more important (artistic vs. weight and size)	Participants rate artistic features as more important than weight and size across conditions and data collections

Table 2

Mandel (2002) replications: Summary of changes in second data collection

Change from first to second data collection	Reasoning behind the change	Differences with previous data collection
Increased sample size and statistical power from n = 311 to n = 1001	Higher power produces more accurate effect size estimates	Results were consistent with original study and Study 3a replication
Randomized comprehension checks presence between-subjects	Comprehension checks may affect pricing decisions	No effect of comprehension checks on pricing
We added "a decade ago" and "now" to all pricing DVs	Emphasize the time perspective	Results were consistent with original study and Study 3a replication
We changed the currency to US$ and specified it throughout the survey	Make it more familiar for American participants	Results were similar across GBP (£ symbol) and USD ($ symbol) denomination

Table 3

Study 1 - Nuttin (1987): Liking proportions for each letter in the alphabet.

	In first name and liked	In first name and not liked	Not in first name and liked	Not in first name and not liked	Proportion of in first name and liked	Proportion of not in first name and liked
A	97	62	57	59	.61	.49
B	19	10	54	192	.66	.22
C	29	34	39	173	.46	.18
D	18	24	36	197	.43	.15
E	56	77	40	102	.42	.28
F	6	1	30	238	.86	.11
G	3	8	27	237	.27	.10
H	17	32	30	196	.35	.13
I	16	119	13	127	.12	.09
J	20	17	44	194	.54	.18
K	17	16	50	192	.52	.21
L	28	44	58	145	.39	.29
M	28	17	59	171	.62	.26
N	27	100	30	118	.21	.20
O	11	42	41	181	.21	.18
P	2	8	30	235	.20	.11
Q	1	1	33	240	.50	.12
R	52	42	65	116	.55	.36
S	42	22	98	113	.66	.46
T	33	35	78	129	.49	.38
U	0	21	14	240	.00	.06
V	4	12	23	236	.25	.09
W	3	4	31	237	.43	.12
X	0	0	52	223	.00	.19
Y	11	48	18	198	.19	.08
Z	2	2	58	213	.50	.21
				Mean	.40	.20

Table 4

Study 1 - Nuttin (1987): Average rankings for each letter in the alphabet.

	In first name	Not in first name
A	2.64	1.96
B	3.10	.81
C	2.00	.59
D	1.95	.50
E	1.36	.86
F	3.14	.36
G	1.64	.31
H	1.22	.39
I	.36	.27
J	2.78	.69
K	2.55	.68
L	1.35	.82
M	2.60	.87
N	.78	.60
O	.64	.56
P	1.20	.34
Q	2.50	.36
R	1.97	1.13
S	2.70	1.71
T	1.99	1.15
U	.00	.15
V	.69	.29
W	2.00	.29
X	N/A	.61
Y	.71	.28
Z	3.00	.70
Mean	1.80	.66

Note. Rankings were reversed so that higher ranking indicate higher liking.

Table 5

Study 2a - Irmak et al. (2013): Means, standard deviations, and effect-size for consideration.

	Buyer (n = 155)	Seller (n = 156)	Total (n = 311)
Goal relevant	7.37 (2.27)	7.58 (2.00)	7.48 (2.14)
Goal irrelevant	6.19 (2.80)	6.12 (2.57)	6.15 (2.68)
Cohen's *d*	.35***	.48***	.41***

Note. Parentheses indicate standard deviation; *** $p < .001$, ** $p < .01$ * $p < .05$

Table 6

Study 2a - Irmak et al. (2013): Means, standard deviations, and effect-size for pricing.

	Seller	Buyer	*d*	Total
Goal relevant	560.77 (162.27) [77]	533.45 (160.66) [78]	.17	547.02 (161.52) [155]
Goal irrelevant	513.92 (142.54) [79]	510.36 (155.38) [77]	.02	512.17 (148.54) [156]
d	.31	.15	-	.23
Total	537.04 (153.90) [156]	521.98 (157.97) [155]	.10	529.54 (155.88) [311]

Note. Parentheses indicate standard deviation. Brackets indicate the number of participants.
d = Cohen's d

Table 7

Study 3a - Mandel (2002): Means, standard deviations, and effect-size for pricing (logged).

	Participant selling, merchant buying	Merchant selling, participant buying	*d*	Total
Merchant interested	2.67 (.92) [78]	2.38 (.79) [77]	.34	2.53 (.87) [155]
Participant interested	2.76 (.78) [78]	2.05 (.50) [78]	1.08	2.40 (.74) [156]
d	.11	.50	-	.16
Total	2.71 (.85) [156]	2.21 (.68) [155]	.65	2.46 (.81) [311]

Note. Parentheses indicate standard deviation. Brackets indicate the number of participants.

Table 8

Study 2b - Irmak et al. (2013): Means, standard deviations, and effect-size for considerations

Goal relevance	Buyer (n = 332)	Owner (n = 332)	Seller (n = 337)	Total (n = 1001)
Goal relevant: Artistic features	7.51 (1.97)	7.48 (2.03)	7.49 (2.02)	7.50 (2.01)
Goal irrelevant: Weight and size	5.99 (2.66)	5.26 (2.77)	5.27 (2.46)	5.51 (2.65)
Cohen's *d*	.43***	.65***	.60***	.56***

Note. Parentheses indicate standard deviation.
*** $p < .001$, ** $p < .01$ * $p < .05$

Table 9

Study 2b - Irmak et al. (2013): Means, standard deviations, and effect-size for pricing.

	Buyer	Owner	Seller	Total
Goal relevant				
With range	574.78 (157.87) [83]	641. 96 (314.86) [82]	588.10 (164.78) [84]	601.40 (224.83) [249]
No range	340.71 (255.09) [83]	546.16 (677.31) [82]	407.62 (367.61) [84]	430.94 (473.15) [249]
Goal irrelevant				
With range	600.20 (523.18) [81]	557.12 (171.97) [84]	525.82 (150.26) [84]	560.57 (326.62) [249]
No range	500.62 (2036.29) [85]	299.64 (199.82) [84]	294.99 (392.78) [85]	365.34 (1204.27) [254]
Total	503.48 (1072.82) [332]	510.22 (412.78) [332]	453.66 (311.38) [337]	488.94 (685.99) [1001]

Note. Parentheses indicate standard deviation. Brackets indicate the number of participants.

Table 10

Study 3b: Mandel (2002) – means, standard deviations, and effect-size for pricing (logged).

	Participant selling, merchant buying	Merchant selling, participant buying	*d*	Total
Merchant interested	3.09 (0.97) [253]	2.57 (0.87) [250]	.41	2.83 (0.96) [503]
Participant interested	3.03 (1.00) [249]	2.63 (0.81) [249]	.56	2.82 (0.93) [498]
d	.07	.09	-	.01
Total	2.60 (0.84) [502]	3.05 (0.99) [499]	.49	2.82 (.94) [1001]

Note. Parentheses indicate standard deviation. Brackets indicate the number of participants.
d = Cohen

Table 11

Comparison of replication findings to original article's results and our pre-registered predictions

Original finding	Predictions	Original effect size	Replication ESs (1st and 2nd data collections)	1st collection (n = 311, MTurk)	2nd collection (n = 1001, MTurk)	Summary / Notes
Nuttin (1987) n = 2047 European students (12 languages)	People prefer letters in their names over letters not in their name.	Unclear	d = 1.08***	Supported.	-	Name-letter effect hypothesis: Strong support.
	People rank letters in names higher than letters not in their names.	Unclear	d = 1.42***	Supported.	-	Name-letter effect extension analysis: Strong support.
Irmak et al. (2013)	Sellers price an object higher than non-owners.	d = 0.99*	d = 0.01 ^{NS} d = 0.10 ^{NS}	Not supported.	Not supported.	Endowment effect hypothesis: No support for the original findings.
n = 60 American undergraduates	Owners price an object higher than non-owners.	d = 0.99*	d = 0 16 ^{NS}	-	Not supported.	
	Interaction between ownership and feature on self-reported reliance	η_p^2 = 0.047†	η_p^2 = .002 ^{NS} η_p^2 = .008*	Not supported.	Inconclusive (much weaker. significant effect).	Weak support for the original findings.
	Interaction between ownership and feature on pricing	η_p^2 = 0.072*	η_p^2 = 0.002 ^{NS} η_p^2 = 0.006*	Not supported.	Inconclusive (much weaker, - significant effect).	Central hypothesis: weak support for the original findings.
Mandel (2002)	Owners price an object higher than non-owners.	d = 0.50*	d = 0.65*** d = 0.49***	Supported.	Supported.	Endowment effect hypothesis: Supported.
n= 80 British undergraduates	Interaction between ownership and transaction demand	η_p^2 = 0.037* (one-tailed)	η_p^2 = 0.019 η_p^2 = 0.002	Supported.	Not supported.	Central hypothesis: mixed

Note. *** $p < .001$; ** $p < .01$; * $p < .05$; † $p < .10$; ^{NS} $p > .10$

Figures

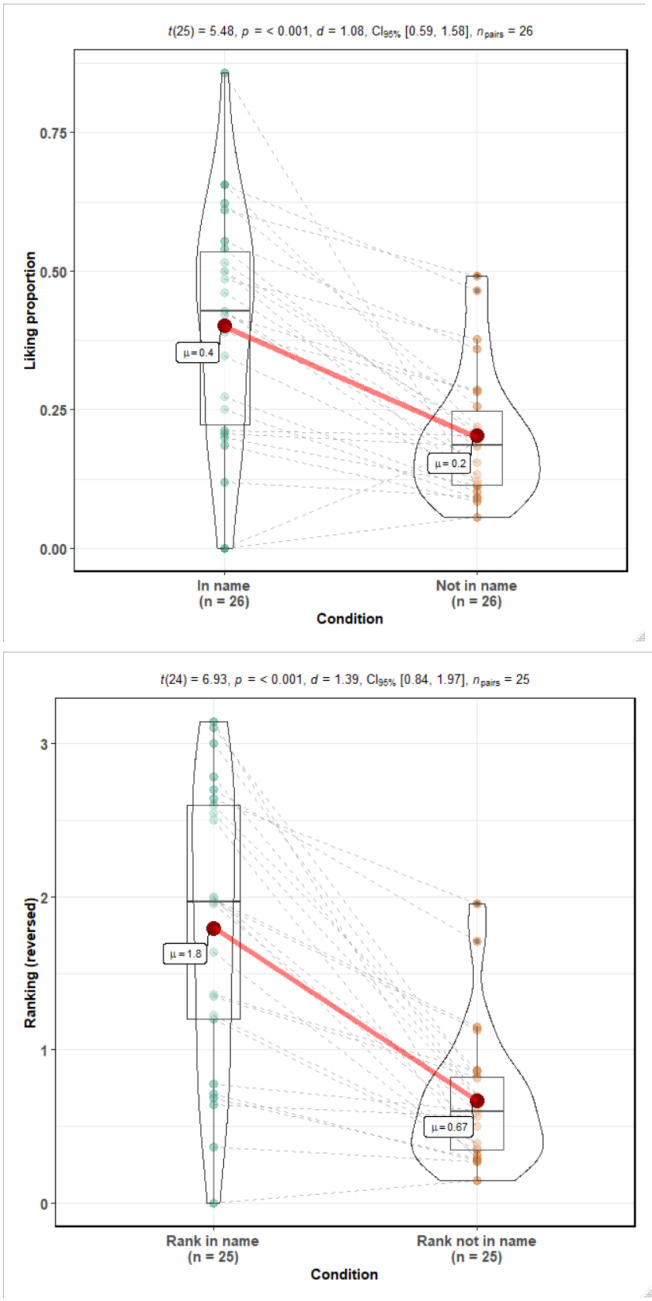

Figure 1. Study 1: Nuttin (1987) replication plots. First plot is for liking proportions, the second plot for rankings. Created using ggstatsplot ggwithinstats function (Patil, 2018). Higher rank indicated higher liking (participants answers were reversed), on a scale of 1 to 6.

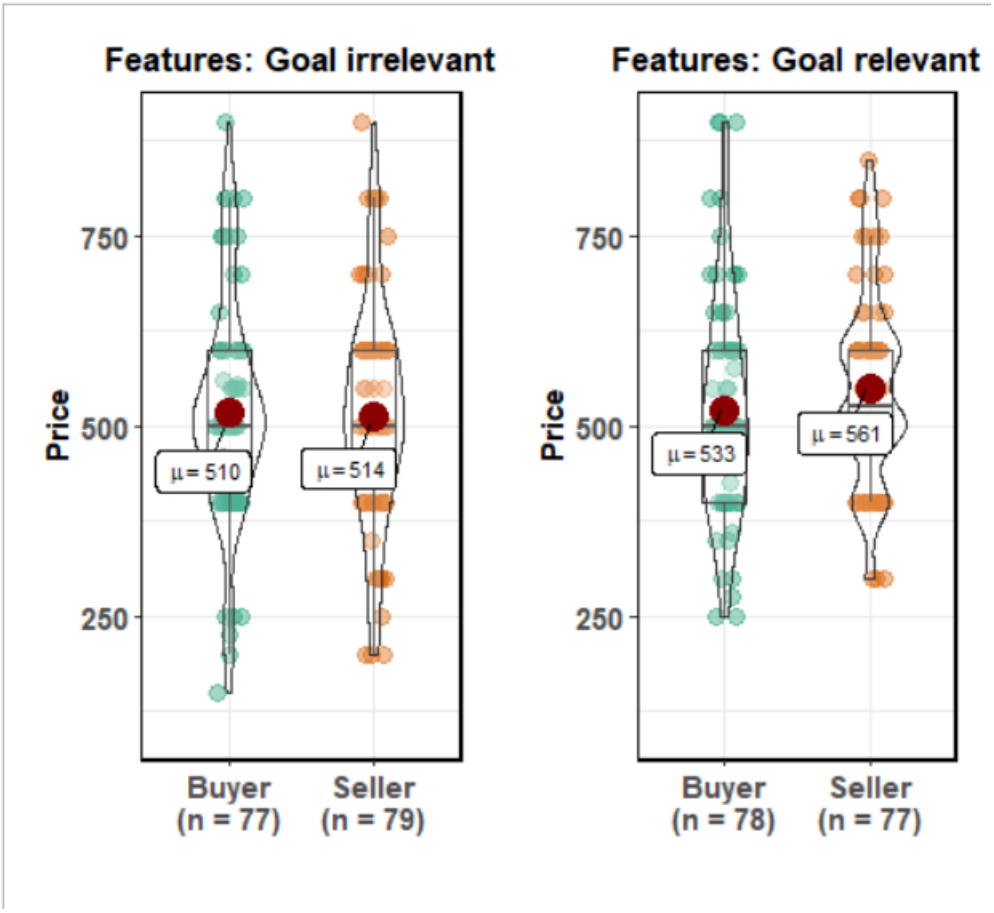

Figure 2. Study 2a: Irmak et al. (2013) replication plots. Created using ggstatsplot grouped_ggbetweenstats function (Patil, 2018).

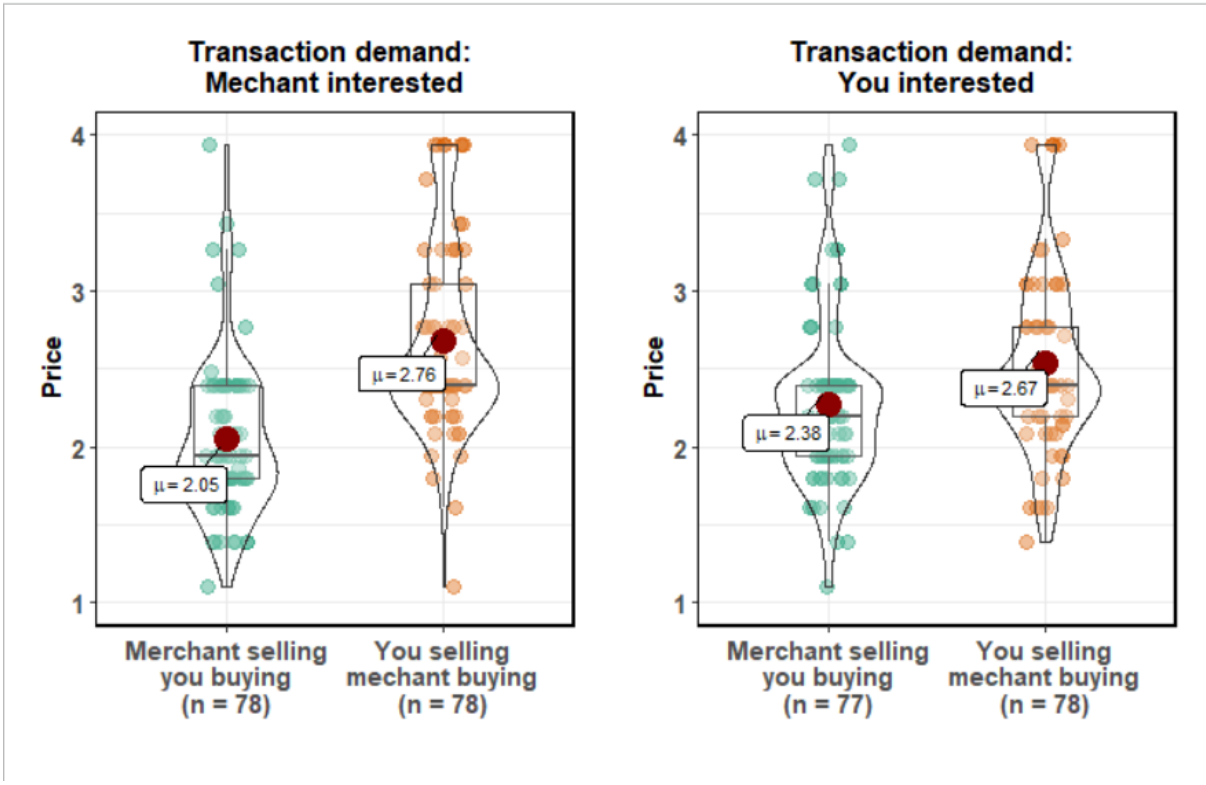

Figure 3. Study 3a: Mandel (2002) replication plots. Log-transformed prices. Created using ggstatsplot grouped_ggbetweenstats function (Patil, 2018).

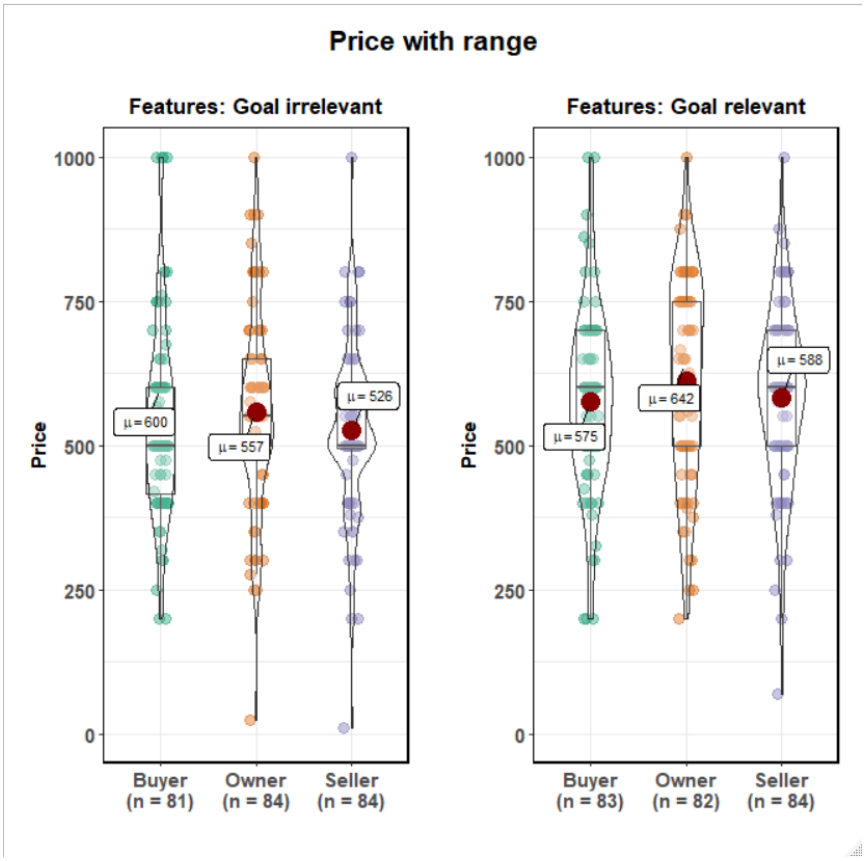

Figure 4. Study 2a: Second Irmak et al. (2013) replication plots. Created using ggstatsplot grouped_ggbetweenstats function (Patil, 2018). The range presented was restricted to 0-1000.

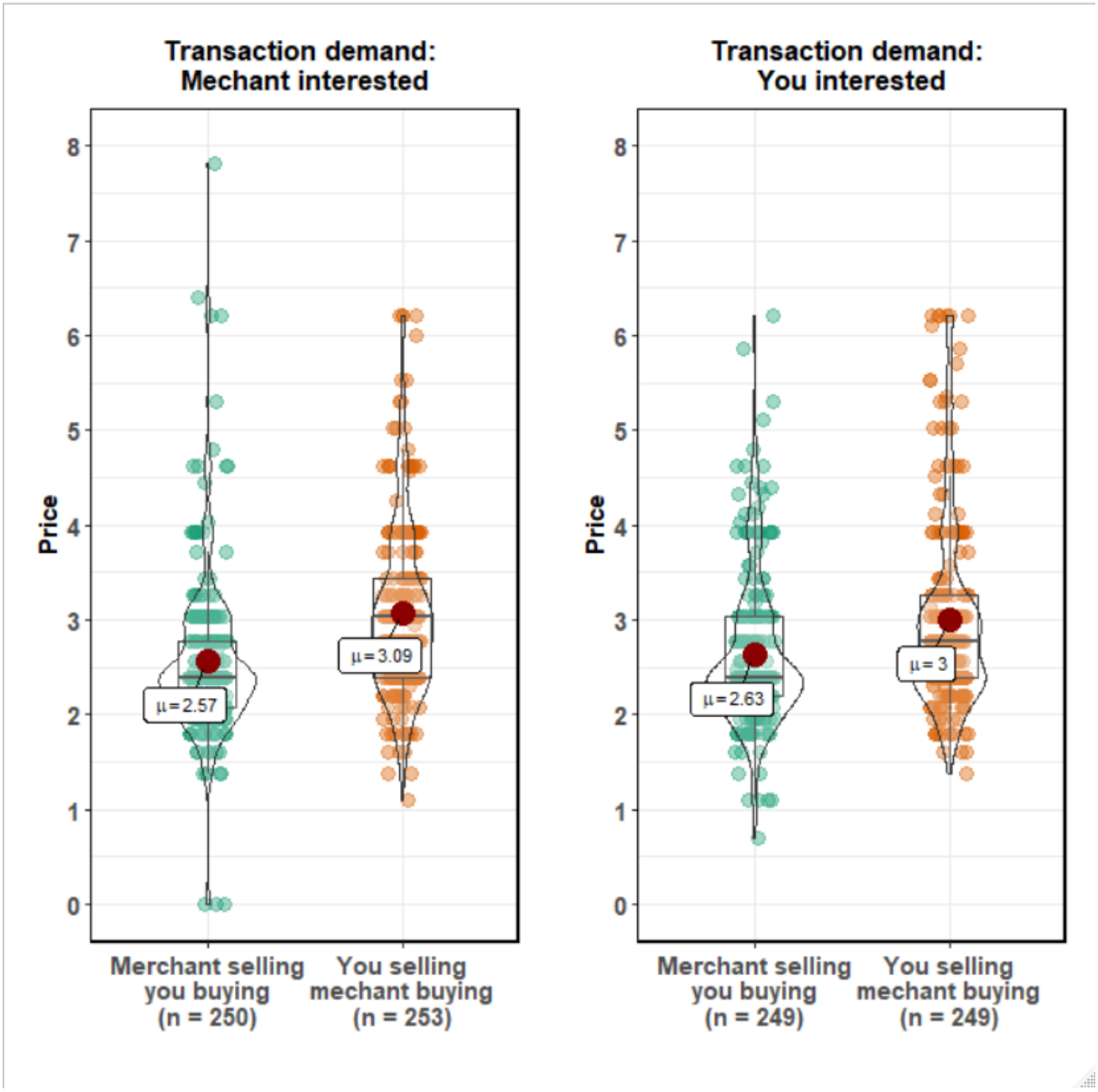

Figure 5. Study 3b: Second Mandel (2002) replication plots. Created using ggstatsplot grouped_ggbetweenstats function (Patil, 2018).

Ownership effect replications & extensions:

Supplementary Materials

Table of contents

Power Analyses

See full details about power-analyses in the pre-registration sections below. In this section we provide a summary of the power analyses.

First data collection

The effect sizes of the three original experiments were determined.
In Part 1a, Nuttin (1987) was very unclear in reporting the analytical methods and the estimated parameters beyond the significance levels, so we made our own estimation. As shown in Table 2 in Nuttin (1987), the enhancement of the average probability that any letter in the English first names was preferred seemed to range from .20 to .35, so we obtained the effect size Cohen's *g* of .15. We ran power analyses for binomial tests with this effect size. When power = .99, the required sample size was 138. To play safe, we would have at least the number of participants (N = 212) in the original study.

In Part 1b, Irmak et al. (2013) reported the main effect of ownership as $F(1, 56) = 14.34$, $p < .001$. We based on the F value and the total number of participants (N = 60) to extract Cohen's *d*, with 30 participants in each condition. We obtained a Cohen's *d* of .99, a very large effect. We ran power analyses for a two-way ANOVA. For d = .99, a required sample size was 33 participants per cell for a one-tailed test with power = .99 and alpha = .05. This is for the main effect, therefore requiring a sample of 66.

In Part 1c, Mandel (2002) reported the main effect of ownership as $F(1, 76) = 4.86$, one-tailed $p < .02$. Again, we based on the F value and the total number of participants (N = 80) to extract Cohen's *d*, with 40 participants in each condition. We obtained a Cohen *d* of .50, a medium effect. We ran power analyses for a two-way ANOVA. For d = .50, a required sample size was 127 participants per cell for a one-tailed test with power = .99 and alpha = .05. This is for the main effect, therefore requiring a sample of 254.

Taken together, the results of power analyses showed that we should have at least 254 participants in our study, and our final valid sample N = 311 was large enough to ensure sufficient statistical power.

Overall, the successful replications found stronger effects than in the original findings in the target article. The failed replication required a sample of 66 based on the original effect, which with our final sample of 311 participants we were well powered even if original effect size was over-estimated. We were also well powered to detect the smallest ownership effects found in a recent meta-analysis of ownership effects (https://www.researchgate.net/publication/326462915_Owning_leads_to_valuing_Meta-analysis_of_the_Mere_Ownership_Effect) with overall summarized effects of g = 0.59, 95% confidence intervals [0.47, 0.70].

Second data collection

In the first data collection our power calculations for power .99 and alpha .05 for the weakest effect in the three experiments was 252. We finally targeted 300.

Given the weak effects we found in the first collection (d = 0.1), we used small telescopes

approach (Simonsohn, 2015, Psychological Science):
For calculation of SESOI we choose entered Irmak Study 2 to a Gpower sensitivity analysis.

Since we introduced an additional factor, for checking whether range inclusion (Irmak) or comprehension checks (Mandel) had any effect, we decided to double that estimate: 460 x 2 = 920, and round it up to 1000 participants.

Open science and disclosures

Open data/code

Data and code are shared using the Open Science Framework. Files are available on: https://osf.io/2cg3e/ .

Data collection

Data collection was completed before conducting an analysis of the data.

Conditions reporting

All collected conditions are reported.

Data exclusions

There were no data exclusions. All data is included in the provided data.

Variables reporting

All variables collected for this study are reported and included in the provided data.

Pre-registrations

First data collection pre-registration: https://osf.io/96aw7;
Extensions pre-registration: https://osf.io/zya9n;
Second data collection pre-registration: https://osf.io/9kxye/.

First data collection: Materials used in the experiment

Study 1

Please choose your favorite 6 letters on the alphabet.
Note: There are no right or wrong answer, don't think too much, just indicate your preference based on your own intuitive feelings. It is important that you do so honestly and that the letters you select really reflect your personal preference.

- A (1)
- B (2)
- C (3)
- D (4)
- E (5)
- F (6)
- G (7)
- H (8)
- I (9)
- J (10)
- K (11)
- L (12)
- M (13)
- N (14)
- (15)
- P (16)
- Q (17)
- R (18)
- S (19)
- T (20)
- U (21)
- V (22)
- W (23)
- X (24)
- Y (25)
- Z (26)

Below are the 6 letters you indicated are your favorite. We now ask that you rank them from the most liked (rank #1) to the least liked (rank #6). Simply write 1 next to your favorite letter,

2 next to your second most favorite letter, and so on till 6 next to your least favorite letters in this selection. When you are happy with the ranking, proceed to the next page.

_____ A (1)

_____ B (2)

_____ C (3)

_____ D (4)

_____ E (5)

_____ F (6)

_____ G (7)

_____ H (8)

_____ I (9)

_____ J (10)

_____ K (11)

_____ L (12)

_____ M (13)

_____ N (14)

_____ O (15)

_____ P (16)

_____ Q (17)

_____ R (18)

_____ S (19)

_____ T (20)

_____ U (21)

_____ V (22)

_____ W (23)

_____ X (24)

_____ Y (25)

_____ Z (26)

[at the end of the survey]

As explained in the study recruitment and the consent form presented to you at the beginning, at this final part of the questionnaire **we are asking you to write down your first name**. First name only, no need to give us your last name.

Note: This field is **-optional-**, and we will explain why we are asking for this detail in the next page. This detail is related to a specific research hypothesis we have for this study. For the study to be successful, it is important that you report this honestly and accurately. Answering this incorrectly will invalidate our results, so if you don't feel comfortable

answering this, please don't answer this question at all.

Importantly, your answers will be kept 100% confidential and will only be used for research purposes to test a specific research question.

[after debriefing]

Now that you understand the purpose of the question, please indicate - did you write down your real name? It's okay if you didn't, but we need to know so that your answer would not bias our findings.

- I wrote down my real name (1)
- Sorry, I didn't write down my real name, please ignore my response (2)

Study 2a

Condition 1: Ownership and goal-relevant condition (seller/heavy features):

Imagine that you want to sell an advanced camera for taking artistic pictures. Your camera has all of the sophisticated features that an art photographer needs. However, the camera is a little bulky and heavy, so it is not easy to carry around with you.

Condition 2: Ownership and goal-irrelevant condition (seller/ light features):

Imagine that you want to sell an advanced camera for taking artistic pictures. Your camera has only some of the sophisticated features that an art photographer needs. However, the camera is compact and light, so it is easy to carry around with you.

Condition 3: No-ownership and goal-relevant condition (buyer/ heavy features):

Imagine that you want to buy an advanced camera for taking artistic pictures. You have been offered a camera, which has all of the sophisticated features that an art photographer needs. However, the camera is a little bulky and heavy, so it is not easy to carry around with you.

Condition 4: No-ownership and goal irrelevant condition (buyer/ light features):

Imagine that you want to buy an advanced camera for taking artistic pictures. You have been offered a camera, which only has some of the sophisticated features that an art photographer needs. However, the camera is compact and light, so it is easy to carry around with you.

Comprehension questions:

Who is selling the camera?

- You (1)
- Someone else (2)

Who is buying the camera?

- You (1)
- Someone else (2)

Which of the following best describes the camera in the scenario?

- Bulky but with all of the sophisticated features (1)
- Light but with only some of the sophisticated features (2)

Price valuation:

Now, considering that similar cameras are sold in the range of $400–$1000, if someone who is looking to take artistic pictures wants to buy your camera, how much would your minimum price be?

Manipulation checks:

- How much was the price you set affected by the features of the camera? (10-point Likert scale: 1 = not at all, 10 = very much)
- How much was the price you set affected by the weight and size of the camera? (10-point Likert scale: 1 = not at all, 10 = very much)

Study 3a

Condition 1: Seller & other party is interested in buying:

A decade ago, you purchased a case of good wine for £5 per bottle. A wine merchant is now interested in buying the case. How much would you be willing to sell it for per bottle?

Condition 2: Seller & interested in selling:

A decade ago, you purchased a case of good wine for £5 per bottle. You are now interested in selling the case to a wine merchant. How much would you be willing to sell it for per bottle?

Condition 3: Buyer & other party is interested in selling:

A decade ago, a wine merchant purchased a case of good wine for £5 per bottle. He is now interested in selling the case. How much would you be willing to buy it for per bottle?

Condition 4: Buyer & interested in buying:

A decade ago, a wine merchant purchased a case of good wine for £5 per bottle. You are now interested in buying the case. How much would you be willing to buy it for per bottle?

Comprehension questions

Who is the potential seller?

- Merchant (1)
- You (2)

Who is the potential buyer?

- Merchant (1)
- You (2)

Who is more interested in making this deal happen?

- Merchant (1)
- You (2)

Price valuation

Now, considering that the merchant purchased the wine for £5 per bottle, how much would you be willing to buy it for per bottle?

Second data collection: Materials used in the experiment

Study 2b

Irmak et al 2003: Introduction

In this part you are presented with a short and simple scenario. You are asked to read the scenario carefully, imagine the scenario as if it's happening to you and taking place in real life, and answer the questions that follow.

Irmak etal: Buyer & goal relevant (advanced/heavy) condition

Imagine that you want to buy an advanced digital single-lens reflex camera (DSLR) camera for taking artistic pictures. You have been offered a DSLR camera, which has all of the sophisticated features that an art photographer needs. However, the camera is a little bulky and heavy, so it is not easy to carry around with you.

[Comprehension checks here, see section below]

Now, it's time for your evaluation.

With range

Now, considering that similar DSLR cameras are sold in the range of $400–$1000, if you were to buy this DSLR camera, how much would your maximum price be? (in US$)

Without range

Now, if you were to buy this DSLR camera, how much would your maximum price be? (in US$)

Irmak etal: Buyer & goal irrelevant (not-advanced/light) condition

Imagine that you want to buy an advanced digital single-lens reflex camera (DSLR) camera for taking artistic pictures. You have been offered a DSLR camera, which only has some of the sophisticated features that an art photographer needs. However, the camera is compact and light, so it is easy to carry around with you.

[Comprehension checks here, see section below]

Now, it's time for your evaluation [with reminder of the scenario, since on a new page]

With range:

Now, considering that similar DSLR cameras are sold in the range of $400–$1000, if you were to buy this DSLR camera, how much would your maximum price be? (in US$)

Without range:

Now, if you were to buy this DSLR camera, how much would your maximum price be? (in US$)

Irmak etal: Owner & goal relevant (advanced/heavy) condition

Imagine that you have an advanced digital single-lens reflex camera (DSLR) camera for taking artistic pictures. Your DSLR camera has all of the sophisticated features that an art photographer needs. However, the camera is a little bulky and heavy, so it is not easy to carry around with you.

Someone who is looking to take artistic pictures wants to buy your camera.

[Comprehension checks here, see section below]

Now, it's time for your evaluation [with reminder of the scenario, since on a new page]

With range

Now, considering that similar DSLR cameras are sold in the range of $400–$1000, if someone who is looking to take artistic pictures wants to buy your DSLR camera, how much would your minimum price be? (in US$)

Without range

Now, if someone who is looking to take artistic pictures wants to buy your DSLR camera, how much would your minimum price be? (in US$)

Irmak etal: Owner & goal irrelevant (not-advanced/light) condition

Imagine that you have an advanced digital single-lens reflex camera (DSLR) camera for taking artistic pictures. Your DSLR camera has only has some of the sophisticated features that an art photographer needs. However, the camera is compact and light, so it is easy to carry around with you.

Someone who is looking to take artistic pictures wants to buy your camera.

[Comprehension checks here, see section below]

Now, it's time for your evaluation [with reminder of the scenario, since on a new page]

With range

Now, considering that similar DSLR cameras are sold in the range of $400–$1000, if someone who is looking to take artistic pictures wants to buy your DSLR camera, how much would your minimum price be? (in US$)

Without range

Now, if someone who is looking to take artistic pictures wants to buy your DSLR camera,

how much would your minimum price be? (in US$)

Irmak etal: Seller & goal relevant (advanced/heavy) condition

Imagine that you want to sell an advanced digital single-lens reflex camera (DSLR) camera for taking artistic pictures. Your DSLR camera has all of the sophisticated features that an art photographer needs. However, the camera is a little bulky and heavy, so it is not easy to carry around with you.

Someone who is looking to take artistic pictures wants to buy your camera.

[Comprehension checks here, see section below]

Now, it's time for your evaluation [with reminder of the scenario, since on a new page]

With range

Now, considering that similar DSLR cameras are sold in the range of $400–$1000, if someone who is looking to take artistic pictures wants to buy your DSLR camera, how much would your minimum price be? (in US$)

Without range

Now, if someone who is looking to take artistic pictures wants to buy your DSLR camera, how much would your minimum price be? (in US$)

Irmak etal: Seller & goal irrelevant (not-advanced/light) condition

Imagine that you want to sell an advanced digital single-lens reflex camera (DSLR) camera for taking artistic pictures. Your DSLR camera has only has some of the sophisticated features that an art photographer needs. However, the camera is compact and light, so it is easy to carry around with you.

Someone who is looking to take artistic pictures wants to buy your camera.
[Comprehension checks here, see section below]

Now, it's time for your evaluation.

With range

Now, considering that similar DSLR cameras are sold in the range of $400–$1000, if someone who is looking to take artistic pictures wants to buy your DSLR camera, how much would your minimum price be? (in US$)

Without range

Now, if someone who is looking to take artistic pictures wants to buy your DSLR camera, how much would your minimum price be? (in US$)

Irmak etal: Comprehension checks

[Participants had to answer the above correctly depending on the assigned condition to be able to proceed to the next page with the DV]

First, several comprehension questions to make sure you read and understood the scenario:

What type of camera is the scenario about?

- A mobile phone camera (1)
- An advanced DSLR camera for taking artistic pictures (2)

Who is the owner of the camera?

- You (1)
- Someone else (2)

Who is the potential buyer of the camera?

- You (1)
- Someone else (2)

Which of the following best describes the camera in the scenario?

- Has all of the sophisticated features an art photographer needs (1)
- Has only some of the sophisticated features an art photographer needs (2)

Which of the following best describes the camera in the scenario?

- A little bulky and heavy and not easy to carry around (1)
- Compact and light so easy to carry around (2)

Irmak etal: Manipulation checks

[random display order]

Affected features

How much was the price you set affected by the advanced art photography features of the DSLR camera? (1) not at all (10) very much

Affected size

How much was the price you set affected by the weight and size of the DSLR camera? (1) not at all (10) very much

Which more important?

Which of the two features is more important for an art photographer who is looking to buy an advanced camera for taking artistic pictures:

- DSLR camera has all of the sophisticated features that an art photographer needs (1)
- DSLR camera is compact and light so easy to carry around (2)

Study 3b

Mandel 2002 [CC/noCC]: Seller & other party is interested in buying:

Imagine that a decade ago, you purchased a case of good wine. A wine merchant is now interested in buying the case.

[In conditions with manipulation checks (half of the participants, randomly assigned): First, a few comprehension questions to make sure you read and understood the scenario:]

Now considering that you purchased the wine for 5 US$ per bottle a decade ago, how much would you be willing to sell it for per bottle now? (in US$)

Mandel 2002 [CC/noCC]: Seller & interested in selling

Imagine that a decade ago, you purchased a case of good wine. You are now interested in selling the case to a wine merchant.

[In conditions with manipulation checks (half of the participants, randomly assigned): First, a few comprehension questions to make sure you read and understood the scenario:]

Now considering that you purchased the wine for 5 US$ per bottle a decade ago, how much would you be willing to sell it for per bottle now? (in US$)

Mandel 2002 [CC/noCC]: Buyer & other party is interested in selling

Imagine that a decade ago, a wine merchant purchased a case of good wine. The merchant is now interested in selling the case to you.

[In conditions with manipulation checks (half of the participants, randomly assigned): First, a few comprehension questions to make sure you read and understood the scenario:]

Now, considering that the merchant purchased the wine for 5 US$ per bottle a decade ago, how much would you be willing to buy it for per bottle now? (in US$)

Mandel 2002 [CC/noCC]: Buyer & interested in buying

Imagine that a decade ago, a wine merchant purchased a case of good wine. Now you are interested in buying the case.

[In conditions with manipulation checks (half of the participants, randomly assigned): First, a few comprehension questions to make sure you read and understood the scenario:]

Now, considering that the wine merchant purchased the wine for 5 US$ per bottle a decade ago, how much would you be willing to buy it for per bottle now? (in US$)

End of Block: Mandel 2002: merchant selling & you interested buying condition

---

Mandel 2002: Comprehension checks

[These only appeared to half of the participants]

Who is the potential seller?

- Merchant (1)
- You (2)

Who is the potential buyer?

- Merchant (1)
- You (2)

Who is more interested in making this deal happen?

- Merchant (1)
- You (2)

Additional analyses

Study 2a (first replication of Irmak et al., 2013)

Additional analyses of goal relevance ratings

We tested both goal relevance ratings against the scale midpoint (5.5), since the primary goal of purchasing the camera (art photography) is hold constant across conditions. Participants indicated that they based their pricing decision on the artistic features of the camera at a higher level than the scale midpoint ($M = 7.48$, $SD = 2.14$), $t(310) = 16.31$, $p < .001$, $d = .93$. Participants indicated that they based their pricing decision on the secondary features of the camera (weight and size) at a higher level than the scale midpoint ($M = 6.15$, $SD = 2.68$), $t(310) = 4.30$, $p < .001$, $d = .24$. We then compared the two ratings to test whether the artistic features of the camera were effectively more important than the weight and size of the camera.

Study 2b (second replication of Irmak et al., 2013)

Interaction

An ANOVA with ownership, goal relevance, and pricing range as between-subjects factors found a significant two-way interaction between ownership and goal relevance, $F(2, 989) = 3.15$, $p = .043$, $\eta_p^2 = .006$. In order to understand what drives this interaction, we ran the same ANOVA excluding one ownership condition at a time. When including only the owner and the seller conditions, the interaction between ownership and goal relevance produced a weak and not significant effect size, $F(1, 665) = 1.94$, $p = .16$, $\eta_p^2 = .003$. When including only the buyer and the seller condition, the interaction between ownership and goal relevance produced a weak and not significant effect size, $F(1, 665) = 2.18$, $p = .14$, $\eta_p^2 = .003$. When including only the buyer and the owner condition, the interaction between ownership and goal relevance produced a weak and significant effect size, $F(1, 660) = 4.17$, $p = .042$, $\eta_p^2 = .006$. While the interaction in the ANOVA considering all ownership condition is statistically significant, it is driven by the contrasting pattern of the buyer and the owner condition. This is consistent with the original study.

Results with log-transformed price

As reported in the pre-registration, we log-transformed the pricing variable since it showed skewness > 2 (with range = 9.12; without range = 16.98). An independent t-test showed that participants presented with a pricing range showed higher mean log-prices ($M = 6.29$, $SD = 0.41$), than participants who were not presented with a range ($M = 5.56$, $SD = 0.87$), Welch's $t(721.33) = 17.20$, $p < .001$, $d = 1.08$. An independent t-test showed a significant effect of feature goal relevance, as participants indicated higher prices when camera features were described as goal relevant ($M = 6.02$, $SD = 0.77$) compared to when they were described as not goal relevant ($M = 5.83$, $SD = 0.77$), $t(999) = 3.87$, $p < .001$, $d = .25$. A one-way ANOVA showed a significant omnibus effect of ownership $F(2, 998) = 3.26$, $p = .039$, $\eta_p^2 = .006$. Planned contrasts correcting for multiple comparisons using Tukey's method showed no significant difference between the buyer ($M = 5.89$, $SD = 0.78$) and the owner condition ($M = 6.01$, $SD = 0.72$), $t(998) = -2.00$, $p = .11$, $d = .16$, and no difference between the buyer and the seller condition ($M = 5.87$, $SD = 0.81$), $t(998) = 0.37$, $p = .93$. $d = .03$. We found a significant difference between the owner and the seller condition, $t(998) = 2.38$, $p = .046$, $d = .19$.
We conducted an ANOVA with ownership, goal relevance, and pricing range as between-subjects factors, which found a significant effect of ownership, $F(2, 989) = 4.27$, $p = .014$, $\eta_p^2 = .009$, a significant effect of goal relevance, $F(1, 989) = 19.29$, $p < .001$, $\eta_p^2 = .019$, a significant effect of pricing range, $F(1, 989) = 304.97$, $p < .001$, $\eta_p^2 = .236$. The ANOVA found a significant two-way interaction between ownership and goal relevance, $F(2, 989) = 3.00$, $p = .05$, $\eta_p^2 = .006$, a significant interaction between goal relevance and pricing range, $F(1, 989) = 4.014$, $p = .045$, $\eta_p^2 = .004$. We found no significant two-way interaction between ownership and pricing range, $F(2, 989) = 1.79$, $p = .17$, $\eta_p^2 = .004$. We found no significant three-way interaction between ownership, pricing range, and goal relevance, $F(2, 989) = .89$, $p = .41$, $\eta_p^2 = .002$.

Additional analyses of goal relevance ratings

Participants in the goal-relevant condition ($M = 7.88$, $SD = 1.97$) were more likely to report that they considered the advanced art features of the camera when deciding on a price

compared to participants in the goal-irrelevant condition (M = 7.11, SD = 1.97), $t(999) = 6.20$, $p < .001$, $d = .39$. Participants were not more likely to indicate that they considered the weight and size of the camera in the goal-relevant condition (M = 5.48, SD = 2.75) compared to the goal-irrelevant condition (M = 5.53, SD = 2.55), $t(999) = .30$, $p = .76$, $d = .02$.. Participants were more likely to indicate that "having all the sophisticated features that an art photographer needs" was more important than "the camera is compact and light so easy to carry around" when the camera had goal-relevant features compared to when the camera had goal-irrelevant features, χ^2 (1) = 62.28, $p < .001$, Cramer's $\varphi = .25$. A majority of participants indicated that "having all the sophisticated features that an art photographer needs" was more important than "the camera is compact and light so easy to carry around" in both the goal-relevant condition (463/498, 93%) and in the goal-irrelevant condition (375/503, 75%). Both proportions are different from chance level (50%), $p < .001$.
We tested both goal relevance ratings against the scale midpoint (5.5), since the primary goal of purchasing the camera (art photography) is hold constant across conditions. Participants indicated that they based their pricing decision on the artistic features of the camera at a higher level than the scale midpoint (M = 7.50, SD = 2.01), t(1,000) = 17.66, p < .001, d = .56. Participants did not indicate that they based their pricing decisions significantly higher than the midpoint (M = 5.51, SD = 2.65), t(1,000) = .07, p = .95, d < .01.

Forced-choice comparison of goal relevance

Participants perceived the scenario as intended with the artistic features being more goal-relevant across conditions (comparison to 50%-50% split; artistic features combined: 838/1001, 84%; p < .001; buyer: 274/332, 83%; owner, 270/332, 81%; seller, 294/337, 87%; comparison across conditions: $\chi 2$ (2) = 4.81, p = .09, Cramer's V = .07).

Effect of survey order

An independent samples t-test found a weak and not statistically significant effect of the order in which surveys (Irmak first; Mandel first) were presented to participants on price (Irmak first M = 513. 03, SD = 917.04; Mandel first M = 466.48, SD = 353.73), $t(999) = 1.07$, $p = .28$, $d = .07$.

An independent samples t-test found a weak and not statistically significant effect of the order in which surveys (Irmak first; Mandel first) were presented to participants on log-transformed price (Irmak first M = 5.97, SD = 0.71; Mandel first M = 5.89, SD = 0.82), $t(999) = 1.56$, $p = .12$, $d = .10$

Effects of price range display

In an independent t-test we found that participants presented with a range indicated higher prices (M = 580.99, SD = 280.84) compared to participants who were not presented with a pricing range (M = 397.82, SD = 917.93; Welch's $t(596.03) = 4.28$, $p < .001$, $d = .27$).
We found no support for a two-way interaction between ownership and pricing range ($F(2, 989) = .07$, $p = .93$, $\eta_p^2 < .001$), a two-way interaction between goal relevance and pricing range ($F(1, 989) = .09$, $p = .76$, $\eta_p^2 < .001$), or a three-way interaction between ownership, goal relevance, and pricing range ($F(2, 989) = 1.01$, $p = .37$ $\eta_p^2 = .002$).
We conclude that the presence of a pricing range did not have much impact on the results and

is therefore an unlikely explanation for the failed replication.

Non-transformed price, scenario presented with price range

Including only participants who were presented with a $400- $1000 price range, an ANOVA with ownership and goal relevance as between-subjects factors, and non-transformed pricing as the dependent variable found no effect of ownership, $F(2, 492) = 1.03$, $p = .36$, $\eta_p^2 = .004$, no effect of goal relevance, $F(1, 492) = 2.61$, $p = .11$, $\eta_p^2 = .005$, and no interaction between ownership and goal relevance, $F(2, 492) = 1.78$, $p = .17$, $\eta_p^2 = .007$, thereby finding results not consistent with the original target study.

Log-transformed price, scenario presented with price range

Including only participants who were presented with a $400- $1000 price range, an ANOVA with ownership and goal relevance as between-subjects factors, and log-transformed pricing as the dependent variable found no effect of ownership, $F(2, 492) = 1.00$, $p = .37$, $\eta_p^2 = .004$, a significant main effect of goal relevance, $F(1, 492) = 7.48$, $p = .006$, $\eta_p^2 = .015$, and no interaction between ownership and goal relevance, $F(2, 492) = 0.89$, $p = .41$, $\eta_p^2 = .004$, thereby finding results not consistent with the original target study.

Non-transformed price, scenario presented with *no* price range

Including only participants who were *not* presented with a $400- $1000 price range, an ANOVA with ownership and goal relevance as between-subjects factors, and non-transformed pricing as the dependent variable found no effect of ownership, $F(2, 497) = 0.33$, $p = .72$, $\eta_p^2 = .001$, no significant main effect of goal relevance, $F(1, 497) = 0.66$, $p = .42$, $\eta_p^2 = .001$, and no interaction between ownership and goal relevance, $F(2, 497) = 2.13$, $p = .12$, $\eta_p^2 = .009$, thereby finding results not consistent with the original target study.

Log-transformed price, scenario presented with *no* price range

Including only participants who were *not* presented with a $400- $1000 price range, an ANOVA with ownership and goal relevance as between-subjects factors, and non-transformed pricing as the dependent variable found a significant effect of ownership, $F(2, 497) = 3.53$, $p = .03$, $\eta_p^2 = .014$, a significant main effect of goal relevance, $F(1, 497) = 12.73$, $p < .001$, $\eta_p^2 = .025$, and no interaction between ownership and goal relevance, $F(2, 497) = 2.21$, $p = .11$, $\eta_p^2 = .009$, thereby finding results not consistent with the original target study regarding the interaction between ownership and goal relevance.

Study 3b (second replication of Mandel, 2002)

Results with not transformed price

An independent-samples t-test showed that participants who were shown comprehension checks did not indicated higher prices ($M = 36.95$, $SD = 187.86$) compared to participants who were not shown comprehensions checks ($M = 37.85$, $SD = 134.19$), $t(999) = .09$, $p = .93$, $d = .01$. We therefore completed the following analyses collapsing across this factor. A t-test

indicated a weak effect of ownership, as participants selling indicated higher prices (M = 48.05, SD = 194.76) than participants buying (M = 26.68, SD = 122.83), Welch's $t(845.90)$ = -2.08, p = .038, d = .13. We found a very weak and not statistically significant effect of transaction demand, as prices were similar when the merchant had higher transaction demand (M = 42.68, SD = 218.88) and when the participant had higher transaction demand (M = 32.07, SD = 71.68*),* $t(999)$ = 1.03, p = .30, d = .07. An ANOVA using ownership, transaction demand, and comprehension checks presence as independent variables revealed no significant two-way interaction between ownership and transaction demand, $F(1, 993)$ = .003, p = ..96, ηp2 < .001, no significant two-way interaction between ownership and comprehension checks presence, $F(1, 993)$ = 1.87, p = .17, η_p^2 = .002, no significant two-way interaction between transaction demand and comprehension checks presence, $F(1, 993)$ = .014, p = .91, η_p^2 < .001, and no significant three-way interaction between transaction demand, comprehension checks presence, and ownership, $F(1, 993)$ = .79, p = .38, η_p^2 = .001.

Effect of survey order

An independent samples t-test found a weak and not statistically significant effect of the order in which surveys (Irmak first; Mandel first) were presented to participants on price (Irmak first M = 42.11, SD = 195.10; Mandel first M = 33.01, SD = 126.43), $t(999)$ = .88, p = .38, d = .06.

An independent samples t-test found a weak and not statistically significant effect of the order in which surveys (Irmak first; Mandel first) were presented to participants on log-transformed price (Irmak first M = 2.87, SD = 1.00; Mandel first M = 2.78, SD = 0.89), $t(999)$ = 1.44, p = .15, d = .09.

Three-way ANOVA with ownership, transaction demand, and comprehension checks presence as factors and log-price as dependent variable

An ANOVA using ownership, transaction demand, and comprehension checks presence as independent variables found no support for any two-way or three-way interactions (ownership and interest: $F(1, 993)$ = 1.55, p = .21, η_p^2 = .002; ownership and comprehension checks: $F(1, 993)$ = .15, p = .70, η_p^2 < .001; interest and comprehension: $F(1, 993)$ = .88, p = .35, η_p^2 = .001; three-way interaction: $F(1, 993)$ = .10, p = .75, η_p^2 < .001).

Figures

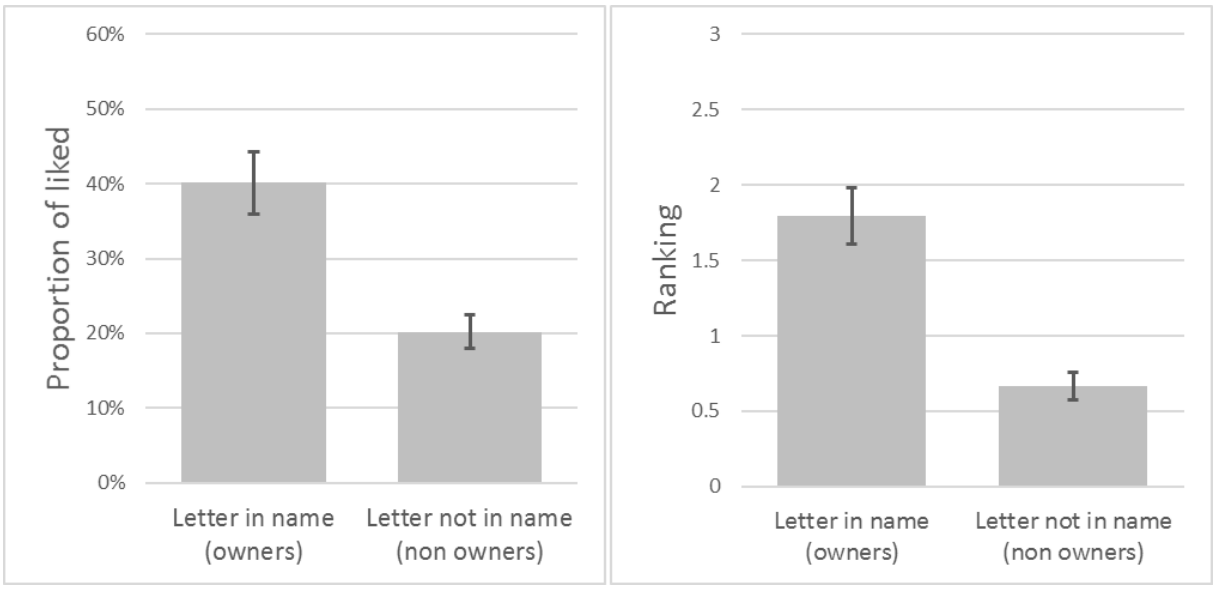

Figure S1. Study 1: Nuttin (1987) replication – plots. Error bars indicate standard error.

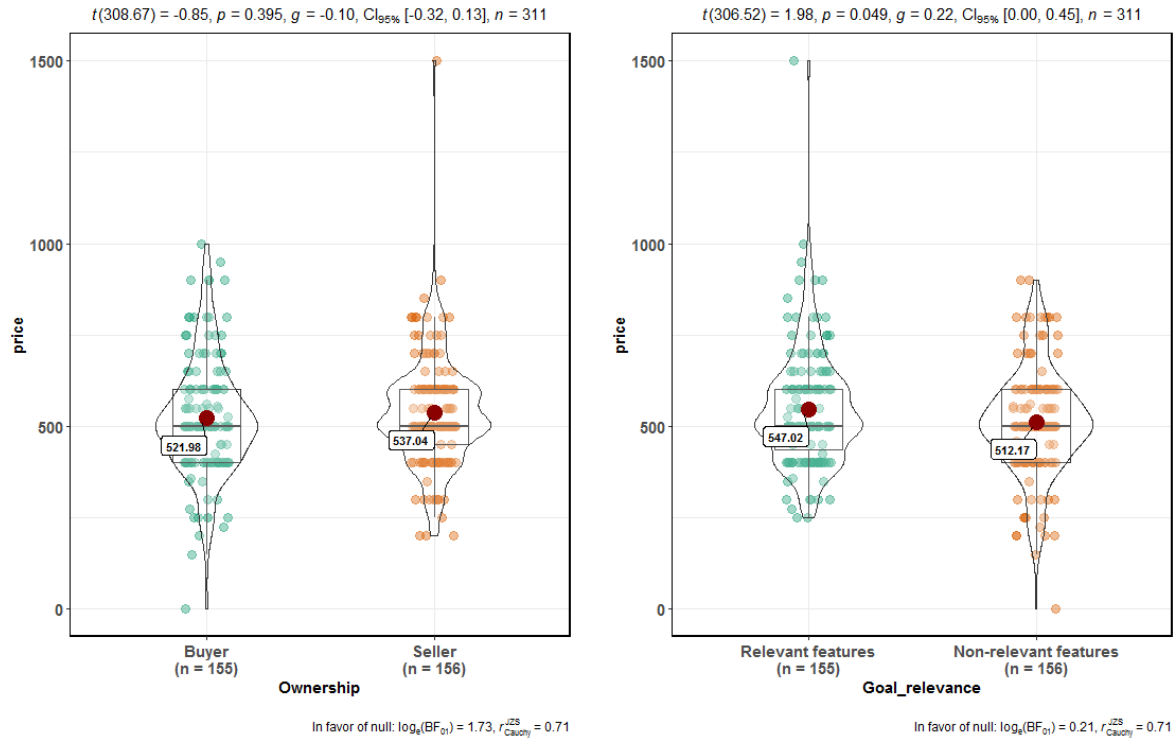

Figure S2. Study 2a: Irmak et al. (2013) replication – plots.

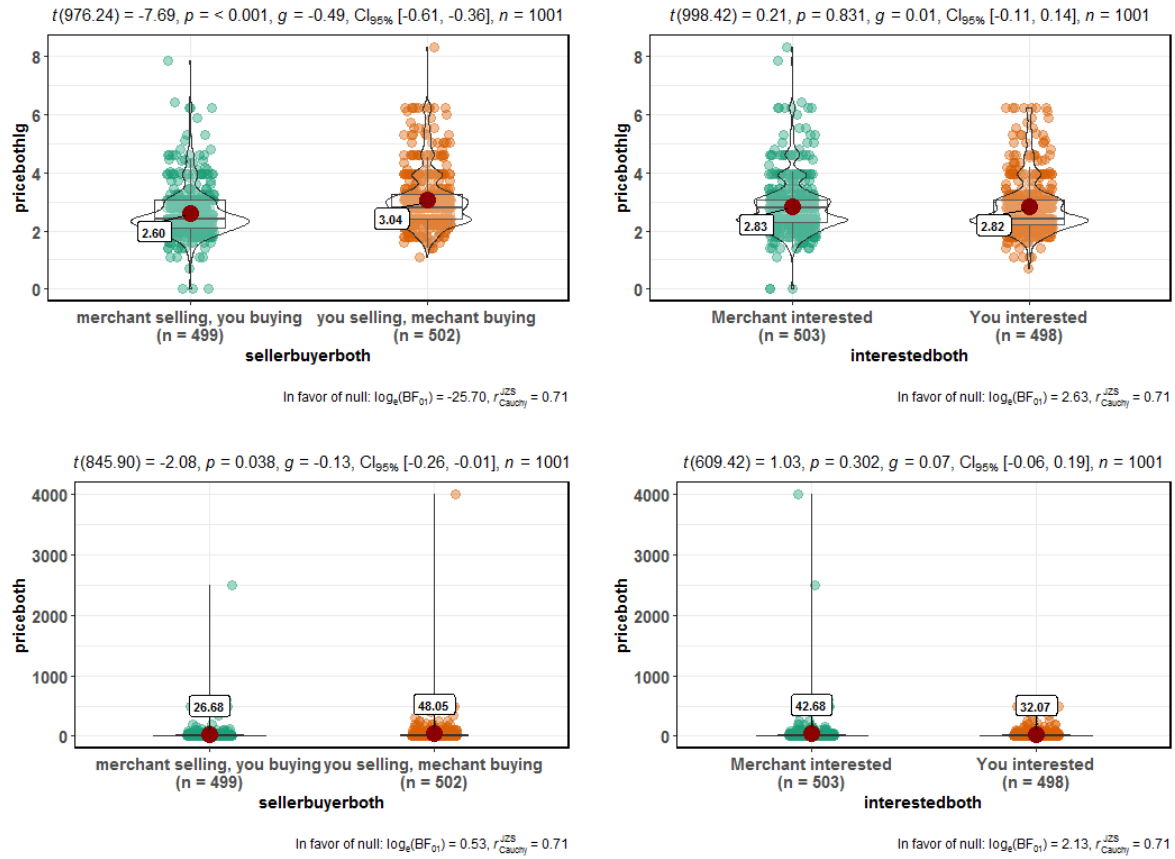

Figure S3. Results of Study 3b (replication of Mandel, 2002, second data collection). The graphs in the first row report data after price log-transformation; the graphs in the second row report data without price log-transformation.

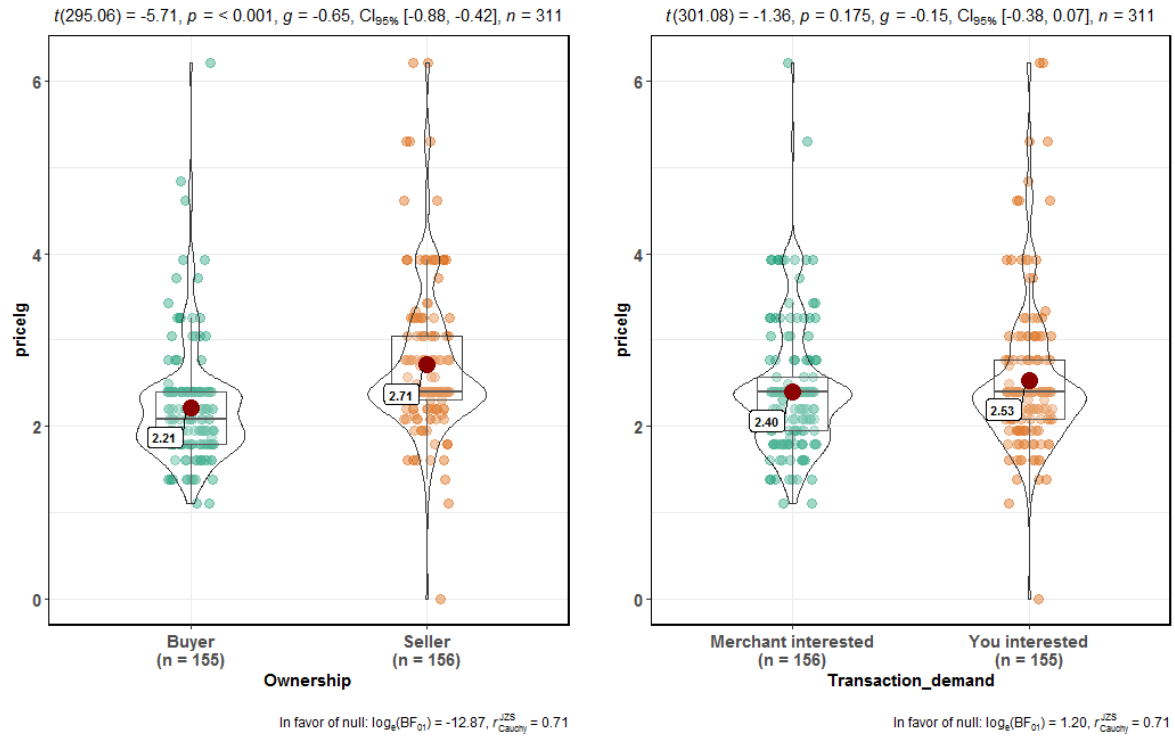

Figure S4. Study 3a: Mandel (2002) replication – plots. Log-transformed prices.

Clarifications made in first round review

Online samples for replications

Many Labs 2 has demonstrated that for a mass replication context and online/offline WEIRD/non-WEIRD had very little impact, especially for judgment and decision-making and cognition studies.

A recent mass replication effort of classic findings in judgment and decision-making was conducted online using Amazon Mechanical Turk with ~70% replication success rate and very high consistency between Amazon Mechanical Turk and undergraduate samples (http://mgto.org/pre-registered-replications/).

A specific example is a replication published in Cognition and Emotion (https://www.tandfonline.com/doi/full/10.1080/02699931.2018.1504747) that re-ran the same design with a different subset sample from Amazon Mechanical Turk after a six months gap and found almost identical result, demonstrating the consistency and reliability of MTurk online sample in replications.

[Please note that our second data collection provided further support for these arguments]

Order effects

Order effects should not be a concern for the following reasons.

The studies were sufficiently different from one another and manipulations in each study were randomized independently, making previous manipulations. As an example for a replication addressing similar concerns with the same target replication see a recent replication of exceptionality effect (https://www.tandfonline.com/doi/full/10.1080/02699931.2018.1504747) clearly demonstrating that order had no effect on results.

Finally, our third (last) replication was successful, and the failed replication was the second replication, which was the first experiment to involve a manipulation. So it's clear order did not stand in the way of a successful replication in the third study and could not have affected the second study.

[Please note that our second data collection provided further support for these arguments]

Adjustments made to Irmak in the first data collection

There are several things to note about the Irmak etal design and our adjustments to address comments made that our adjustments did not address ownership.

1. The conditions in Study 2 are titled buyers and sellers, not buyers and owners. The authors were not sensitive to the differences between owners and buyers. The description of the study clearly states "The two versions of the description [with **selling condition** in brackets] are presented below:" and "Next, those in the buying [**selling**] condition provided their maximum buying". Their manipulation did not match the intended content of the conditions.
2. The conditions in Study 2 further did not keep the wants of Mandel equivalent. The original framing was : "Considering that similar cameras are sold in the range of $400–$1000, **if you were to buy this camera** [if someone who is looking to take artistic pictures **wants to buy your camera**], how much would your maximum [minimum] price be? $_____.". The wants are not equivalent across conditions. To truly focus the manipulation on buying/selling, the wants needed to be kept constant.
3. Irmak further confused transaction cost in their DV, and we tried to address that. Confused how? here's from their methods section, notice the "wants/were" (bold added for emphasis) : "Considering that similar cameras are sold in the range of $400–$1000, if you **were** to buy this camera [if someone who is looking to take artistic pictures **wants** to buy your camera], how much would your maximum [minimum] price be? $_____."" In the additional 2nd data collection we added a condition that reverted this to the original to address any possible concerns that our adjustments to make things equivalent is somehow what changed the effect.
4. Irmak et al.'s Study 1 contrasted selling, buying, and owning. Their report (underline added for emphasis):
   "The results showed that, as predicted, participants in the selling condition had stronger preferences for high-level action identifications than those in the buying condition and in the owning condition. There was no significant difference between buying and owning conditions ($z = .45$, $p > .60$)."

Therefore, even if we assume that Irmak actually contrasted ownership with buying, rather than what they intended to demonstrate regarding the contrast between selling and buying, and even if we assume that their unequal manipulation of the ownership/buying wants were intentional and what led to the effect, then finally, based on their own results from Study 1, the differences between owners and sellers in these situations is very weak.