JCP JOURNAL OF CONSUMER PSYCHOLOGY

SCP SOCIETY FOR CONSUMER PSYCHOLOGY

Uninformative Anchors Have Persistent Effects on Valuation Judgments

Sangsuk Yoon
University of Dayton

Nathan Fong
Rutgers University – Camden

Accepted by Amna Kirmani and Anirban Mukhopadhyay, Editors; Associate Editor, Joel Huber

Anchoring effects influence a wide range of numeric judgments, including valuation judgments, such as willingness-to-pay (WTP). However, prior research has not established whether anchoring only temporarily distorts responses or exerts persistent influence on preferences. This article presents three incentive compatible experiments examining the long-term effects of random anchoring on WTP. Study 1 evaluated the persistence of anchoring effects over long durations, and showed that the strength of the effect decayed but did not disappear completely even 8 weeks later. In Study 2, a random anchor significantly influenced WTP after one week, regardless of whether WTP was also elicited immediately following the anchoring procedure, showing that consistency motivations do not account for persistence of anchoring effects. Study 3 showed relatively low anchors resulted in more stable valuations, compared with participants who reported WTP with no anchoring procedure. Together with the pattern of decay over time in Study 1, this suggests that anchoring facilitates the "imprinting" of valuation judgments for later retrieval. These studies show that anchoring effects can lead to lasting changes in valuation judgments, providing the first demonstration of long-term persistence of constructed preferences as a result of an uninformative and arbitrary manipulation.

Keywords Anchoring effect; Long-term effect; Constructed preferences; Willingness-to-pay

Researchers in the heuristics and biases tradition have often compared phenomena arising in various judgment tasks to those in perception. Tversky and Kahneman (1974) compared probability judgments to visual assessments of physical quantities, such as size or distance. In the realm of perceptual illusions, removing the features of a stimulus that cause the illusion should reduce the associated biases in judgment. For example, a viewer of the well-known Müller-Lyer illusion may perceive two identical line segments to be different lengths depending on whether the accompanying tails point in or out. Subsequently removing the tails from the stimuli should result in judgments that the two lines are the same length; the bias in assessment of length should not persist (Greist-Bousquet & Schiffman, 1981). This naturally leads to the question of whether other biases in judgment persist beyond the end of the procedures that generate them. For what types of judgments do biases persist, how strongly, and for how long? We approach this question with respect to valuation judgments, where our findings provide insight into the nature of preferences. Do distortions in valuation judgments become internalized, or, with the source of the distortion removed, do subsequent judgments to revert to one's underlying, inherent preferences?

Anchoring effects have been shown to influence people's numeric judgments, assimilating an estimate toward a previously considered standard of comparison (the anchor), even when the standard is uninformative for the given task (Chapman & Johnson, 1999; Strack & Mussweiler, 1997; Tversky & Kahneman, 1974). Tversky and Kahneman (1974) asked participants to estimate the percentage of African countries in the United Nations. Before answering the question, participants were asked whether their answer was higher or lower than either 10% or 65%. Even though the comparison number was randomly generated by spinning a wheel of fortune, participants' numeric estimates were influenced by the number they compared; participants who considered 65% stated higher estimates than those who considered 10% (median answers: 65% group = 45% vs. 10% group = 25%). Anchoring can influence a variety of consequential decisions, such as credit card minimum repayments (Stewart, 2009), real estate evaluations (Northcraft

Received 26 June 2017; accepted 30 December 2018
Available online 17 January 2019
Correspondence concerning this article should be addressed to Nathan Fong, School of Business – Camden, Rutgers University, 227 Penn St, Room 318, Camden, NJ 08102-1656, USA. Electronic mail may be sent to nathan.fong@rutgers.edu.

 1057-7408/2019/1532-7663/29(3)/391–410
DOI: 10.1002/jcpy.1091

& Neale, 1987), negotiations (Galinsky & Mussweiler, 2001), auctions (Ku, Galinsky, & Murnighan, 2006), performance judgments (Thorsteinson, Breier, Atwell, Hamilton, & Privette, 2008), stock market estimations (Kaustia, Alho, & Puttonen, 2008), purchase volumes (Wansink, Kent, & Hoch, 1998), and food intake estimates (Marchiori, Papies, & Klein, 2014).

In many of the aforementioned cases, the anchor itself may carry information; for example, while the first offer in a negotiation serves as an anchor, it also carries information about the other party's valuation (Galinsky & Mussweiler, 2001). More surprisingly, previous studies found that explicitly random experimental anchors affect consequential valuation judgments (Ariely, Loewenstein, & Prelec, 2003; Bergman, Ellingsen, Johannesson, & Svensson, 2010; Simonson & Drolet, 2004). Ariely et al. (2003) asked participants to state willingness-to-pay (WTP) for several market goods. Before answering the question, participants were asked whether they are willing to buy (WTB) the shown items for a dollar amount using the last two digits of their social security number (the anchor) as the price. Even though the price was effectively random, making it uninformative for the given valuation task, and the task was incentive compatible, participants' WTP was systematically influenced by the anchoring number.

Valuation anchoring has been regarded as evidence demonstrating preference construction, the notion that eliciting preferences prompts a respondent to form preferences, rather than simply report inherent preferences. Anchoring effects on valuations violate procedural invariance, the principle that the manner in which preferences are elicited should not affect stated preferences (Slovic, 1995). The majority of valuation anchoring studies have shown significant effects, but invariably the valuation judgments immediately follow the anchoring manipulation (Ariely et al., 2003; Bergman et al., 2010; Chapman & Johnson, 1999; Fudenberg, Levine, & Maniadis, 2012; Green, Jacowitz, Kahneman, & McFadden, 1998; Johnson & Schkade, 1989; Northcraft & Neale, 1987). Prior research has not established whether constructed preferences from random anchoring persist or disappear over time. Furthermore, prior research on the persistence of constructed preferences has studied contexts where preference construction procedures were informative, such as learning from repeated choices or experiences (Amir & Levav, 2008; Hoeffler & Ariely, 1999; Yoon & Simonson, 2008), a free-choice paradigm where participants are un/consciously validating their choices (Izuma et al., 2010; Sharot, Fleming, Yu, Koster, & Dolan, 2012; Simon, Krawczyk, Bleicher, & Holyoak, 2008; Simon & Spiller, 2016), social decision-making (Huang, Kendrick, & Yu, 2014; Izuma & Adolphs, 2013), or physical effort (Schonberg et al., 2014), in contrast with the uninformative random anchors we use. Thus, in addition to the first evidence of long-term persistence of valuation anchoring, we provide the first evidence of persistent constructed preferences resulting from uninformative cues.

Why might we expect uninformative cues to have persistent effects? Previous research has shown that, when a participant considers an anchor, they preferentially increase the processing of information that supports the anchor as a possible answer (Chapman & Johnson, 1999; Strack & Mussweiler, 1997), an anchoring mechanism referred to as selective accessibility. Previous anchoring studies using general knowledge questions have shown that anchoring effects persisted even after one week regardless of whether numeric judgments followed immediately after comparison questions, but anchoring effects did not persist when participants were anchored while under cognitive load (Blankenship, Wegener, Petty, Detweiler-Bedell, & Macy, 2008; Mussweiler, 2001). Thus, cognitive elaboration contributes to persistence. Similarly, anchors may cause people to selectively process the reasons they might purchase an item for the random price. This selective information processing can increase a decision maker's confidence in their valuation judgment, leading the anchor-influenced valuation to become internalized and resulting in long-term anchoring effects on subsequent valuations. This internalization would support an "imprinting" account of preference construction, where subsequent valuations stabilize after an initial judgment (Ariely et al., 2003; Hoeffler & Ariely, 1999).

However, several factors potentially work against finding persistent, rather than transient, valuation anchoring effects. Firstly, other known mechanisms that contribute to anchoring effects, such as anchoring and (insufficient) adjustment (Epley & Gilovich, 2001) and response scale distortion (Frederick & Mochon, 2012), should disappear as the salience of a random anchor fades over time. Furthermore, valuation judgments are distinct from other types of numeric judgments in that a participant's previous experiences and preferences play an important role (Fudenberg et al., 2012). These previous experiences and preferences could play the role of a self-generated anchor (Epley & Gilovich, 2001) and can dilute the effect of an experimenter-given

random anchor on valuation judgments, especially as the salience of the anchor fades.

We do not differentiate between the previously identified mechanisms, but rather ascertain whether valuation anchoring persists by systematically measuring the effect of random anchoring on WTP at several different time intervals. While we find that the strength of the anchoring effect decreases after an initial session, it then stabilizes over subsequent sessions. The effect persists even though we rely on incentive compatible elicitation tasks where a participant's best strategy is to determine their own preferences and adjust their WTP accordingly (Camerer et al., 2016). Thus, while short-term distortions may contribute to the effect, we find persistent anchoring effects, showing how uninformative contextual cues can exert a lasting influence on valuation judgments.

Pilot Study and Overview of Experiments

We used similar experimental procedures in all of our studies. In an initial session, participants were asked whether they would buy each of six market goods (willingness-to-buy, WTB; binary decision: Yes or No) for a random price (the anchor), which ranged from 0 to 99. We refer to the WTB decision as the anchoring procedure, which we administered in the initial session for every experimental condition of every study. At several subsequent points in time, on a schedule that varies by study and condition, participants were asked to state the most they would be willing to pay (WTP) in a dollar amount without any range restriction. As in Ariely et al. (2003), since the price in the WTB question is random, it is uncorrelated with participants' prior preferences; we refer to a positive correlation between the anchor and WTP as the anchoring effect. We refer to a positive correlation between the anchor and WTP measured at some time after the initial session as a persistent effect; such persistence has not been previously shown.

A pilot study was completed by 141 undergraduate students in exchange for class credit. Each participant drew a single anchor from a deck of cards with numbers ranging from 0 to 99. The anchor was used for WTB decisions on a set of six market goods that span several distinct categories (cordless mouse, Bluetooth keyboard, normal and fancy dinner, art book, and humidifier). We measured WTP in the initial session, again after a week, and a third time 2–5 months from the first session. In each session, before responding, participants saw and could touch the actual items (for the dinner, we provided menus for the normal and fancy restaurants without price information). Half of the items had WTP elicited in the initial session (*immediate WTP*) and half did not (*anchor only*), randomized within-subjects, but the *anchor only* condition always preceded the *immediate WTP* condition. We used a Becker-DeGroot-Marschak (BDM) incentive compatible method (Becker, DeGroot, & Marschak, 1964) to make participants' decisions consequential for 5% of participants, selected at the end of the second session, and for an additional 5% of participants who completed the third session. Participants were informed that they would be endowed enough money to cover any purchase if selected, but we did not specify the exact amount (which was equal to the maximum BDM price) to avoid inducing reference point effects. We report complete details of the pilot study in Methodological Details Appendix S1.

Figure 1a shows the relationship between WTP and the randomly assigned anchor in the first session for the *immediate WTP* items. WTP is aggregated by participant, and shows a clear positive association with the anchor. The lines compare a linear fit to a nonparametric fit. The slope of the nonparametric fit indicates the strength of the anchoring effect across anchor values without prespecifying functional form or inflection points. The marginal effect visibly diminishes for more extreme anchors, but the effect of anchoring does not disappear (i.e. WTP for the highest anchors is still higher than for the lowest anchors). Otherwise, the effect appears roughly linear. In many of our subsequent analyses, we summarize the anchoring effect with a linear regression coefficient; for example, the regression coefficient for the linear fit in Figure 1a is 0.2, implying that a one unit increase in the anchor causes a 20 cent increase in WTP. Alternatively, we depict the anchoring effect in each study by comparing average WTP for discrete bins comprising low, medium, and high anchor values (Methodological Details Appendix S2).

Figure 1b shows the relationship between WTP in the second session and the anchor. The participants were not shown the anchor again after the WTB questions in the initial session. Fitted lines corresponding to immediate WTP and long-term WTP show that the anchoring effect appears to weaken, but does not disappear completely.

Figure 2 shows how the slope of the anchoring effect changes over time for a subsample of 55 participants who opted in to a third session. We find

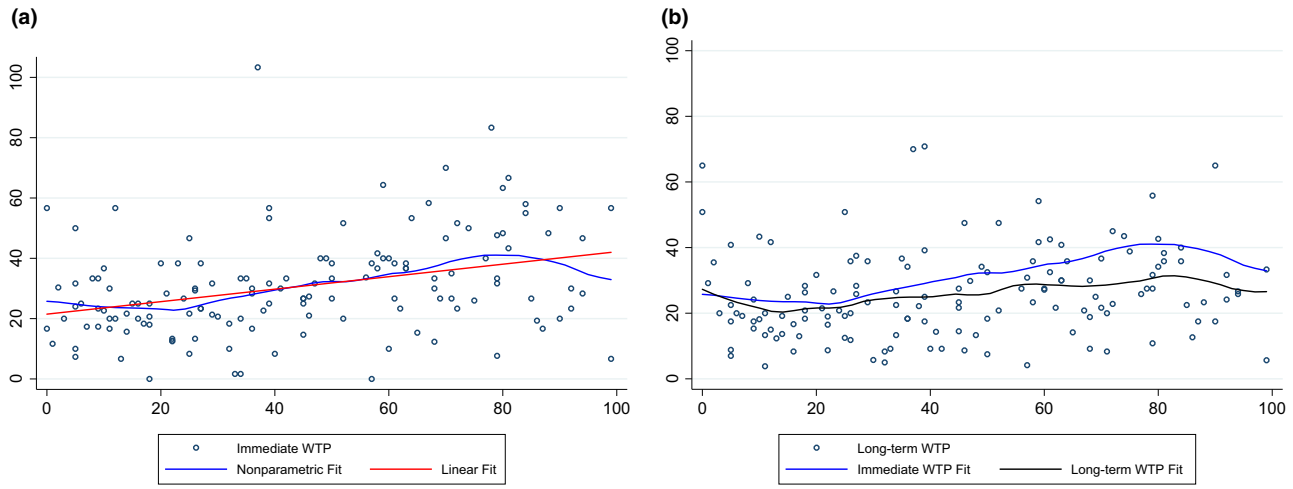

Figure 1. Anchoring effects in the pilot study. *Y*-axis indicates willingness-to-pay and *X*-axis indicates anchor value. (Left, Panel a) Anchoring effects on immediate WTP. Red line indicates a linear fit between WTP and anchor, while blue line indicates a nonlinear fit between WTP and anchor. (Right, Panel b) Blue line indicates a nonlinear fit between WTP and anchor in Session 1, while black line indicates a nonlinear fit between WTP and anchor in Session 2. [Color figure can be viewed at wileyonlinelibrary.com]

that the anchoring effect persists even after surprisingly long time periods. Furthermore, the effect weakens over time, but after a sharp decrease early on, the pattern seems to stabilize, mirroring temporal patterns of information retention in memory research (Rubin & Wenzel, 1996). While the first two sessions were conducted in-person, the third session was conducted online, and the time interval was not controlled. We note that the anchoring effects for the participants completing the third part, compared to the full sample, were slightly stronger in the first two sessions, indicating potential selection biases.

Our exploration of the pilot study revealed several opportunities to confirm and explain the observed patterns. In Study 1, we assigned participants to report WTP at fixed time intervals of 4 and 8 weeks, for a robust test of long-term anchoring effects and to estimate the pattern of decay. Remarkably, we confirm that anchoring effects continue to affect valuations for weeks and even months after the initial anchoring procedure. We

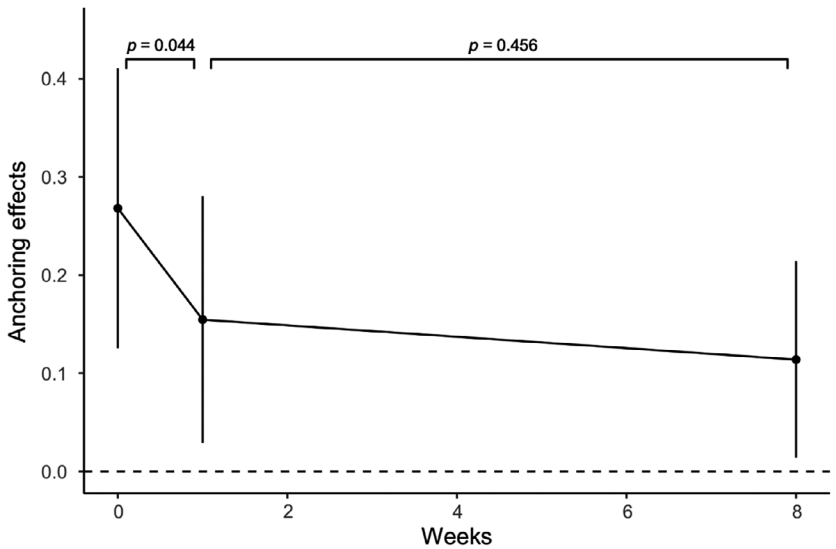

Figure 2. Anchoring effects over time in the pilot study. Y-axis indicates regression coefficients, with the regression coefficients estimated separately for each session. Error bars indicate 95% confidence intervals.

again find a pattern where anchoring effects decrease early on and then stabilize, so the initial anchoring effect potentially consists of both short-term distortions and long-term shifts in perceptions. We also assign a *rehearsal* condition where we included an additional WTP elicitation at the 1-week mark, to test whether reinforcement of the WTP judgment increased persistence, but we did not find a strong moderating effect.

In Study 2, we investigated the long-term effect of random anchors on WTP in two ways. In an *anchor only* condition, we introduce a 1-week gap between the anchoring procedure (i.e. WTB) and initial WTP elicitation. We compare that with the *immediate WTP* procedure we used in Study 1, varying the procedure between subjects. If long-term effects are driven by consistency motivations (rather than imprinting of preferences), we would expect *immediate WTP* to have stronger effects than *anchor only*, but the two conditions showed equally strong anchoring effects in the second week. As an additional factor, we manipulate whether a single *repeated anchor* is used for all items, as in Studies 1 and 2, or *multiple anchors* are independently drawn for each item. This helps us test whether memory of the anchor facilitates the anchoring effect, as participants could be re-anchoring themselves in later sessions. We do not find an interaction between anchor repetition and anchoring persistence, suggesting a limited role for the anchor beyond the initial evaluation.

In Study 3, we use a *no anchor* group to elicit WTP in the absence of anchors, allowing us to compare the stability of WTP with and without the anchoring procedure. Larger WTP adjustments after an anchoring procedure would be indicative of anchor-induced errors that are subsequently corrected, but we find no such pattern. In fact, we find that low to medium anchor values result in smaller WTP adjustments and stable anchoring effects. In comparison, WTP judgments following high anchor values receive larger adjustments, and the average WTP level a week later does not differ from the no-anchor group; it appears high anchors produce more short-term distortions in WTP. We also test for the effects of incentives on persistence by randomly assigning a *hypothetical* group that receives no incentives. If hypothetical WTP judgments showed more persistent anchoring, it would suggest that transient anchoring effects can be worn down with strong enough incentives, but incentives did not have a notable effect on persistence. Finally, we tested participants' understanding of the BDM procedure and added an *incentives + amount* condition where we specified the exact amount of the endowment, to ensure that attempts to game the BDM procedure did not influence our results.

The studies are summarized in Table 1, including WTP elicitation timelines and names for each experimental condition. The remainder of the paper provides detailed descriptions and analysis of the results, followed by a general discussion of our findings.

Study 1. Long-Term Persistence

Participants

The study consisted of three sessions. We aimed to recruit 200 participants so that each experimental condition could have 50 participants, a similar sample size to that in Ariely et al. (2003). Since the study was a longitudinal design conducted in a group setting, we predefined the stopping rules as follows: (a) as soon as the total number of recruitments exceeds 200, or (b) the total number exceeds 190 as of the end of an academic semester. A total of 194 university undergraduate students participated in the experiment in exchange for class credit, and a total of 150 participants (mean age = 20.18 years, SD = 1.78; 77 men, 73 women; one participant did not provide age information) completed all of the three sessions.

Procedure

A 2 (rehearsal: *rehearsal* vs. *no rehearsal*; between-subject) × 3 (time: Session 1 vs. Session 2 vs. Session 3; within-subject) × 2 (delay of Session 3: *4-week* vs. *8-week*; between-subject) mixed design was used. Participants were randomly assigned to one of four cells (delay × rehearsal), with participants from each session assigned to the same cell.

The overall procedures were similar to the design for the pilot study, except that participants were asked to come to the laboratory three times (Session 1 vs. Session 2 vs. Session 3). In Session 1, all groups were asked to answer WTB and WTP questions for six market goods (cordless mouse, Bluetooth keyboard, normal and fancy dinner, art book, and humidifier; average price = $48.33, price range: $30–$100). Items were physically presented except for the normal and fancy dinner. After answering all of the questions, participants were asked to provide demographic information. In Session 2, participants in the *rehearsal* condition were asked to once again answer WTP questions for the six items. Those in the *no rehearsal* condition instead completed an unrelated task (e.g. attitude toward

Table 1
Summary of Studies and WTP Elicitation Timelines

Study	Objectives	Experimental condition	Initial session	One week	Two weeks	Four weeks	Eight weeks
Pilot (N = 141)	Exploratory (details in Appendix)	Anchor only (3 items)		WTP2			WTP3
		Immediate WTP (3 items)	WTP1	WTP2			WTP3
Study 1 (N = 150)	Estimate persistence of anchoring over different time intervals; test effects of rehearsal (repeated WTP elicitation)	Rehearsal, 4-week	WTP1	WTP2		WTP3	
		No Rehearsal, 4-week	WTP1			WTP3	
		Rehearsal, 8-week	WTP1	WTP2			WTP3
		No Rehearsal, 8-week	WTP1				WTP3
Study 2 (N = 628)	Test whether persistence requires immediate WTP elicitation (consistency motivations); test for the moderating effect of variation in the anchors	Repeated anchor, anchor only		WTP2	WTP3		
		Multiple anchors, anchor only		WTP2	WTP3		
		Repeated anchor, immediate WTP	WTP1	WTP2			
		Multiple anchors, immediate WTP	WTP1	WTP2			
Study 3 (N = 362)	Estimate the magnitude of WTP adjustments and test for the effects of incentives on persistence	No Anchor, hypothetical	WTP1	WTP2			
		No Anchor, incentives	WTP1	WTP2			
		Anchor, hypothetical	WTP1	WTP2			
		Anchor, incentives	WTP1	WTP2			
		Anchor, amount	WTP1	WTP2			

different donation messages) that did not involve WTP responses. In Session 3, both *rehearsal* and *no rehearsal* groups were asked to answer WTP questions for the six items, but the participants in the *4-week* condition returned 4 weeks after Session 1, while those in the *8-week* condition returned 8 weeks after Session 1. At the end of Session 3, participants were asked to provide their best guess for the random price they picked in Session 1 (the anchoring number).

For both sessions, we used BDM incentive compatible method (Becker et al., 1964) to make participants' decisions consequential. The incentive compatible procedures followed this sequence: (a) each participant had a 5% chance that one of their decisions would be resolved with real money and products, (b) the session from which answers were drawn was randomly decided, (c) the item to be sold was randomly selected, and (d) in the case where the answers were drawn from Session 1, the question to be used (whether WTB or WTP) was random. Randomization was performed transparently, by rolling dice or tossing a coin. If the purchase was based on a WTB question and their answer was Yes, participants purchased the selected item for the random (anchor) price and kept the leftover cash from the endowment ($80); if their answer was No, there was no transaction and participants kept the whole endowment. If the purchase was based on a WTP question, we randomly selected a price from a 10 by 10 price matrix which ranged from $0 to $80 by rolling two 10-face dice, and compared the price with participants' WTP for the item randomly selected to be sold. If their WTP was greater than the random price from the price matrix, they purchased the selected item for the random price and kept the leftover cash, while there was no transaction and kept the whole endowment if their WTP was smaller than the random price. The incentive compatible procedures were clearly explained to the participants in each session before starting the experiment. All experiment materials and data are available online (https://osf.io/e2byg/?view_only=feae2d9c859944dd81ca95e11fadc355).

Results

We regressed WTP on anchoring number for each session, with item fixed effects to account for differences in average WTP across items (equivalent to including a dummy variable in the model for each item). We also employed subject-level clustered standard errors to account for the dependency across items within a subject. A total of 15 extreme responses with WTP greater than $150 and missing responses were excluded from the analysis. We found significant anchoring effects for all three sessions. The pattern was similar to the pilot study, showing a sharp decrease between Session 1 and Session 2, whereas the two later sessions showed a stable anchoring effect (Figure 3). We further examined whether the anchoring effect interacted with *time* (Session 1 vs. Session 2 vs. Session 3) by

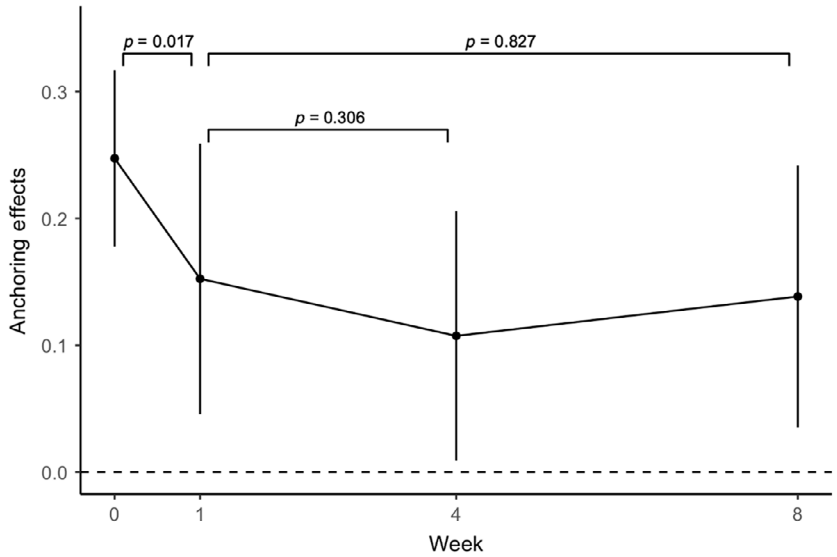

Figure 3. Anchoring effects over time in Study 1. Y-axis indicates regression coefficients, with the regression coefficients estimated separately for each session. Error bars indicate 95% confidence intervals.

regressing WTP on anchoring number interacted with three contrasts for *time*. We found a significant interaction between *anchor* and *time* for Session 1 versus Session 2 contrast (−1: Session 1 vs. 1: Session 2; $b = -0.05$, $SE = 0.02$, $t = -2.41$, $p = .02$), but there was no significant interaction between *anchor* and *time* for Session 2 vs. Week 4 contrast (−1: Session 2 vs. 1: Week 4; $b = -0.02$, $SE = 0.02$, $t = -1.03$, $p = .31$) and for Session 2 vs. Week 8 contrast (−1: Session 2 vs. 1: Week 8; $b = -0.01$, $SE = 0.03$, $t = -0.22$, $p = .83$). These results show that anchoring effect on WTP was significantly smaller after 1 week, but the effect had stabilized by week four.

Next, we examined whether repeating the WTP elicitation in Session 2 moderated the long-term anchoring effect on WTP. For the analysis, we regressed WTP from Session 3 on anchoring number, interacted with WTP *rehearsal* (−1: *no rehearsal* vs. 1: *rehearsal*) and *delay* (−1: 4-week vs. 1: 8-week) contrasts. The result showed that there was no significant *anchor* × *rehearsal* × *delay* three-way interaction ($t = -0.51$, $p = .61$) or *anchor* × *rehearsal* interaction ($t = 0.70$, $p = .49$), showing that repeated elicitation of WTP did not influence persistence (Model 2 in Table 2). Unsurprisingly, since there were no differences in procedures between conditions in Session 1, we did not find significant moderation effects of *rehearsal* and *delay* on WTP responses in Session 1 (Model 1 in Table 2), showing that there was no difference in anchoring effects on immediate WTP responses. Finally, we contrasted the moderation effects of *rehearsal* and *delay* across Session 1 and Session 3 (0: Session 1 vs. 1: Session 3; Model 3 in Table 2). However, we did not find any significant interaction with time except for the *anchor* × *time* interaction ($t = -4.29$, $p < .001$).

Table 2
Regression Results for Rehearsal and Delay in Study 1

	(1) Session 1	(2) Session 3	(3) Session 1 vs. 3
Anchor	0.24*** (0.03)	0.12** (0.04)	−0.12*** (0.03)
Delay	−1.48 (1.69)	−1.55 (2.11)	−0.07 (1.49)
Rehearsal	1.74 (1.69)	0.73 (2.11)	−1.01 (1.49)
Anchor × Delay	0.01 (0.03)	0.02 (0.04)	0.01 (0.03)
Anchor × Rehearsal	−0.01 (0.03)	0.03 (0.04)	0.03 (0.03)
Delay × Rehearsal	0.89 (1.69)	−0.59 (2.11)	−1.48 (1.49)
Anchor × Delay × Rehearsal	−0.05 (0.03)	−0.02 (0.04)	0.03 (0.03)
Intercept	Item FE	Item FE	Item FE
N	895	895	1,790

Note: Clustered standard errors are in the parentheses. The categorical variables *Delay* (−1: 4-week vs. 1: 8-week) and *Rehearsal* (WTP rehearsal; −1: no rehearsal vs. 1: rehearsal) were effect coded. Model 3 indicates the difference in predictors between the first and the third session from an *Anchor* × *Delay* × *Rehearsal* × *Time* (dummy coded; 0: Session 1 vs. 1: Session 3) regression analysis.
***$p < .001$, **$p < .01$.

We also examined the effect of memory on the long-term anchoring effect on WTP. A total of 41 participants correctly remembered the anchoring number, while 105 participants did not (four

participants did not provide a recalled anchoring number). We regressed WTP from Session 3 on anchoring number, interacted with *delay* (−1: 4-week vs. 1: 8-week) and *memory* (−1: inaccurate vs. 1: accurate recall; Model 1 in Methodological Details Appendix S2). We did not find a significant *anchor* × *memory* × *delay* three-way interaction (b = −0.02, SE = 0.03, t = −0.55, p = .58) or a significant *anchor* × *memory* interaction (b = −0.03, SE = 0.03, t = −0.98, p = .33). We also investigated the effect of memory on the long-term anchoring effects on WTP by treating memory as the distance between the actual random price they picked in Session 1 and participants' guess about the random price in Session 3 (Model 2 in Methodological Details Appendix S3). The results did not show a significant *anchor* × *memory* × *delay* three-way interaction (b = 0.003, SE = 0.002, t = 1.36, p = .18) and the two-way interaction between *anchor* and *memory* was not significant (b = −0.001, SE = 0.002, t = −0.23, p = .82). In a further analysis, we found that even when controlling for the recalled anchor, we still found significant effects of the true anchor on WTP (Model 3 in Methodological Details Appendix S3; b = 0.15, SE = 0.05, t = 2.95, p = .004; the effect of recalled anchor price on WTP was not significant; b = −0.04, SE = 0.06, t = −0.79, p = .43).

Discussion

In Study 1, we tested the long-term effect of an uninformative anchor on WTP and corroborated the decay pattern which we observed in the pilot study. By exogenously manipulating the last session (*4-week* vs. *8-week*), we mitigate the effects of selection/survival bias. Consistent with the pilot study, we found that anchoring effects sharply decreased after 1 week but stabilized over time. Even 8 weeks after the anchoring procedure, a one-unit increase in the anchor still caused a 14 cent increase in WTP. The stabilizing pattern suggests that we cannot fully attribute the anchoring effect on WTP to a simple response distortion.

We tested the effects of several possible moderators. First, we tested whether rehearsing WTP moderated the long-term anchoring effect. Participants might try to provide responses in later sessions consistent with their initial WTP responses, allowing a short-term effect to persist without affecting preference; they may balance the incentive to provide their true WTP with consistency motivations. Rehearsal after the first week should make initial WTP responses more salient, but we did not find evidence that rehearsal moderated the long-term anchoring effect. However, stating WTP even once right after the anchoring procedure could potentially activate the consistency motivation, or could be seen as a commitment to similar subsequent decisions; commitments can influence consequential decisions weeks later, despite financial incentives to renege (Ederer & Schneider, 2018). To rule out these possibilities, we also test for persistent anchoring effects with and without the WTP elicitation immediately after the anchoring procedure using a between-subject design in Study 2. We tested this in the pilot study using a within-subject design, but participants' anchor-influenced WTP for the *immediate WTP* items could spill over into their WTP for the *anchor only* items (Methodological Details Appendix S1). This was a conservative approach given our initial expectations that there would be a measurable consistency effect. By using a between-subject design in Study 2, we test persistent effects in the *anchor only* condition in a more robust way.

We also tested whether memory of the random price anchor moderated the long-term anchoring effect. It was possible that participants might be affected by the recalled random price anchor in later sessions. The anchoring effect could be driven by short-term distortions that get reestablished by participants' recall of the anchor when reevaluating WTP; essentially, the better they remember the anchor, the more likely they could spontaneously re-anchor themselves. However, several measures of memory failed to moderate long-term anchoring effects, and our analyses are limited by the fact that recalled anchor was recorded after the final WTP elicitation and could be influenced by participants' WTP response. Since memory was observed rather than manipulated and subject to confounding (e.g. participants with better memory could be less susceptible to anchoring) and memory still could affect the long-term anchoring effect implicitly (Kyung & Thomas, 2016), we further investigate the effect of memory by manipulating repetition of the anchor in Study 2, which affects participants' ability to recall the anchor.

Study 2. The Effect of Immediate WTP Responses on Long-Term Anchoring Effects

Design and Procedures

A 2 (immediate WTP elicitation: *anchor only* vs. *immediate WTP*) × 2 (anchor repeat: *repeated* vs. *multiple anchors*) between-subject design was used. Overall procedures were similar to those in Study 1 with several changes. First, the study was

conducted online, so the items were presented on the screen, and the anchor prices were randomly generated by the computer. Second, we changed the six items to a Bluetooth speaker, vacuum, toaster oven, electric kettle, smart scale, and humidifier (average price = $39.23, price range: $27.44–$52.50). Third, the chance of being a winner was 5% per each participant in Study 1, but in this study, participants were informed that after data collection one participant in each condition would be randomly selected for purchasing one of the items. Lastly, we introduced two new experimental conditions. Participants in the *anchor only* condition did not provide WTP responses in the first session and provided WTP only in the second session, while those in the *immediate WTP* condition provided WTP in both sessions. The *anchor only* participants were also asked to participate in a third session, 1 week after the second session, to provide their WTP a second time. Participants in the *multiple anchor* condition received different anchors across the six items, in contrast to the *repeated anchor* condition, where the same anchor was used for all six items.

Participants

Participants were recruited from Amazon Mechanical Turk, and we aimed to recruit 200 per condition. A total of 802 participants completed the first session, and 628 of them completed the second session (mean age = 37.50, *SD* = 11.44, 335 female); the average attrition rate was 21%, and the range of the attrition rates was 17%–23%. Participants were paid $1 for the first session and were paid $2 for the second session. Among the 319 participants in the *anchor only* condition, 286 participants completed the third session (the attrition rates were 13% in the nonrepeat condition and 8% in the repeat condition) and they were paid $2.

Results

A total of 47 WTP responses which were higher than $150 in any of the three sessions were excluded from the analysis. First, we tested whether the short-term and long-term anchoring effects on WTP were moderated by *anchor repeat* and *immediate WTP* elicitation (Table 3). For the analysis, we regressed WTP responses on anchor interacted with *anchor repeat* (−1: *multiple anchor* vs. 1: *repeated anchors*) and *immediate WTP elicitation* (−1: *anchor only* vs. 1: *immediate WTP*) contrasts. We also estimated subject-level clustered standard errors to account for dependency across items within a participant and item fixed effects. The result showed that repeating the anchor did not moderate anchoring effects on immediate WTP (*immediate WTP* condition only; $t = -1.38$, $p = .17$; Model 1 in Table 3). Similarly, repeating anchor and immediate WTP elicitation did not moderate anchoring effects on WTP responses one week after (Model 2 in Table 3). The regression results neither showed a significant *anchor* × *anchor repeat* × *immediate WTP* elicitation three-way interaction ($t = -1.53$, $p = .13$) nor showed a significant *anchor* × *immediate WTP* elicitation interaction ($t = -0.55$, $p = .58$). These nonsignificant interaction effects might imply that

Table 3
Regression Analysis Results in Study 2

	(1) WTP Session 1	(2) WTP Session 2	(3) WTP Session 3	(4) First WTP	(5) Second WTP	(6) First vs. Second
Anchor	0.31*** (0.03)	0.12*** (0.02)	0.16*** (0.03)	0.22*** (0.02)	0.13*** (0.02)	−0.09*** (0.02)
Immediate		1.12 (1.24)		−4.63*** (1.03)	1.67 (1.28)	6.27*** (1.02)
Repeat	2.95* (1.26)	0.78 (1.24)	−1.49 (1.77)	0.92 (1.03)	0.57 (1.28)	−0.29 (1.02)
Anchor × Immediate		−0.01 (0.02)		0.09*** (0.02)	−0.02 (0.02)	−0.11*** (0.02)
Anchor × Repeat	−0.04 (0.03)	0.001 (0.02)	0.04 (0.03)	−0.003 (0.02)	0.003 (0.02)	0.005 (0.02)
Immediate × Repeat		1.91 (1.24)		2.01^{+} (1.03)	2.10 (1.28)	0.11 (1.02)
Anchor × Immediate × Repeat		−0.03 (0.02)		−0.04^{+} (0.02)	−0.03 (0.02)	0.001 (0.02)
Intercept	Item FE	Item FE	Item FE	Item FE	Item FE	Item FE
N	1,834	3,727	1,695	3,727	3,529	7,256

Note: Clustered standard errors are presented in the parentheses. First WTP and Second WTP of the *anchor only* condition in model (4) and model (5) were WTP in Session 2 and Session 3 respectively. *Immediate* (immediate WTP elicitation; −1: *anchor only* vs. 1: *immediate WTP*) and *Repeat* (anchor repeat; −1: *multiple anchors* vs. 1: *repeated anchor*) were effect coded. In model (6), the contrast between first and second WTP was dummy coded (0: First WTP vs. 1: Second WTP).
***$p < .001$, *$p < .05$, $^{+}p < .10$.

immediate WTP responses are not a necessary condition for long-term anchoring effects on WTP. Repeating the anchor also did not moderate anchoring effects on WTP either after one week (*anchor* × *anchor repeat* interaction: $t = 0.07$, $p = .95$; Model 3 in Table 3) or after two weeks from anchors were provided (*anchor only* condition only; $t = 1.15$, $p = .25$; Model 3 in Table 3). The overall results imply that repeating a single anchor across items does not induce stronger long-term anchoring effects on WTP.

Next, we investigated whether repeating the anchor or immediate WTP elicitation moderated the change in anchoring effects on WTP across two sessions. We label WTP in Session 1 from the *immediate WTP* condition and WTP in Session 2 from the *anchor only* condition as First WTP, while we label WTP in Session 2 from the *immediate WTP* condition and WTP in Session 3 from the *anchor only* condition as Second WTP. The regression analysis results for the First WTP showed a significant *anchor* × *immediate WTP* elicitation interaction ($t = 4.54$, $p < .001$; Model 4 in Table 3) showing that the anchoring effect on the first WTP was stronger when WTP was measured immediately after anchor was provided than when WTP was measured 1 week after. The marginally significant *anchor* × *immediate WTP* elicitation × *anchor repeat* three-way interaction ($t = -1.85$, $p = .065$) indicates that the difference in anchoring effects between when the first WTP elicitation occurred immediately rather than after a week was smaller when the anchor was repeated. This provides a very weak indication that some participants who recall the anchor display a stronger anchoring effect when the initial WTP occurs a week later.

Anchoring effects on the second WTP were slightly different than those on the first WTP (Model 5 in Table 3). There was no significant *anchor* × *immediate WTP* elicitation interaction for the second WTP ($t = -0.96$, $p = .34$), showing that whether the first WTP was measured immediately or it was measured with a 1-week delay did not affect the anchoring effect on the second WTP. To illustrate the timing of the WTP elicitations, Figure 4 depicts the anchoring coefficient for each experimental group in each session. The flat time pattern for the anchor only groups suggests that the initial drop in the strength of the anchoring effect occurs regardless of whether WTP is elicited right away.

We support this observation by testing whether the decay of anchoring effects on WTP was moderated by *immediate WTP* elicitation and *anchor repeat*. For the analysis, we ran an *anchor* × *immediate WTP* elicitation× *anchor repeat* × *time* (0: first WTP vs. 1: second WTP) regression analysis, defining the decay as the difference between anchoring effects on the first WTP and on the second WTP. The results showed a significant *anchor* × *immediate WTP* elicitation× *time* interaction (Model 6 in Table 3; $t = -5.56$, $p < .001$). Separate *anchor* × *time* regression analyses for the *immediate WTP* and *anchor only* conditions revealed that the decay was significant in the *immediate WTP* condition ($t = -6.17$,

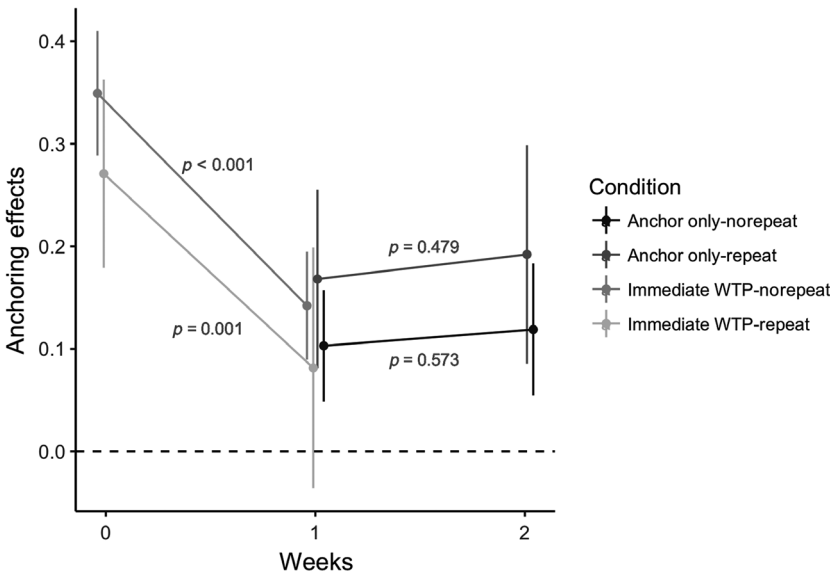

Figure 4. Anchoring effects over time in Study 2. *Y*-axis indicates regression coefficients, with the regression coefficients estimated separately at each session. Error bars indicate 95% confidence intervals.

$p < .001$), while the decay was not significant in the *anchor only* condition ($t = 0.98$, $p = .33$).

Discussion

Study 2 builds on the results of Study 1 in two ways. In Study 1, we showed that anchoring effects on WTP can persist for a surprisingly long time after the anchoring procedure. While this could result from a shift in preferences, we noted that it could also result from a desire to provide consistent responses, or memory of the anchor could allow participants to retrace their steps when forming judgments for a subsequent valuation. In Study 2 we first tested whether repeating a price anchor across items contributed to the long-term anchoring effects on WTP. By adding a condition where each item a participant considered received a different anchoring number, we tested whether making the anchor harder to remember reduced persistence. We did find that participants who received multiple anchors did not recall the anchoring values as well (actual and recalled anchor association was stronger in the repeat condition than in the multiple anchor condition; actual anchor × *repeat* interaction on recalled anchor: $b = 0.14$, $SE = 0.05$, $t = 1.68$, $p = .01$; Methodological Details Appendix S4). However, we did not find a significant moderating effect of anchor repetition on the anchoring effect, suggesting that explicit memory of the anchor might not be necessary for persistent anchoring effects.

In addition, Study 2 provides evidence that consistency motivations do not fully account for the persistence of anchoring effects. Participants in Study 1 stated their WTP multiple times, and the motivation to provide consistent WTP responses may carry some weight in their decision-making. To rule out this possibility, half of the participants in Study 2 underwent the anchoring procedure (providing WTB responses) in the first session without providing WTP for any items. While participants in this condition could potentially be motivated to respond consistently with their WTB response, the consistency motivations should be weaker than when they immediately provide a WTP response.

To examine the role of consistency with the WTB response, we tested whether participants whose WTP was consistent with their WTB (e.g. WTP is greater than WTB when their WTB was YES or WTP is smaller than WTB when their WTB was No) showed stronger long-term anchoring effects by running an *anchor* × *consistency* (−1: inconsistent vs. 1: consistent) regression. The results showed that participants who provided inconsistent WTP responses actually exhibited stronger anchoring effects than those who provided consistent responses (*anchor* × *consistency* interaction: $b = -0.04$, $SE = 0.02$, $t = -1.87$, $p = .062$). Thus, we find it unlikely that consistency motivations alone account for persistence.

It may seem counterintuitive that participants whose WTB and WTP were consistent showed weaker long-term anchoring effects than those who were inconsistent. However, some participants with consistent responses may have perceived the anchor to be implausibly low or high. In contrast, participants who showed inconsistent responses between WTB and WTP were less confident in their initial valuations and thus were more vulnerable to an uninformative price anchor. In a further analysis, we found that inconsistent respondents also showed stronger short-term anchoring effects on WTP than consistent respondents in Session 1 (*anchor* × *consistency* interaction: $b = -0.10$, $SE = 0.04$, $t = -2.77$, $p < .01$). However, we did not measure their decision confidence in our study. Future research might be needed to investigate the potential role of decision confidence in short-term and long-term anchoring effects on WTP.

Finally, even though we found long-term anchoring effects of comparable strength in the *anchor only* and *immediate WTP* conditions, the anchoring effect was stronger when WTP was measured immediately. This suggests that the decay observed in Study 1 commences even before a WTP response is given, raising the possibility that the initial anchoring effects combine a short-term response distortion (which dissipates in the absence of the anchor) and a lasting change in valuation judgments which persists over time. If this were the case, we would expect participants to adjust WTP responses from their previous WTP following an anchoring procedure more than when they provide WTP response in the absence of any anchoring. Alternatively, if the anchor prompts participants to think more about their initial WTP response, they may adjust their WTP responses less. In Study 3, we tested these predictions by comparing the magnitude of the adjustments in WTP between sessions with and without anchoring procedures (anchor condition vs. control condition).

In addition, we investigated the effect of the incentive compatible method on persistence in Study 3. We used a BDM incentive compatible method in the prior two studies to make participants' decisions more consequential, since in the

absence of incentives the anchoring effect could persist simply because participants have less reason to correct mistakes in their initial responses. However, the incentive compatible method we utilized could have unintended effects. In the prior two studies, we did not reveal the amount of the endowment to rule out the possibility that the endowment amount could function as another anchor. This leaves open the possibility that participants made assumptions about the endowment amount that could affect the results. For example, people assigned a $20 anchor might assume an endowment of around $20, while those assigned an $80 anchor might assume an endowment of around $80. To rule out this possibility, we tested whether revealing the endowment influenced the long-term anchoring effect on WTP. Separately, the incentive compatibility methods could potentially confuse participants, and the simpler instructions of a hypothetical study provides an additional robustness check (particularly as online participants in Studies 2 and 3 could not easily request clarifications).

Study 3. The Effect of Anchoring on WTP Stability

Design and Procedures

Three different anchoring conditions were employed: an incentive compatible condition with unknown endowment (*anchor incentive*), an incentive compatible condition with known endowment (*anchor amount*), and a nonincentive compatible condition (*anchor hypothetical*). Contrasting the anchoring effect among the three conditions can reveal the effects of incentive compatibility and known endowment amount on the long-term anchoring effect on WTP. The six items were identical to the items used in Study 2.

The overall anchoring procedures were similar to those of the *repeated anchor, immediate WTP* condition in Study 2, with slight changes. First, in the two incentive compatible conditions, each participant had a 3% chance of being a winner (participants were informed that three winners in each condition would be selected as winners). Second, participants in the *anchor amount* condition were additionally informed that they would be endowed $100 if they were selected as a winner; otherwise, the instructions for the incentive compatibility were the same with those in the previous two experiments in the *anchor amount* and the *anchor incentive* conditions. The *anchor hypothetical* condition did not receive any instruction about the incentive compatibility procedures.

To compare the stability of WTP responses with and without anchoring procedures, we also added two additional no-anchoring conditions: a no-anchor condition with incentive compatibility (*no anchor incentive*) and a no-anchor condition without incentive compatibility (*no anchor hypothetical*). Participants in these two conditions were asked to provide WTP for the six items without the anchoring procedures across two sessions with a 1-week gap. The *no anchor incentive* group was additionally informed that three winners would be randomly selected after completing data collection and the winners would purchase one of the items based on the BDM incentive compatible method.

Participants

We aimed to recruit 100 participants per condition, and the participants were recruited from Amazon Mechanical Turk. A total of 508 participants completed the first session, and 362 of them completed the second session (mean age = 35.18 years, SD = 10.24, 157 female). The average attrition rate was 29%, and the range of attrition rates across the five conditions was 26%–32%. Participants were paid $1 for the first session and $2 for the second session.

Results

A total of 47 WTP responses greater than $150 in either session were excluded from the analysis, leading to the exclusion of all responses for one participant (our main analyses without the exclusion of outliers are reported in Methodological Details Appendix S5). We first investigated whether anchoring effects on WTP were different across the three anchoring conditions in both sessions. For the analysis, we regressed WTP responses in each session on the anchoring number, interacted with two contrast variables: *amount* (−1: *unknown endowment* vs. 1: *known endowment*) and *hypothetical* (−1: *incentive compatible* vs. 1: *hypothetical*). To account for dependencies within a subject and item effects, we estimated subject level clustered standard errors and item fixed effects. Anchoring effects were significant in both sessions (Models 1 and 2 in Table 4). However, we did not find significant main effects of *amount* or *hypothetical*, nor did we find interaction effects with the anchor. Further analysis results revealed that the *anchor* × *amount* and *anchor*

Table 4
Regression Analysis Results in Study 3

	(1) WTP Session 1	(2) WTP Session 2	(4) WTP Session 1 vs. 2
Anchor	0.33*** (0.06)	0.14** (0.05)	−0.20*** (0.03)
Hypothetical	1.30 (2.48)	2.95 (2.37)	1.64 (1.56)
Amount	1.44 (2.63)	3.09 (2.58)	1.65 (1.72)
Anchor × Hypothetical	−0.05 (0.06)	−0.06 (0.05)	−0.008 (0.03)
Anchor × Amount	−0.03 (0.07)	−0.07 (0.06)	−0.04 (1.72)
Intercept	Item FE	Item FE	Item FE
N	1,288	1,288	2,576

Note: Clustered standard errors are presented in the parentheses. The variables *Hypothetical* (−1: incentive compatible vs. 1: hypothetical) and *Amount* (−1: unknown endowment vs. 1: known endowment) were effect coded. The last column indicates interaction with *time* dummy contrast (0: Session 1 vs. 1: Session 2).
***$p < .001$, **$p < .01$.

× *hypothetical* interactions did not change differently over time (Model 3 in Table 4).

Next, we tested whether a known endowment or a hypothetical task influenced the decay of anchoring effects. To test this, we regressed WTP responses on anchor interacted with *time* coded as a dummy contrast (0: Session 1 vs. 1: Session 2) and the two different incentive method variables (*amount* and *hypothetical*) with item fixed effects and subject level clustered standard errors. The results show neither a significant *anchor* × *time* × *amount* interaction ($t = -1.09$, $p = .28$; Figure 5 Left) nor a significant *anchor* × *time* × *hypothetical* interaction ($t = -0.26$, $p = .79$; Figure 5 Right), indicating that the decay was not moderated by the known endowment and hypothetical task. We found a significant *anchor* × *time* interaction ($t = -5.87$, $p < .001$), showing that anchoring was once again weaker in Session 2 than in Session 1.

Next, we tested for differences in the magnitudes of adjustments in WTP responses across conditions. If the long-term anchoring effect was driven primarily by short-term biases, participants in the anchor conditions should adjust their WTP responses in the second session more than those in the control (no anchor) conditions. On the other hand, they may adjust less if anchoring induces preference changes through anchor-influenced deliberation. We compared whether participants adjusted their WTP responses more with anchoring procedures than without anchoring procedures, but this was not the case (Model 1 in Table 5). We also investigated the amount of adjustment in the anchor conditions by splitting low, middle, and high anchors. The low, middle, and high anchors were formed by taking anchors below the 25th, between the 25th and 75th, and above the 75th percentiles of the WTP distributions for each item in the control conditions. We found that people adjusted their WTP responses less in the Low and Middle anchor conditions than in the High anchor and control conditions (Figure 6; Model 2 in Table 5). Further regression analysis results also showed that there was no difference in adjustment between the Low and Middle anchor conditions ($b = 1.40$, $SE = 1.19$, $t = 1.17$, $p = .24$), but people adjust significantly more in the High anchor condition ($b = 5.31$, $SE = 1.33$, $t = 3.98$, $p < .001$) and in the No Anchor conditions ($b = 3.98$, $SE = 1.31$, $t = 3.04$, $p = .003$) than in the Low anchor condition. We also ran the same regression analysis with the Middle anchor condition as a baseline to compare the difference in WTP adjustments between the Middle, High, and No Anchor conditions. The results showed that that people significantly adjusted more in the High anchor condition ($b = 3.91$, $SE = 1.17$, $t = 3.33$, $p = .001$) and in the No Anchor condition ($b = 2.58$, $SE = 1.31$, $t = 1.97$, $p = .049$) than in the Middle anchor condition.

Since WTP adjustments were smaller for low and middle anchors, we tested whether anchoring effects were moderated by unexpectedly low or high anchors across sessions. To test this, we compared WTP in the No Anchor conditions with the three anchor conditions. In Session 1, participants stated significantly lower WTP in the Low and Middle anchor conditions (Low anchor: $t = -9.07$, $p < .001$; Middle anchor: $t = -3.32$, $p = .001$) than in the No Anchor conditions, while they stated significantly higher WTP in the High anchor condition than in the No Anchor conditions ($t = 1.07$, $p = .04$; Model 1 in Table 6). The results indicate that significant anchoring effects are driven both by decreased WTP for low anchors and by increased WTP for high anchors. In Session 2, the Low and Middle anchor groups still stated significantly lower WTP than the No Anchor conditions (Low anchor: $t = -5.73$, $p < .001$; Middle anchor: $t = -2.95$, $p = .001$), while WTP for the High anchor condition showed no difference compared to the No Anchor conditions ($t = -0.13$, $p = .90$; Model 2 in Table 6). This indicates that the long-term anchoring effect on WTP was driven by low anchors but not by high anchors. Further analysis showed that the Low anchor condition adjusted their WTP upward ($t = 3.03$, $p = .003$), while the High anchor condition adjusted WTP downward in Session 2 ($t = -5.57$,

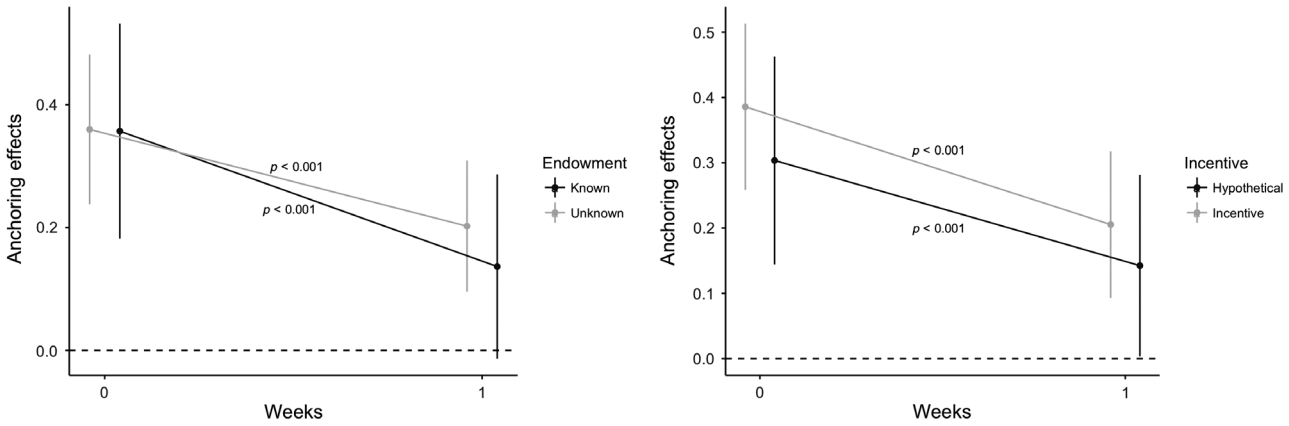

Figure 5. Anchoring effects over time in Study 3 by amount (*unknown* vs. *known*; Left) and hypothetical (*incentive* vs. *hypothetical*; Right) in Study 3. Error bars indicate 95% confidence intervals.

p = .001; Model 3 in Table 6). The WTP adjustment in the High anchor condition resulted in similar average WTP as the No Anchor condition, while adjustments in the Low anchor condition did not eliminate the gap in WTP compared to the No Anchor condition or the Middle anchor condition. We conclude that the short-term anchoring effect is driven by both low and high anchors, while the long-term anchoring effect is driven more by low anchors.

Discussion

In Study 3, we tested the effect of incentive compatible procedures on the persistence of anchoring effects on WTP. Revealing the endowment amount does not moderate long-term or short-term anchoring effects on WTP, indicating that confounding effects from participants' misunderstanding of the incentive compatible methods do not account for anchoring persistence. Surprisingly, omitting incentive compatibility does not intensify long-term and short-term anchoring effects on WTP, implying that introducing incentives to state true preference does not eliminate or reduce persistent anchoring effects on WTP. One potential limitation is that even though we employed an incentive compatible method to make participants' decisions consequential, the chance of item realization might

Table 5
Regression Analysis Result for the WTP Adjustments in Study 3

	(1) Δ(WTP 2–WTP 1) Task	(2) Δ(WTP 2–WTP 1) Anchor
Task	−0.64 (0.57)	
vs. *Middle*		1.40 (1.19)
vs. *High*		5.31*** (1.33)
vs. *No Anchor*		3.98** (1.31)
Intercept	Item FE	Item FE
N	2,125	2,125

Note: Δ(WTP 2–WTP 1) indicates absolute distance between WTP in Session 2 and in Session 1. Clustered standard errors are presented in the parentheses. The categorical variable *Task* was effect coded (−1: *no anchor* vs. 1: *anchoring task*). The baseline is *Low* anchor condition and *Middle*, *High*, and *No Anchor* conditions are dummy coded. The coefficient for *Middle* is different from both *High* and *No Anchor* at the 95% significance level.
**p < .01, ***p < .001.

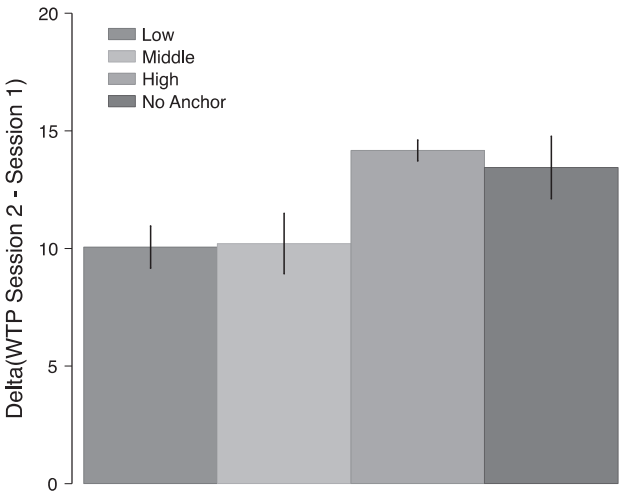

Figure 6. WTP adjustments across the two sessions depending on Low, Middle, and High anchors. The Low, Middle, and High anchors were categorized based on the WTP distributions of each item from the No-Anchor conditions. Thus, Low anchors include below 25%, Middle anchors include between 25% and 75%, and High anchors include above 75% of the WTP distribution of each item in the No-Anchor conditions. Error bars indicate standard errors.

not be high enough. Recently, Yang, Toubia, and Jong (2018) has shown that people show increased attention and more comprehensive information search when the chance of reward realization is high compared to hypothetical choice circumstances, whereas when the chance is low (1%), they do not show increased attention allocation and comprehensive information search compared to hypothetical choice conditions. Each participant had a 3% of chance of item realization, which is greater than 1% but was still a relatively low chance. Future research might be needed to investigate whether incentives can dilute or eliminate short-term and long-term anchoring effects on WTP when the chance of item realization is high.

We also investigated the degree to which the anchoring effects on WTP were driven by response biases or preference changes by comparing the magnitudes of adjustments in WTP responses across conditions. If anchoring were primarily driven by transient response biases, participants would adjust their responses towards their true preferences in the second session, when the anchor is removed. However, it turned out they do not adjust their responses any more than participants who did not receive an anchor in the first session. In fact, participants made smaller adjustments following an anchoring procedure when receiving low or medium anchor values, consistent with increased deliberation in their initial WTP responses. This also shows that participants will adjust their WTP responses to avoid making what they perceive as errors, which is more likely when they receive a high anchor as compared to low anchors, but not more likely than when providing WTP in the absence of anchors. Comparing the evolution of average WTP levels of different anchor values to participants who did not receive anchors, we found that participants receiving high anchors end up with comparable WTP to those receiving no anchors. This overall pattern of WTP adjustments suggests that the effect of low and medium anchors in particular are internalized in a manner consistent with the imprinting account of valuation anchoring.

Table 6
Regression Analysis Result for the WTP responses Across Anchors and Sessions in Study 3

	(1) WTP Session 1	(2) WTP Session 2	(3) WTP Session 1 vs. 2
vs. *Low*	−18.47*** (2.04)	−13.30*** (2.32)	5.12** (1.69)
vs. *Middle*	−6.50** (1.96)	−6.95** (2.35)	−0.41 (1.76)
vs. *High*	5.27* (2.55)	−0.31 (2.45)	−5.57** (1.71)
Intercept	Item FE	Item FE	Item FE
N	2,125	2,125	4,250

Note: Clustered standard errors are presented in the parentheses. The *Low*, *Middle*, and *High* anchors were constructed from the WTP distribution of each item in the no anchor conditions (below 25th percentile, between 25th and 75th percentile, above 75th percentile respectively). The baseline is the *No Anchor* condition. Model (3) indicates the contrast between Model (1) and Model (3) with time dummy variable (0: Session 1 vs. 1: Session 2).
*$p < .05$, **$p < .01$, ***$p < .001$.

General Discussion

Findings and Limitations

In a series of studies, we examined the long-term effect of random anchoring on WTP, a widely used measure of consumer preferences, using an incentive compatible task. In Study 1, we evaluated the effect's pattern of decay by manipulating the time gap between WTP elicitations. We found similar effects for both 4-week and 8-week delays, showing that the strength of the effect stabilizes after an initial decline. In Study 2, we examined whether consistency motivations and memory of the anchor could contribute to the persistence of the anchoring effect on WTP. However, we did not find evidence that either moderates the persistence of the effect. In Study 3, we show that WTP becomes more stable over time after considering low to moderate anchors compared to high anchors or the absence of anchors, contradicting the expectation that persistent anchoring effects will eventually be "corrected." The findings from each study are summarized in Table 7.

We consistently find that anchoring effects lead to lasting changes in valuation judgments. While the long-term effect sizes are only half those of immediate anchoring effects, we also find that the effect stabilizes within a week, and we find similar effects at 1, 4, and 8 weeks after the anchoring procedure. Thus, anchoring effects persist for surprisingly long intervals; additional research could establish how quickly the decay onsets and how far into the future an effect can still be detected. A limitation of our findings is that we have not established clear boundary conditions for the effect. We do not find that consistency with prior valuation judgments accounts for persistence; the initial choice in response to the WTB question appears to be enough to associate the anchor with future valuations of the same product. However, some element of consistency must logically accompany the effect,

Table 7
Summary of Results

Study	Immediate Anchoring Coefficient	Long-term Anchoring Coefficient	Findings
Study 1	0.24	0.12	• Persistent effects over different time intervals (1, 4, and 8 weeks) • Decay pattern stabilizes after first week • Did not find a moderating effect of rehearsal (null effect of additional WTP elicitation)
Study 2	0.31	0.12	• Persistent effects without immediate WTP elicitation • Decay pattern stabilizes after first week • Did not find a moderating effect of anchor memory (null effect of repeated vs. multiple anchors)
Study 3	0.33	0.14	• Anchors did not result in larger magnitude adjustments to WTP (absolute difference week-to-week, null effect relative to elicitations without anchors) • Low anchors result in smaller magnitude adjustments to WTP relative to high anchors or elicitations without anchors • Did not find a moderating effect of incentives (null effects of hypothetical and incentive with known endowment)

whether that is consistency with the WTB choice, with the thought process that occurred in that initial session, or with a revised set of preferences. Distinguishing between these possibilities could help explain the persistent effects. Our evidence on the role of memory is also inconclusive. The pattern of decay we repeatedly observe, particularly over experimentally controlled time intervals as depicted in Figures 3 and 4, resembles the exponential decay observed in tests of memory. However, our attempts to experimentally manipulate memory, whether through repeated WTP elicitation or repetition of the anchor value, did not moderate the strength of the anchoring effect.

Contributions on Constructed Preferences

While the mechanism for persistent anchoring effects remain an open question, the later valuation judgments do not appear to be mistakes. We found that varying incentives did not moderate persistence. Furthermore, the anchoring procedure did not increase the magnitude of adjustments people make to the valuation judgments, which would indicate "corrections" after a short-term distortion. Our findings on the stability of anchor-influenced valuations provide insight on the nature of constructed preferences. Numerous studies have shown that preferences are constructed as the need arises, influenced by a decision maker's traits and the context in which judgments and decisions are made (Slovic, 1995). However, debate has continued on the extent to which preferences are malleable. Valuation anchoring has previously been regarded as evidence for coherent preferences, because of the consistent relative valuations across items (Ariely et al., 2003); the arbitrary influence of irrelevant anchors could be thought of as a short-term distortion (Simonson, 2008). The persistence of the effect favors an interpretation where anchoring influences subsequent instances of constructed preferences (Bettman, Luce, & Payne, 2008).

Additionally, relatively little is known about the persistence of constructed preferences, and the results of prior studies have been inconsistent. For example, Schonberg et al. (2014) found that participants showed increased preference for items experimentally associated with irrelevant auditory cues and motor responses, with effects persisting longer than a month. Sharot et al. (2012) showed that choice-induced preferences persisted even after 2.5–3 years from the initial session. Izuma and Adolphs

(2013) showed that experiencing a peer group's decisions influences participants' preferences even after 4 months. On the other hand, several studies on long-term effect of cognitive dissonance and social influence have only shown short-term persistence. Huang et al. (2014) examined how long people retain other's opinions, and found that participants did not retain other's opinions longer than 3 days. Lee and Schwarz (2010) showed that choice-induced preferences can be reset simply by physically washing their hands using soap. Simon et al. (2008) also showed that choice-induced preferences disappear after 1 week (also see, Simon & Spiller, 2016). However, an important distinction is that prior studies on the persistence of constructed preferences used choice-induced preference (e.g. Sharot et al., 2012; Simon et al., 2008) or social conformity (Huang et al., 2014; Izuma & Adolphs, 2013), where the source of preference construction is potentially informative. In contrast, we investigate whether task-irrelevant information can persist over time. This study is the first to examine the persistence of constructed preferences using a valuation anchoring task, where the anchoring number was explicitly random and participants' decisions were consequential. Our findings showed that anchor-induced preferences can persist for months, even though the random anchor is uninformative, and susceptibility to anchoring ostensibly reduces the accuracy of consequential judgments.

If valuation anchoring effects had been found to be short-lived, the effects might be categorized as an example of choice construction as defined by Amir and Levav (2008): decision makers learn valuation strategies in a certain context (e.g. valuations accompanied by an anchor), and revert to relying on their prior preferences after the direct effect of the contextual cue has faded. A choice construction interpretation might construe the long-term effects of anchoring on WTP as the learning of decision strategies from repeated WTP responses or consistency motivations, rather than the learning or changing of preferences (Amir & Levav, 2008). We believe that we address both of these possibilities. First, we did not find a significant effect of memory on the persistence of the effects. If participants learned that relying on the anchors is an efficient approach to the task, those who remembered anchoring numbers more accurately should have shown stronger correlation between WTP and the original anchor, but this was not the case. Separately, if the long-term effect of anchoring on preferences was driven by consistency motivation or learning, anchoring effects on WTP should be stronger when WTP was elicited immediately following WTB or was elicited repeatedly. In Study 2, however, we still found significant anchoring effects on WTP when elicited 1 week after an anchor procedure (with no WTP elicitation in the initial session). Moreover, we did not find evidence that the anchoring effect was stronger when participants rehearsed WTP responses in Study 1. These results seem to indicate that consistency motivation or learning are not the main causes of the long-term anchoring effects.

Contributions on Valuation Anchoring

We also contribute to research on valuation anchoring. Anchoring effects on factual numeric judgments are robust, and a mass-replication project even found stronger effects than the target studies (Klein et al., 2015). However, replication attempts for valuation anchoring had inconsistent results. Bergman et al. (2010) found significant effects, whereas Fudenberg et al. (2012) did not find anchoring effects on WTP or willingness-to-accept (WTA). Maniadis, Tufano, and List (2014) also failed to replicate an anchoring effect on WTA for an unpleasant hedonic experience (though their results fail to reject the original study; see Simonsohn, Simmons, & Nelson, 2014). In this study, we found strong anchoring effects in multiple experiments, using larger sample sizes than previous studies. Our results imply that anchoring effects on WTP valuations are not false positives.

The persistence of anchoring effects also provides insight on the relative importance of mechanisms that potentially contribute to valuation anchoring. The literature has documented several mechanisms that generate anchoring effects (for a summary, see Mochon & Frederick, 2013), but has not differentiated between competing mechanisms in the context of valuation anchoring. Leading explanations for anchoring effects in more general settings include selective accessibility (as described in our introduction), scale distortion, and anchoring and adjustment. Scale distortion theory suggests that anchoring effects are not due to representational change; rather, they are driven by response scale distortion (Frederick & Mochon, 2012). Under this account, the anchor affects the mapping of judgments to the response scale for a given task, in which case anchoring effects should be "shallow" and transient. Once the anchoring number is forgotten, its distorting effect on the response scale should fade as well. We would make a similar prediction for an anchoring and adjustment account,

where the anchor serves as a starting point in a search for plausible responses (Epley & Gilovich, 2001; Tversky & Kahneman, 1974): if the anchor is forgotten, anchoring and adjustment would cease to be a viable strategy. Thus, several previously documented anchoring mechanisms should affect participants' WTP for an item in the short-term without influencing their internal representations of value for the item. While Ariely et al. (2003) use repeated valuations to support an imprinting account of preference construction, the observed consistency (termed "coherence") in valuations within a single experimental session could result from scale distortion. However, we report anchoring effects that stabilize within a week after an initial decline, and do not find that anchoring leads to larger magnitude WTP adjustments in subsequent sessions. The long-lasting effects we observe in our studies support an imprinting account of preference construction, in which decision makers learn valuations based on selectively accessible information, and imply that scale distortion alone does not account for valuation anchoring effects.

We do not claim that the persistence of anchoring effects, or the imprinting of preferences, excludes other mechanisms as contributors to valuation anchoring. We have noted that the initial drop in the strength of the effect is consistent with short-term distortions. Furthermore, even though anchoring effects caused by scale distortion theory do not assume representational changes, Adaval and Monroe (2002) showed a possibility that a price scale used in a decision context could have long-term effects. The authors showed that participants who saw an item (target item) with high-priced items perceived the target item cheaper than those who saw the target item with low-priced items even after 48 hr from the time they experience the price contexts. Scale distortion theory and Adaval and Monroe (2002) used different experimental paradigms in that the former employs a sequential numeric judgments paradigm, while the latter uses a paradigm where participants learn the price context from sequential viewing of the items. However, it proposes a possibility that previously experienced price scales could have long-term effects on consumer price and product perceptions. Future research may be needed to test whether scale distortion has long-term effects on WTP and other numeric judgments.

An imprinting of preferences account of persistent valuation anchoring is consistent with research on the question-behavior effect where simply measuring people's future behavior intention could affect their actual future behavior (for a review, see Sprott et al., 2006). For example, Morwitz, Johnson, and Schmittlein (1993) showed that simply asking participants whether they would purchase a car or a computer within certain time periods could affect their actual purchase rates within the next 6 months. One of the explanations of the question-behavior effect, *attitude accessibility*, argues that contemplating given future behavior intention questions have people retrieve their attitude toward and belief about the behavior, and their attitude toward the behavior polarizes over time. These processes lead to behavioral changes. This account bears some similarity to the selective accessibility account of anchoring, except the random anchor influences which attitudes become polarized. However, if the question-behavior effect contributed to persistent anchoring, we might have expected *WTP rehearsal* and *immediate WTP* elicitation to moderate the long-term anchoring effect. The results of Study 1 and 2 did not support this hypothesis. Nonetheless, anchoring effects and the question-behavior effect potentially share common underlying mechanisms, which could be the topic of future research.

Marketing Implications

The persistence of valuation anchoring effects can have broad practical implications. Anchoring effects have been demonstrated in a variety of domains, including valuations in different situations. Our findings raise the possibility that anchors in various contexts can permanently shift valuations and lead to long-term behavioral changes. Furthermore, in the domain of consumer good pricing, we find that lower anchors may generate more durable effects, exacerbating some of the risks marketers face when lower-priced competition or their own lower-priced brand extensions affect consumer valuations. While the anchors encountered in everyday life may not be as arbitrary as the random numbers used in our studies, their effects may persist beyond the contexts in which the anchors hold relevance.

References

Adaval, R., & Monroe, K. B. (2002). Automatic construction and use of contextual information for product and price evaluations. *Journal of Consumer Research*, *28*, 572–588. https://doi.org/10.1086/338212

Amir, O., & Levav, J. (2008). Choice construction versus preference construction: The instability of preferences

learned in context. *Journal of Marketing Research*, *45*, 145–158. https://doi.org/10.1509/jmkr.45.2.145

Ariely, D., Loewenstein, G., & Prelec, D. (2003). "Coherent arbitrariness": Stable demand curves without stable preferences. *Quarterly Journal of Economics*, *118*, 73–105. https://doi.org/10.1162/00335530360535153

Becker, G. M., DeGroot, M. H., & Marschak, J. (1964). Measuring utility by a single-response sequential method. *Behavioral Science*, *9*, 226–232. https://doi.org/10.1002/(ISSN)1099-1743

Bergman, O., Ellingsen, T., Johannesson, M., & Svensson, C. (2010). Anchoring and cognitive ability. *Economics Letters*, *107*, 66–68. https://doi.org/10.1016/j.econlet.2009.12.028

Bettman, J. R., Luce, M. F., & Payne, J. W. (2008). Preference construction and preference stability: Putting the pillow to rest. *Journal of Consumer Psychology*, *18*, 170–174. https://doi.org/10.1016/j.jcps.2008.04.003

Blankenship, K. L., Wegener, D. T., Petty, R. E., Detweiler-Bedell, B., & Macy, C. L. (2008). Elaboration and consequences of anchored estimates: An attitudinal perspective on numerical anchoring. *Journal of Experimental Social Psychology*, *44*, 1465–1476. https://doi.org/10.1016/j.jesp.2008.07.005

Camerer, C. F., Dreber, A., Forsell, E., Ho, T.-H., Huber, J., Johannesson, M., . . . Wu, H. (2016). Evaluating replicability of laboratory experiments in economics. *Science*, *351*, 1433–1436. https://doi.org/10.1126/science.aaf0918

Chapman, G. B., & Johnson, E. J. (1999). Anchoring, activation, and the construction of values. *Organizational Behavior and Human Decision Processes*, *79*, 115–153. https://doi.org/10.1006/obhd.1999.2841

Ederer, F., & Schneider, F. (2018). *The Persistent Power of Promises*. SSRN. Retrieved from https://ssrn.com/abstract=3169881

Epley, N., & Gilovich, T. (2001). Putting adjustment back in the anchoring and adjustment heuristic: Differential processing of self-generated and experimenter-provided anchors. *Psychological Science*, *12*, 391–396. https://doi.org/10.1111/1467-9280.00372

Frederick, S. W., & Mochon, D. (2012). A scale distortion theory of anchoring. *Journal of Experimental Psychology: General*, *141*, 124–133. https://doi.org/10.1037/a0024006

Fudenberg, D., Levine, D. K., & Maniadis, Z. (2012). On the robustness of anchoring effects in WTP and WTA experiments. *American Economic Journal: Microeconomics*, *4*, 131–145.

Galinsky, A. D., & Mussweiler, T. (2001). First offers as anchors: The role of perspective-taking and negotiator focus. *Journal of Personality and Social Psychology*, *81*, 657–669. https://doi.org/10.1037/0022-3514.81.4.657

Green, D., Jacowitz, K. E., Kahneman, D., & McFadden, D. (1998). Referendum contingent valuation, anchoring, and willingness to pay for public goods. *Resource and Energy Economics*, *20*, 85–116. https://doi.org/10.1016/S0928-7655(97)00031-6

Greist-Bousquet, S., & Schiffman, H. (1981). The role of structural components in the Mueller-Lyer illusion. *Perception & Psychophysics*, *30*, 505–511. https://doi.org/10.3758/BF03204847

Hoeffler, S., & Ariely, D. (1999). Constructing stable preferences: A look into dimensions of experience and their impact on preference stability. *Journal of Consumer Psychology*, *8*, 113–139. https://doi.org/10.1207/s15327663jcp0802_01

Huang, Y., Kendrick, K. M., & Yu, R. (2014). Conformity to the opinions of other people lasts for no more than 3 days. *Psychological Science*, *25*, 1388–1393. https://doi.org/10.1177/0956797614532104

Izuma, K., & Adolphs, R. (2013). Social manipulation of preference in the human brain. *Neuron*, *78*, 563–573. https://doi.org/10.1016/j.neuron.2013.03.023

Izuma, K., Matsumoto, M., Murayama, K., Samejima, K., Sadato, N., & Matsumoto, K. (2010). Neural correlates of cognitive dissonance and choice-induced preference change. *Proceedings of the National Academy of Sciences*, *107*, 22014–22019. https://doi.org/10.1073/pnas.1011879108

Johnson, E. J., & Schkade, D. A. (1989). Bias in utility assessments: Further evidence and explanations. *Management Science*, *35*, 406–424. https://doi.org/10.1287/mnsc.35.4.406

Kaustia, M., Alho, E., & Puttonen, V. (2008). How much does expertise reduce behavioral biases? The case of anchoring effects in stock return estimates. *Financial Management*, *37*, 391–412. https://doi.org/10.1111/j.1755-053X.2008.00018.x

Klein, R. A., Ratliff, K. A., Vianello, M., Adams, R. B. Jr, Bahník, Š., Bernstein, M. J., . . . Brumbaugh, C. C. (2015). Investigating variation in replicability. *Social Psychology*, *45*, 142–152.

Ku, G., Galinsky, A. D., & Murnighan, J. K. (2006). Starting low but ending high: A reversal of the anchoring effect in auctions. *Journal of Personality and Social Psychology*, *90*, 975–986. https://doi.org/10.1037/0022-3514.90.6.975

Kyung, E. J., & Thomas, M. (2016). When Remembering Disrupts Knowing: Blocking Implicit Price Memory. *Journal of Marketing Research*, *53*, 937–953. https://doi.org/10.1509/jmr.14.0335

Lee, S. W., & Schwarz, N. (2010). Washing away postdecisional dissonance. *Science*, *328*, 709–709. https://doi.org/10.1126/science.1186799

Maniadis, Z., Tufano, F., & List, J. A. (2014). One swallow doesn't make a summer: New evidence on anchoring effects. *The American Economic Review*, *104*, 277–290. https://doi.org/10.1257/aer.104.1.277

Marchiori, D., Papies, E. K., & Klein, O. (2014). The portion size effect on food intake. An anchoring and adjustment process? *Appetite*, *81*, 108–115. https://doi.org/10.1016/j.appet.2014.06.018

Mochon, D., & Frederick, S. (2013). Anchoring in sequential judgments. *Organizational Behavior and Human*

Decision Processes, *122*, 69–79. https://doi.org/10.1016/j.obhdp.2013.04.002

Morwitz, V. G., Johnson, E., & Schmittlein, D. (1993). Does measuring intent change behavior? *Journal of Consumer Research*, *20*, 46–61. https://doi.org/10.1086/209332

Mussweiler, T. (2001). The durability of anchoring effects. *European Journal of Social Psychology*, *31*, 431–442. https://doi.org/10.1002/(ISSN)1099-0992

Northcraft, G. B., & Neale, M. A. (1987). Experts, amateurs, and real estate: An anchoring-and-adjustment perspective on property pricing decisions. *Organizational Behavior and Human Decision Processes*, *39*, 84–97. https://doi.org/10.1016/0749-5978(87)90046-X

Rubin, D. C., & Wenzel, A. E. (1996). One hundred years of forgetting: A quantitative description of retention. *Psychological Review*, *103*, 734–760. https://doi.org/10.1037/0033-295X.103.4.734

Schonberg, T., Bakkour, A., Hover, A. M., Mumford, J. A., Nagar, L., Perez, J., & Poldrack, R. A. (2014). Changing value through cued approach: An automatic mechanism of behavior change. *Nature Neuroscience*, *17*, 625–630. https://doi.org/10.1038/nn.3673

Sharot, T., Fleming, S. M., Yu, X., Koster, R., & Dolan, R. J. (2012). Is choice-induced preference change long lasting? *Psychological Science*, *23*, 1123–1129. https://doi.org/10.1177/0956797612438733

Simon, D., Krawczyk, D. C., Bleicher, A., & Holyoak, K. J. (2008). The transience of constructed preferences. *Journal of Behavioral Decision Making*, *21*, 1–14. https://doi.org/10.1002/bdm.575

Simon, D., & Spiller, S. A. (2016). The Elasticity of Preferences. *Psychological Science*, *27*, 1588–1599. https://doi.org/10.1177/0956797616666501

Simonsohn, U., Simmons, J. P., & Nelson, L. D. (2014). *Anchoring is not a false-positive: Maniadis, Tufano, and List's (2014)'failure-to-replicate'is actually entirely consistent with the original*. SSRN. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2351926

Simonson, I. (2008). Regarding inherent preferences. *Journal of Consumer Psychology*, *18*, 191–196. https://doi.org/10.1016/j.jcps.2008.04.007

Simonson, I., & Drolet, A. (2004). Anchoring effects on consumers' willingness-to-pay and willingness-to-accept. *Journal of Consumer Research*, *31*, 681–690. https://doi.org/10.1086/425103

Slovic, P. (1995). The construction of preference. *American Psychologist*, *50*, 364–371. https://doi.org/10.1037/0003-066X.50.5.364

Sprott, D. E., Spangenberg, E. R., Block, L. G., Fitzsimons, G. J., Morwitz, V. G., & Williams, P. (2006). The question–behavior effect: What we know and where we go from here. *Social Influence*, *1*, 128–137. https://doi.org/10.1080/15534510600685409

Stewart, N. (2009). The cost of anchoring on credit-card minimum repayments. *Psychological Science*, *20*, 39–41. https://doi.org/10.1111/j.1467-9280.2008.02255.x

Strack, F., & Mussweiler, T. (1997). Explaining the enigmatic anchoring effect: Mechanisms of selective accessibility. *Journal of Personality and Social Psychology*, *73*, 437–446. https://doi.org/10.1037/0022-3514.73.3.437

Thorsteinson, T. J., Breier, J., Atwell, A., Hamilton, C., & Privette, M. (2008). Anchoring effects on performance judgments. *Organizational Behavior and Human Decision Processes*, *107*, 29–40. https://doi.org/10.1016/j.obhdp.2008.01.003

Tversky, A., & Kahneman, D. (1974). Judgment under Uncertainty: Heuristics and Biases. *Science*, *185*, 1124–1131. https://doi.org/10.1126/science.185.4157.1124

Wansink, B., Kent, R. J., & Hoch, S. J. (1998). An anchoring and adjustment model of purchase quantity decisions. *Journal of Marketing Research*, *35*, 71–81. https://doi.org/10.1177/002224379803500108

Yang, L., Toubia, O., & Jong, M. G. D. (2018). Attention, Information Processing and Choice in Incentive-Aligned Choice Experiments. *Journal of Marketing Research*, *55*, 783–800. https://doi.org/10.1509/jmr.15.0474

Yoon, S.-O., & Simonson, I. (2008). Choice set configuration as a determinant of preference attribution and strength. *Journal of Consumer Research*, *35*, 324–336. https://doi.org/10.1086/587630

Supporting Information

Additional supporting information may be found in the online version of this article at the publisher's website:

Appendix S1. Pilot Study.

Appendix S2. Discretized Mean WTPs in Each Study (Error bars indicate standard errors).

Appendix S3. Regression Analysis Results for the Effect of Memory on the Long-term Anchoring Effects on WTP in Study 1.

Appendix S4. Regression Analysis Result for the Recalled Anchor in Study 2.

Appendix S5. Regression Results without Excluding Outliers.