THE EFFECT OF CHOICE ON MEMORY AND VALUE FOR CONSUMER PRODUCTS

by

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ABSTRACT

There is evidence that after a person chooses between two items, the chosen item is more memorable than the unchosen alternative. This is known as the *chosen-item effect* (Coverdale & Nairne, 2019). We frequently make choices, such as which restaurant to visit for dinner, or which brand of shampoo to buy, and what we choose in these situations can influence what we remember. In the field of consumer behavior, it is believed that memory for brand names and products influences consumer purchasing behaviors. As such, we were interested in investigating whether the chosen-item effect could be extended to memory for brands and product names. If choosing a brand name or product makes it more memorable, then companies can apply the chosen-item effect to improve an item's memorability and potentially increase sales of that item. In three experiments we investigated whether the chosen-item effect can be extended to memory for products (Experiment 1) and brand names (Experiment 2 & 4b) and found a mnemonic benefit for items that were chosen over those that were not chosen.

In addition to the relationship between choice and memory, there is also a relationship between choice and value. We hypothesized that people would be willing to pay more for items that they have previously chosen, in addition to having better memory for them. We conducted a second set of experiments (Experiments 3 & 4a) to investigate whether the chosen-item effect extends beyond memory to value. We found that items that have previously been chosen were not perceived as being more valuable than those that were not chosen. This finding has theoretical implications for research on the mechanism(s) responsible for the chosen-item effect.

INTRODUCTION

The act of choosing and the choices we make influence our memory. For example, allowing participants to choose to-be-remembered words in an intentional memory task improves performance over controls who have the same choices made for them (Hirano & Ukita, 2003; Monty & Perlmuter, 1975; Perlmuter, Monty, & Kimble, 1971; Takahashi, 1992, 2002; Toyota, 2015; Watanabe, 2001; Watanabe & Soraci, 2004). This finding is known as the *self-choice effect*.

Similarly, participants who are allowed to control aspects of a learning episode have better memory than participants who are not given control during learning (Markant, DuBrow, Davachi, & Gureckis, 2014; Murty, Dubrow, & Davachi, 2015, 2019; Voss, Gonsalves, Federmeier, Tranel, & Cohen, 2011). This effect, known as the *self-directed learning effect,* has been demonstrated even when the only aspect of the learning episode that participants are able to control is the presentation timing of the stimuli (Markant, DuBrow, Davachi, & Gureckis, 2014). Choosing also improves memory for items studied following a choice when participants believe that their choices influenced which to-be-remembered items were shown (Murty, Dubrow, & Davachi, 2015). These effects demonstrate that participants who make choices during encoding have better memory for the encoded information than participants who do not make choices during learning. In other words, there is a mnemonic benefit associated with the act of choosing compared to not choosing.

Recently a *chosen-item effect* has also been demonstrated: When people make choices between two alternatives there is a mnemonic benefit for the chosen item over the not chosen alternative (Coverdale & Nairne, 2019). In contrast to the effects described above this chosen item benefit occurs within a choice condition as opposed to across conditions of either choice or no choice. Furthermore, this effect cannot be accounted for by the relative fit of the word to the encoding question or context.

Coverdale and Nairne (2019) gave participants pairs of words and asked them to choose one of the two words based on either its relevance to survival (Experiment 1) or its match to an objective category (Experiment 2). Critically, for half the words participants were instructed to choose the word that better fit the encoding context and for the other half they were instructed to choose the word that didn't fit (or was a worse fit) for the encoding context. For example, participants saw the words "golf" and "shoe", and some had to choose the word that was more representative of the category "a sport" whereas others were asked to choose the word that was

less representative of that category. In this way, choice was dissociated from fit or congruity with the encoding context. Half the time the chosen word was the one that better matched the category and the rest of the time the chosen word was less of a match to the category. In both experiments, during a surprise free recall task, Coverdale and Nairne (2019) found that participants recalled more chosen words than unchosen words in both the "more relevant"/"more of a match" and the "less relevant"/"less of a match" conditions. Importantly, choice did not interact with congruity. The act of choosing led to better memory for chosen items over unchosen alternatives regardless of the match between the word and its encoding context.

We regularly select a single item among alternatives. For example, you might choose which brand of laundry detergent to buy at the store, or pick which streaming company to subscribe to, or decide what television show to watch. The results of Coverdale & Nairne (2019) suggest that decisions like these likely influence our memory. Specifically, it suggests that we will better remember the items that were chosen over those that were not chosen.

The Effect of Choice on Memory for Consumer-Relevant Stimuli

This project has two main goals: First, to investigate whether the chosen-item effect can be extended to more ecologically relevant stimuli, particularly to consumers' memory for different products and brands. This is important because consumer memory is assumed to be related to purchase behaviors (Axelrod, 1968; although see, Stewart & Pavlou, 2002) and is used to measure advertising effectiveness (see Stewart, Pechmann, Ratneshwar, Stroud & Bryant, 1985). Brand recall and recognition are used as measures of the effectiveness of advertisements presented in a variety of contexts including on television (e.g., Li, 2010; Terry, 2005), during sporting events (e.g., Walsh, Kim, & Ross, 2008), in video games (e.g., Lull, Cruz, Gibson, & Bushman, 2018; Mackay, Ewing, Newton, & Windisch, 2009), and on internet webpages (e.g., Han, 1992; Li, & Bukovac, 1999). Keller (1993) notes that advertisements almost always contain two pieces of information about the advertised product: its category/class and the brand name. Therefore, we propose to study memory for those two pieces of information (in Experiments 1 and 2, respectively).

All past research looking at the chosen-item benefit has been done using carefully controlled lists of unrelated words as stimuli. It is unknown whether and to what extent these findings generalize to more ecologically valid stimuli such as products and brand names.

Advertising stimuli are usually more complex than those used in basic psychological research which has led people to question the extent to which psychological effects can be relevant to understanding advertising effects (Bettman, 1979; Shapiro, & Krishnan, 2001). Some researchers have argued that the relative simplicity of basic memory stimuli compared to media and advertising stimuli makes the corresponding mnemonic findings inapplicable to the study of consumer behavior (e.g., Wright, 1974). Rather than using the simplistic stimuli typically found in basic memory research, researchers studying consumer memory tend to use realistic advertising stimuli such as advertisements (e.g., Furnham, Gunter, & Richardson, 2002), logos (e.g., Jeong, Bohil, & Biocca, 2011), brand names (e.g., Brennan, 2008), and products (e.g., Gupta, & Lord, 1998). It is therefore important that we evaluate whether the chosen-item effect can still be obtained with more complex advertising research (i.e., actual advertisements).

Although some might argue that consumer decisions are often stimulus-based, that is, based on information that is available when making a choice (Lynch, & Srull, 1982), Alba, Hutchinson, and Lynch (1991) point out that most consumer decisions involve memory to some extent and memory often plays a critical role in consumer choices. People use memory to recall brand names and claims from advertisements (Krishnan, & Chakravarti, 1993) and recall brand evaluations such as their affective feelings towards the brand. Moreover, cognitive inferences and beliefs related to the brand as well as behavioral intentions about the brand influence consumer judgements and decisions (Farquhar, 1989).

Due to its importance in consumer decision making, memory has been a topic of interest in the field of consumer behavior for many years. In addition to being used as a measure of advertisement effectiveness, consumer behavior researchers have applied common memory effects to the study of consumer behavior. For example, Krishnan and Chakravarti (1993) reported several experiments looking at encoding-retrieval interactions using brand names, product categories, and picture advertisements. Burke and Srull (1988) investigated proactive and retroactive interference effects for print advertisements. Thompson and Barnett (1981) found generation effects in multiple experiments for fictitious brand names (see also, Brennan, 2008), and others have considered how the spacing effect can be used to improve consumer memory (Janiszewski, Noel, Sawyer, 2003). Furthermore, part-list cueing (Alba, & Chattopadhyay, 1985), levels of processing (e.g., Reid, & Soley, 1980), and serial position effects (Chaney et al., 2018; Gupta, & Gould, 2007; Li, 2010; Terry, 2005), have all been studied within the consumer behavior literature.

In the following experiments, we extend the study of the chosen-item effect to more ecologically valid stimuli, specifically products/services and brand names and find that, even when advertisements are used as stimuli, chosen items are more memorable than unchosen alternatives. As noted above this research is relevant to the study of consumer behavior which has been concerned for decades with consumer memory and the application of memory principles to consumer settings. By demonstrating that the chosen-item effect can be found within this domain these findings contribute to both psychological and consumer behavior research.

The Effect of Choice on Valuation

The second major goal of this research is to investigate whether the chosen-item effect extends to value judgments. That is, we were interested in whether chosen items are perceived as more valuable than items that are not chosen. If choosing items can improve memory for products and brands but also increase the amount of money consumers are willing to invest in them, then its usefulness in a marketing or advertising setting would expand greatly. For example, companies could introduce choices into advertisements to increase the amount of money a consumer would be willing to pay for their product. If consumers were not previously willing to purchase a product because they thought it was too expensive, they might be willing to pay for it after choosing it. Conversely, if consumers previously believed that the product was worth the price it was listed at, after a choice they may feel that the item is a better bargain which might make them feel more favorably about the brand and reinforce their decision to purchase their products. Such an extension is also theoretically important because it offers insights into the mechanism responsible for the chosen item effect as well as for some benchmark consumer behavior effects, as noted below.

There are a variety of situations that are known to increase the value people place on different items. For example, research on the *Ikea effect* suggests that people are willing to pay more for an item they built (i.e., put together) than an identical control (Norton, Mochon, & Ariely, 2012) and the *mere touch effect* is the finding that people judge the value of objects to be higher after they have made physical contact with the object (Peck & Shu, 2009). One of the best-known value effects is the *endowment effect* – an increase in the value of something because of ownership. The general finding of research on the endowment effect is that the maximum amount a person is willing to pay to acquire an item is lower than the minimum amount required for them to sell that

same item once it is owned (Dommer, & Swaminathan, 2013; Horowitz & McConnell, 2002; Jaeger, Brosnan, Levin, & Jones, 2020; Kahneman, Knetsch, & Thaler, 1990; 1991; Morewedge & Giblin, 2015; Morewedge, Shu, Gilbert, & Wilson, 2009; Maddux et al., 2010; Reb and Connolly, 2007; Thaler, 1980).

In a typical endowment effect experiment half of the participants are given an item (e.g. a raffle ticket, mug, pens, etc.) and are asked if they would be willing to sell it at each of a series of prices. The value of the item is considered to be the price at which they switch from saying they would not sell the item to saying they would sell the item. The average selling price for this group is compared to a different group that is not given the item but is shown it and asked if they would be willing to buy it at each of the same prices. The typical finding is that, for an identical object, people want more money to sell an item they own than they would be willing to pay to buy it. In other words, people place a higher value on items that they own even if those items were recently acquired by them and/or randomly assigned as theirs.

One explanation for the endowment effect is loss aversion (Kahneman & Tversky, 1979; Kahneman et al., 1990; 1991). Loss aversion is a cognitive bias in which people are more sensitive to losses (giving up something) than to equal sized gains (acquiring something) leading to a greater change in value for losses relative to gains (Kahneman et al., 1990; 1991). This was originally proposed to explain the endowment effect because if people weigh losses as greater than gains then the relative change in value would be greater for sold items than bought items. However, Morewedge, Shu, Gilbert and Wilson (2009) demonstrated that participants who were given a mug (owners) at the start of the experiment put a higher value on the mug not only when selling it but also when purchasing an identical second mug compared to subjects who merely set a price for buying one or two of the mugs (nonowners). Morewedge et al. also found that mug owners placed a higher value on an identical mug when buying or selling for another participant compared to nonowners who were buying or selling for someone else. These findings cannot be accounted for by loss aversion accounts of the endowment effect.

Not only do people value items they own more than those that they do not, research also suggests that people have better memory for things that they own compared to things that are owned by other people (Cunningham, Turk, Macdonald, & Macrae, 2008; Englert & Wentura, 2016; Turk, van Bussel, Waiter, & Macrae, 2011; van den Bos, Cunningham, Conway, & Turk, 2010). This is known as the *mere ownership effect*. It seems that ownership affects both memory

for and valuation of items. We hypothesized that choice would similarly affect both memory and valuation. One reason to expect that was that there are established relationships between memory and value.

In experiments on *value-directed remembering* (e.g., Castel, Benjamin, Craik, & Watkins, 2002), participants are presented with information that is paired with a number (e.g., ranging from 1-12). Participants remember more of the high value information than the low value information if they are told to study the information for an upcoming test in which their goal is to maximize their score. The number assigned to the information represents the amount of points they will receive for remembering that information. Put differently, we selectively remember high-value information over low-value information. These results have been demonstrated not only with random word lists but also with more naturalistic stimuli such as different allergens and the corresponding severity of allergic reactions to them (Friedman, McGillivray, Murayama, & Castel, 2015).

Beyond a mnemonic advantage for high-value information relative to low-value information, it appears that we are biased to believe that forgotten information is less important than remembered information. Castel and colleagues (2012) used a typical value directed remembering procedure in which words were encoded based on an assigned point value and then tested using free recall. Following the free recall task, participants were cued to recall the point value associated with all the words originally presented. They found that participants gave lower values to the words that were forgotten during the free recall test than those that were remembered during the free recall test. In other words, people think that information that has been forgotten was less important than information that was remembered. It appears that in addition to value influencing memory, what we remember influences our perceptions of value.

Based on the above noted relationships between value and memory, and the findings that certain manipulations (i.e., ownership) affect both memory and valuation, we believed that choice would affect value in addition to memory. Some evidence suggesting that this may be the case is the finding that both human and nonhuman animals prefer the opportunity to make choices (Beatie, Baron, Hershey & Spranca, 1994; Bown, Read, & Summers, 2003; Catania, & Sagvolden, 1980; Suzuki, 1999; Voss & Homzie, 1970) – known as the *lure of choice* – and that humans place a higher value on the ability to choose (Fujiwara et al., 2013; Siddiqi, 2009; Szrek & Baron, 2007) even in situations when the choices don't change or improve the final outcome. For example, Szrek

and Baron (2007) found that participants were willing to pay more for an insurance policy when they were given the chance to select it over an alternative compared to when an identical plan was given as the only option. Fujiwara and colleagues (2013) found that when participants were asked which they would rather receive, when given the choice between a monetary amount and a number that represented the number of everyday objects they would be allowed to select from as a prize, participants place a higher value on more options. That is, the amount of money needed for participants to select the monetary option was higher for more choice alternatives than fewer choice alternatives.

In addition to being willing to pay more for the option to choose and have more choices, there is evidence that people exhibit *a control premium* – that is, participants are willing to give up some of a monetary reward to maintain control rather than to delegate control to others (Owens, Grossman, & Fackler, 2014). In an experiment by Bobadilla-Suarez, Sunstein, and Sharot (2017) researchers gave participants the opportunity to either make a choice that could result in a monetary reward ("gain trial") or penalty ("loss trials") or to allow another person (an "advisor") to make the choice for them. Participants were told the probability of the advisor being correct as well as the amount of the winnings the advisor would charge if he or she answered correctly (or return if incorrect on a loss trial). They found that participants did not behave rationally (in a way that would maximize their profits) and instead preferred to retain control even though it resulted in them earning less money.

Outside of laboratory experiments, the value of choice has been discussed in behavioral economics. In both the closed-end fund discount anomaly (Dimson & Mino-Kozerski, 1999) and in American versus European call option pricing (Geske & Roll, 1984), the opportunity to have more choices increases value relative to fewer choices (Siddiqi, 2009). Two types of investment funds are open-end funds and closed-end funds. These types of funds differ in that all shares of a closed-end fund are issued initially and can later only be traded with other shareholders whereas shares of open-end funds can be purchased either from shareholders or directly from the fund. Closed-end funds are usually traded at a discount to their net asset value (NAV) whereas open-end funds are sold at their NAV (Dimson & Mino-Kozerski, 1999). Siddiqi (2009) proposed that the reason for this discount is that investors have an additional choice in open-end funds compared to closed-end funds. Siddiqi (2009) also suggested that choice accounts for the difference in

American and European call option pricing, which differ only in that with European options the buyer can only exercise the option at the expiration date rather than at any time before maturity.

In memory research we see that the opportunity to choose improves memory and that choosing an item improves memory for that item relative to other items. It is reasonable to believe that if the opportunity to choose increases value then choosing an item might increase the value of that item relative to other non-chosen items. Therefore, given that people place a higher value on the opportunity to make choices, we expected that people would also judge chosen items as more valuable than unchosen alternatives.

Such a demonstration would add significantly to the current cognitive literature on memory for choice and value, but also to marketing and advertising applications. If a consumer's valuations of products and brands could be increased simply by having him/her make insignificant choices about brands, then a company could increase their profits by creating advertisements that lead consumers to choose their brand. For example, imagine if instead of having consumers watch a random advertisement before a YouTube video, they made choices about which brands they preferred (or did not prefer). Similarly, in place of CAPTCHAs that ask people to prove they are human by choosing which parts of images have cars in them, they might instead choose which of several logos corresponded to fast food restaurants. If choosing a brand increased the perceived value of their products, then such simple changes could increase the value that consumers place on products associated with chosen brands. No prior research had investigated whether items become more valuable after being chosen.

EXPERIMENT 1

To begin, though, we sought to replicate the chosen-item benefit in recall using stimuli that represent actual consumer products and services (e.g. chips, juice, restaurant, etc.). Again, such an extension is important because it shows the generality of the chosen-item effect and encourages its application to the fields of advertising and consumer behavior. To determine whether chosen products and services are more memorable than their not chosen counterparts, we presented participants with pairs of items and either asked them to choose the item that they would *more prefer* to see an advertisement for, or to choose the item that they would *less prefer* to see an advertisement for. This task was chosen because this type of decision is similar to choices already made by consumer (e.g., opting to skip or watch an ad prior to watching a YouTube video) and could reasonably be included as an option prior to an advertisement (e.g. prior to showing an advertisement, this type of choice can be used to give consumers some control over what ads they will watch). By having people make some choices based on which they would more prefer and the rest based on which they would less prefer we are able to see whether chosen items are more memorable than unchosen alternatives and whether a chosen item benefit is present for both the preferred and less preferred products/services. Including this dimension allows us to account for the mnemonic effects of preference while controlling for the possibility that people will have better memory for items that are of personal relevance/interest to themselves.

Method

Participants

Sixty-four Purdue University undergraduates, who were native English speakers, were recruited from an introductory psychology course in which they received partial course credit in exchange for their participation. The sample size was determined based on a power analysis using the partial eta effect size obtained in Experiment 1 of Coverdale and Nairne (2019). Based on this analysis we determined that we would need 64 people to have above a 95% chance of detecting a choice effect of the size previously reported ($\eta_p^2 = .18$).

Materials

Forty-eight names of products and services were selected from VanArsdall (2016) as stimuli with the conditions that they needed to be things that people would buy/consume and that could reasonably appear in an advertisement (e.g., beer, cereal, candy). The list of words was divided into two sets of 24 words. One set was presented as the stimuli for blocks 1 and 3 and the other set was presented as the stimuli for blocks 2 and 4. The words in these two sets were matched in average concreteness, familiarity, imageability, animacy, and word length and are listed in Appendix A.

Within each of the four blocks, words were randomly paired together with six pairs appearing in each block, such that word pairings and their orders within a block were randomized for all participants. In all blocks, participants were told to imagine that they were about to view an advertisement. In two of the blocks participants were asked to choose which of two products/services they would *more prefer* to see in an advertisement and in the other two blocks participants were asked to choose which they would *less prefer* to see in an advertisement.

Decision type (more prefer/less prefer) alternated across blocks and was counterbalanced such that half of the participants made choices about which product/service they would *more prefer* to see in the first block, and the other half of participants made choices about which product/service they would *less prefer* to see in the first block.

Procedure

Participants were tested on individual computers in sessions lasting up to 30 minutes. To begin the experiment participants were instructed that they would be performing a series of tasks on the computer. At the start of each task and before each block of choices, participants were presented with on-screen instructions. Instructions for the two types of decision tasks (more prefer/ less prefer) were as follows:

> *More Prefer* "In this task, we would like you to imagine that you are about to see a video advertisement. We are going to show you pairs of words, representing the products or services that are being advertised, and we would like you to decide which of the two you would MORE prefer to watch an advertisement for.
>
> You will make your decision by using the mouse to click on the product that you wish to select.

As you are making your decisions, please try to immerse yourself in the situation described above. Imagine what the advertisements might be like and then simply choose the one that you would MORE prefer to see."

Less Prefer "In this task, we would like you to imagine that you are about to see a video advertisement. Now, we are going to show you pairs of words, representing the products or services that are being advertised, and we would like you to decide which of the two you would LESS prefer to watch an advertisement for.

You will make your decision by using the mouse to click on the product that you wish to select.

As you are making your decisions, please try to immerse yourself in the situation described above. Imagine what the advertisements might be like and then simply choose the one that you would LESS prefer to see."

Prior to blocks one and two (i.e., the first of each of the two types of decision tasks), participants performed two practice trials. These four trials were excluded from all analyses. During the decision task participants were presented with a pair of words and the prompt "Which would you MORE (or LESS) prefer to watch an advertisement for?". Each pair of words was presented for 5 seconds and participants were instructed to use that time to make a choice by using the mouse to click on the word that they wished to select. Across the four blocks, participants made 24 decisions: 12 decisions based on which product they would more prefer to watch an advertisement for and 12 based on which product they would less prefer to watch an advertisement for.

Following the decision task, participants engaged in a 2-minute even/odd distractor task followed by a 5-minute surprise free recall task. During the distractor task, participants were presented with a single digit number and asked to determine whether the number was even or odd. For the free recall task, participants were asked to type as many of the product names as they remembered regardless of the choices they made.

Results and Discussion

For all analyses, we set $\alpha = .05$ (two-tailed) unless otherwise specified. The data for each of the relevant conditions are shown in Figure 1. Using a repeated measures analysis of variance (ANOVA) we found a main effect of choice $F(1, 63) = 6.10$, $MSE = .02$, $p = .016$, $\eta_p^2 = .09$, such that chosen products ($M = .32$, $SD = .15$) were more likely to be remembered during free recall than their not chosen alternatives ($M = .28$, $SD = .15$). We also found a main effect of preferences

$F(1, 63) = 12.45$, $MSE = .02$, $p = .001$, $\eta_p^2 = .17$, such that products that participants preferred to watch advertisements for ($M = .33$, $SD = .15$) were more memorable than those that participants did not prefer to watch ($M = .28$, $SD = .15$). However, the effect of choice on memory did not depend on whether the word represented a product/service that the participant preferred or not. In other words, the effects of choice and preference did not interact $F(1, 63) = .12$, $MSE = .02$, $p = .74$, $\eta_p^2 = .002$.

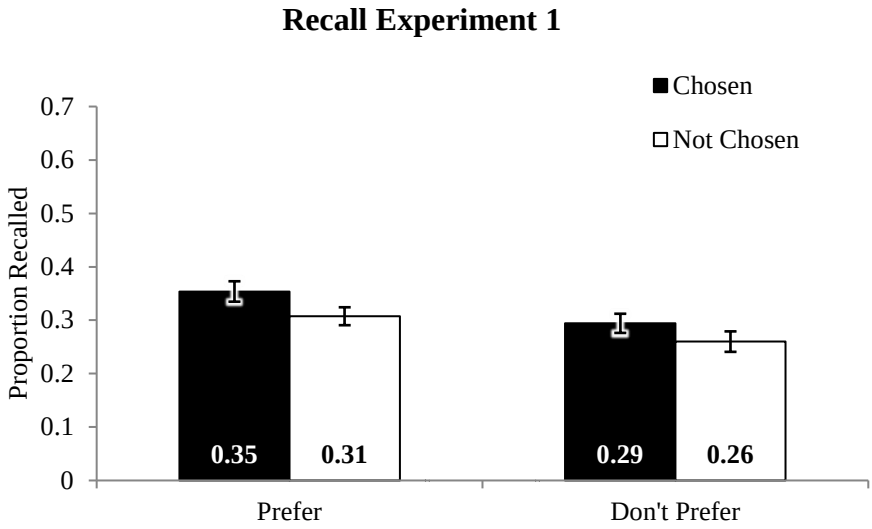

Figure 1. Free recall performance for Experiment 1 as a function of choice and preference. Prefer-Chosen is the proportion of products recalled that were chosen in the "more prefer" task. Prefer-Not Chosen is the proportion of products recalled that were not chosen in the "less prefer" task. Don't Prefer-Chosen is the proportion of products recalled that were chosen in the "less prefer" task. Don't Prefer-Not Chosen is the proportion of products recalled that were not chosen in the "more prefer" task. Error bars represent the standard error of the mean.

However, this nonsignificant interaction only tells us that these data are not statistically unlikely within the null distribution, not whether there is evidence in favor of a null interaction. Therefore, we conducted an additional Bayesian analysis on the null interaction using Masson's (2011) guidelines. We found moderate evidence in favor of a null interaction $BF_{01} = 7.61$. That is, the observed pattern of data is 7.61 times more likely within the null distribution than an alternative distribution. This suggests that choosing a product/service is equally beneficial for less preferable

advertisements as for more preferable advertisements. In other words, a chosen word is more memorable even if it was chosen as being less preferable.

In addition, there was a strong correlation (r = .92) between the proportion of times a given product was chosen in the "more prefer" condition and the proportion of times that same product was not chosen in the "less prefer" condition across participants. This correlation is plotted in Figure 2. This strong correlation suggests that, although choices were subjective, there was consistency across participants in how preferable participants anticipated each brand would be to watch relative to the other brands. This is important because it suggests that on average each item appeared approximately equally often as chosen and not chosen. If there had not been a strong correlation between the chosen words in the "more prefer" condition and the not chosen words in the "less prefer" condition it might indicate that participants are simply biased to select one product over another regardless of the choice they are asked to make. This would result in an item selection confound because the chosen and the not chosen items would be different words which may be more/less memorable for reasons other than whether or not they were chosen. It is worth noting that item selection is a concern for the main effect of preference as well because the same items are generally preferred across participants. However, we are not concerned with this confound because preference is not a variable we are particularly interested in and the effect of choice does not seem to depend on preference.

These findings indicate that the chosen item effect can be replicated using consumer products as stimuli. This experiment not only replicates the chosen-item effect with novel stimuli but also demonstrates that it can be obtained with more ecologically valid stimuli and in more ecologically valid contexts. In previous experiments participants performed choice tasks based on which of two words was more/less representative of a category or more/less relevant to a survival situation. These tasks are rather unusual and are unlikely to occur in day-to-day life. In contrast this experiment uses tasks based on preference for ads which is something that consumers are much more likely to encounter in their daily lives. For example, on YouTube they might choose to skip an ad for a product that they dislike, or when browsing on the internet they might choose to click on an in-page advertisement for a product related to their search interests. The findings of this experiment show that people have better memory for the products that they select even when this selection is based on them preferring that product less.

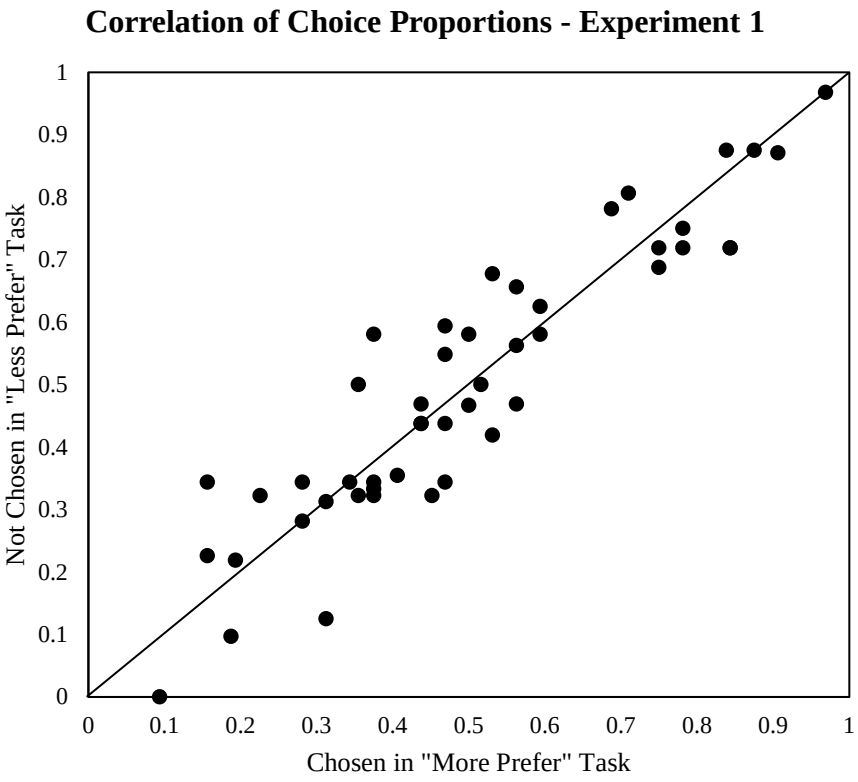

Figure 2. Plot of proportion of times each product was chosen in the "more prefer" task relative to the proportion of time it was not chosen in the "less prefer" task. Dots on the diagonal line indicate products that were chosen in the “more prefer” task as frequently as they were not chosen in the “less prefer” task.

EXPERIMENT 2

In Experiment 1 we found that the names of products and services (e.g. chips, juice, restaurant, etc.) were more memorable if they had previously been chosen for inclusion as an advertisement. Items that participants indicated that they would prefer to watch an advertisement for were also more memorable, but these two effects did not interact. However, it is usually more common and important that consumers remember brand names than specific products. That is, it does not help a company if someone remembers that they saw an interesting advertisement for a soda unless they can remember that it was a Coke commercial and not a Pepsi commercial. As noted above, brand name memory has been historically used as a metric for measuring advertisement effectiveness.

Our second experiment was designed to determine whether the results of Experiment 1 could be replicated using brand names from actual advertisements (e.g. Lay's, Tropicana, Chipotle, etc.) rather than simply the names of products/services. That is, it allowed us to replicate the previously observed effect using stimuli that would be more relevant to someone looking to influence consumer behavior, specifically actual advertisements for common brands. Consequently, we not only changed the stimuli from products/services to brand names but also changed from merely words to images of advertisements that have been used to sell these items.

Method

Participants

Based on a power analysis using the partial eta square effect size for the chosen-item effect that we obtained in Experiment 1 we estimated that we would need to collect 112 participants to have a 90% chance of detecting a choice effect equal to or greater than the one observed in Experiment 1. Thus, 112 native English-speaking participants were collected and compensated with partial credit towards an introductory psychology course.

Materials

Thirty-two advertisements for recognizable brands and products were used as stimuli (Appendix B). All were created from images of advertisements found on the internet and were modified such that they were simplified versions of these existing advertisements. All images represented unique products and brands such that no two brands were associated with the same type of product (i.e., Trek was the only bicycle advertisement and Nikon was the only camera advertisement).The images were also selected to include the product and/or brand logo with minimal other objects present. Examples of these advertisements are shown in Figure 3.

Figure 3. Examples of advertisement images used for Experiments 2 – 4.

The pairs of images were divided into four blocks, each with four pairs of advertisements. In all blocks, participants were asked to imagine that they are about to view a video advertisement for the brand and product pictured in the image. As in Experiment 1, for two blocks participants were asked to choose which of two brands they would *more prefer* to see an advertisement for and in the other two blocks participants were asked to choose which they would *less prefer* to see an advertisement for. Decision type (more prefer/less prefer) alternated between blocks and was counterbalanced across participants such that half of the participants made decisions based on which brand they would *more prefer* to see an advertisement for in the first and third blocks and the other half made decisions based on which brand they would *more prefer* to see an advertisement for in the second and fourth blocks. The presentation order of the pairs was randomized within each block such that in each of the blocks the pairs of brands shown were the same for each participant but their order within the block was randomized. This is different from

Experiment 1 in that each item was always presented with the same alternative. For Experiment 3 pairings needed to be fixed, so it was important to demonstrate that we could obtain a chosen-item effect in memory with the same design.

Procedure

The experimental procedure closely followed that of Experiment 1. Each participant performed the experiment on individual computers in sessions lasting up to 30 minutes. Participants received instructions at the start of each task and before each block of choices. Instructions for the two types of decision tasks (more prefer/ less prefer) were as follows:

> *More Prefer* "In this task, we would like you to imagine that you are about to see a video advertisement. We are going to show you pairs of pictures, each showing the brand and product that are being advertised, and we would like you to decide which of the two advertisements you would MORE prefer to watch.
>
> You will make your decision by using the mouse to click on the brand name of the advertisement that you wish to select.
>
> As you are making your decisions, please try to immerse yourself in the situation described above. Imagine what the advertisements might be like and then simply choose the one that you would MORE prefer to see."
>
> *Less Prefer* "In this task, we would like you to imagine that you are about to see a video advertisement. We are going to show you pairs of pictures, each showing the brand and product that are being advertised, and we would like you to decide which of the two advertisements you would LESS prefer to watch.
>
> You will make your decision by using the mouse to click on the brand name of the advertisement that you wish to select.
>
> As you are making your decisions, please try to immerse yourself in the situation described above. Imagine what the advertisements might be like and then simply choose the one that you would LESS prefer to see."

Prior to each of the first two blocks, participants performed a practice trial. These trials were excluded from all analyses. During the decision tasks participants were presented with two images of a product and brand along with the prompt "Which advertisement would you MORE (or LESS) prefer to watch?". Participants had 10 seconds to make each choice about which advertisement they would prefer to watch. Across the four blocks each participant made eight decisions based on which advertisement they would *more prefer* to see and eight based on which they would *less prefer* to see for a total of 16 decisions overall.

As in Experiment 1, after the decision task participants performed a brief even/odd distractor task. Following the distractor task, participants were given a surprise 5-minute free recall test in which they were asked to recall as many of the brand names that were presented earlier as they could, in any order, regardless of the decisions they made. A brand name was counted as correctly recalled even if it was misspelled. Some brands have odd or unusual spellings so if the recalled brand name was close enough to be recognized as one of the presented brands it was counted as correct (e.g., if a participant typed "Fabreze" or "Febreeze" rather than "Febreze" it was counted as correct). Variants of the brand name were accepted as correct (e.g., both "Coke" and "Coca-Cola" were counted as correct as were "Lay's" and "Frito-Lay"). However, recalling the product category rather than the brand name did not count as a correct recall (e.g., "orange juice" was not counted as a correct recall of "Tropicana").

Results and Discussion

For all analyses, $\alpha = .05$ (two-tailed) unless otherwise specified. Average recall based on preference and choice are shown in Figure 4. Using a 2 x 2 repeated measures analysis of variance (ANOVA) with choice (chosen vs. not chosen) and preference (prefer vs. don't prefer) as within-subject factors, we found a main effect of choice $F(1, 111) = 13.12$, $MSE = 0.03$, $p < .001$, $\eta_p^2 = .11$, such that more chosen brands ($M = .36$, $SD = .13$) were correctly recalled during the free recall test than their not chosen counterparts ($M = .31$, $SD = .13$). Additionally, brand names of advertisements that were preferred ($M = .39$, $SD = .14$) were correctly recalled more often than those that were not preferred ($M = .28$, $SD = .12$), $F(1, 111) = 53.02$, $MSE = .03$, $p < .001$, $\eta_p^2 = .32$. These main effects were not qualified by an interaction. In other words, the effect of choice on free recall performance was the same for brands that were preferred and not preferred, $F(1, 111) = .03$, $MSE = .02$, $p = .87$, $\eta_p^2 = .03$.

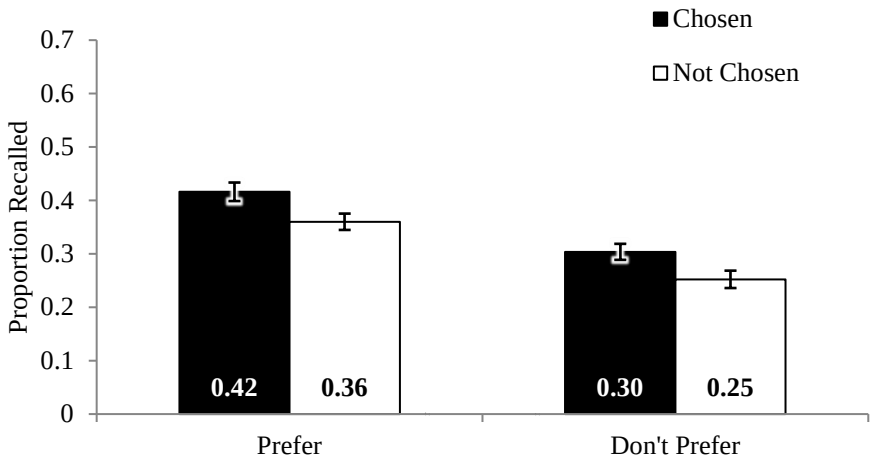

Figure 4. Free recall performance for Experiment 2 as a function of choice and preference. Prefer-Chosen is the proportion of brand names recalled that were chosen in the "more prefer" task. Prefer-Not Chosen is the proportion of brand names recalled that were not chosen in the "less prefer" task. Don't Prefer-Chosen is the proportion of brand names recalled that were chosen in the "less prefer" task. Don't Prefer-Not Chosen is the proportion of brand names recalled that were not chosen in the "more prefer" task. Error bars represent the standard error of the mean.

As in Experiment 1, we conducted a Bayesian analysis on the null interaction to evaluate support for the null hypothesis. We found strong evidence in favor of a null interaction BF_{01} = 10.35. That is, we are 10.35 times more likely to observe this pattern of data within the null distribution than an alternative distribution, suggesting that the mnemonic benefit for chosen brands was the same for brands that were preferred and not preferred.

We also found that the proportion of times a brand was chosen in the "more prefer" was strongly correlated with the proportion of times it was not chosen in the "less prefer" condition (r = .93) indicating that degree of preference for one brand over its pair is highly consistent across participants (Figure 5). Importantly, this indicates that across participants each brand was chosen approximately equally often as it was not chosen, ruling out item-selection confounds as an explanation for the observed chosen-item effect.

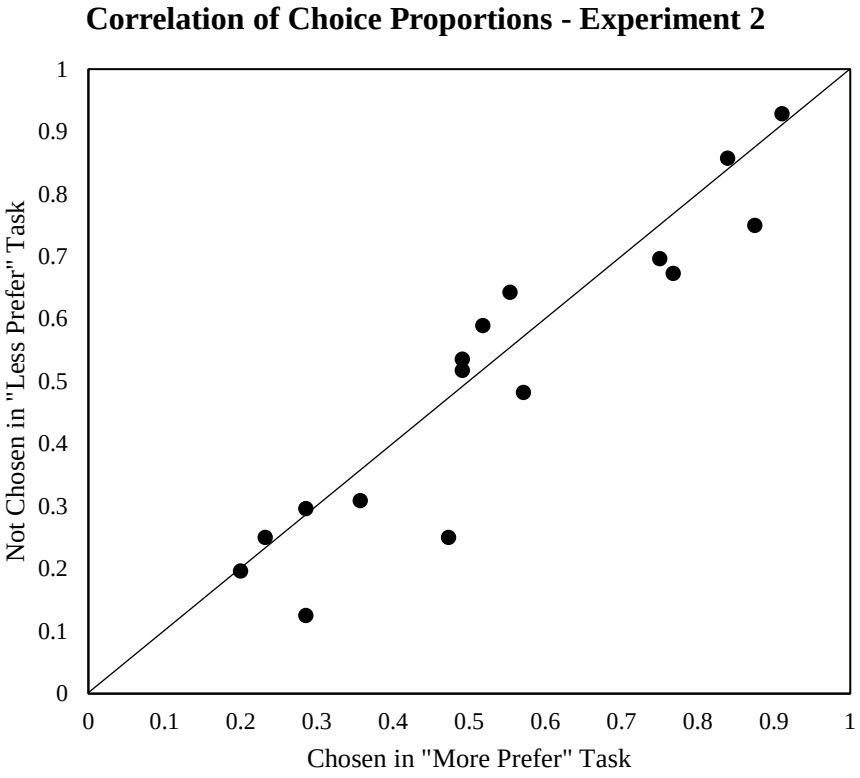

Figure 5. Plot of proportion of time the left brand in a pair was chosen in the "more prefer" task relative to the proportion of time it was not chosen in the "less prefer" task. The diagonal line represents an equal proportion of times being chosen in the “more prefer” task as not chosen in the “less prefer” task.

These findings indicate that in addition to consumable products/services, the chosen-item effect extends to memory for specific brand names. Furthermore, this research demonstrates that the chosen-item effect can be obtained using advertisements. This finding is novel in that all previous work investigating the chosen-item effect has been done using words as stimuli. Advertisements for specific brands are more complex and more ecologically valid stimuli than what has been used previously. Furthermore, judging preference for one advertised brand over another is something that a consumer would be likely to do in their daily lives. Taken together, these findings indicate that choosing an advertisement for a brand makes that brand more memorable, even for brands that participants indicated they would less prefer to watch an advertisement for.

EXPERIMENT 3

We turn now to the question of value, particularly whether the chosen-item effect extends to the perception of value or monetary worth. As described in the introduction, previous research has shown that various factors such as physical touch and ownership influence how valuable we perceive products to be. Furthermore, there is evidence that the ability to make choices is valued so much that consumers will pay more to have additional choices even when those choices are meaningless and do not change the outcome of events (see for example, Szrek & Baron, 2007).

The purpose of Experiment 3 was to determine whether choosing a brand, based on which of two brands is more/less preferred to watch an advertisement for, increases the perceived value of a product associated with that brand. In other words, the goal of the following two experiments was to investigate whether the chosen-item effect extends to value. We investigated this using the same decision task that was used in Experiment 2 followed by a task in which participants made judgements about the monetary value of the advertised products. A free recall test of the brand names was included after the value judgement task for exploratory analyses.

The value judgement task that we used is similar to tasks that have been used in the endowment literature to measure value. In a typical endowment experiment (e.g., Kahneman et al., 1990) half of the participants are randomly assigned to receive an item (e.g., a coffee mug). All participants are then given a range of prices (e.g. $0.00 to $9.50) in small increments (e.g. $0.50 increments). For each price increment they are asked to indicate whether they would be willing to sell (mug owners) or buy (nonowners) the mug at that price. They are instructed that at the end of the experiment a random price will be selected, and they will have to follow through with the decision (buy/sell or not buy/keep) they made for that price point. For example, if they had been given the mug and selected that they would sell the mug at $7.00 or more, then they would be required to keep the mug if a price less than $7.00 was selected but would have to exchange the mug for cash if a price equal to or greater than $7.00 was selected. However, endowment effects have also been observed using hypothetical rather than real exchanges and using open ended questions about the maximum price participants would be willing to pay for the item (for a review see, Horowitz & McConnell, 2002).

Because the following experiments were based on memory experiments and include a recall component, many items are needed to avoid ceiling levels of recall. It would be far too costly

to compensate each person with/for every product, therefore we opted to use a hypothetical valuation method in which participants chose which of a series of prices is the maximum they would be willing to pay to acquire the item. This method is similar to the "Buy Price" condition described in Jaeger, Brosnan, Levin, Jones (2020), except that we provided people with a range of prices rather than making the question entirely open ended.

In sum, the goal of this experiment was to determine if being chosen causes a brand/product to be valued more than if it is not chosen. Because we are interested in whether there is an endowment-like effect based on choice (rather than ownership) we propose a valuation task similar to tasks that have been used in the endowment literature as our dependent measure. We predict that products of chosen brands will be deemed more valuable than those of unchosen brands similar to the way that chosen products have been found to be more memorable than unchosen products (e.g., Experiment 1).

Method

Participants

We collected data from 200 native English-speaking participants online from a Purdue University introductory psychology course, for which participants received partial course credit as compensation for their participation. Based on an a priori power analysis conducted using G*Power (Faul, Erdfelder, Bunchner, & Lang, 2009), a sample of this size would allow us to detect a small choice effect (an effect size of .1) with a repeated measures design and alpha equal to .05, 80% of the time. Because we did not have a good estimate of what the effect size might be, we selected this as a semi-conservative starting point.

Materials

The stimuli used in the decision task of this experiment were primarily those that were used in Experiment 2. A couple of substitutions were made to replace brands that represent services (e.g., Chase – a bank) rather than tangible products that could be purchased and brands for products that were not everyday convenience items (e.g., Jeep – a vehicle). Aside from the substitution of some brands/advertisements, the decision task for this experiment was identical to the one described in Experiment 2.

The market price for items was estimated using retail prices listed for the products in online shops (e.g., Instacart). Each item was paired with an item of similar value such that the market price of the chosen and the unchosen items would be similar. For example, the price of a full-sized Snickers candy bar is approximately $1.19 and a 5.3 oz cup of Chobani yogurt is approximately $1.29 so these two items were paired together. By pairing items of similar prices together the average market value of the chosen and unchosen items was approximately equal regardless of which specific items were chosen. A list of the brands and products used can be found in Appendix C.

For the value judgement task, each brand's advertisement, and a description of its associated product (e.g., an 8 oz bag of Lay's potato chips), was presented individually along with a scale of 7 possible prices that was intended to encompass a range of reasonable prices for that item. The same scale was presented for both items that were paired together with the midpoint of the scale being the average price of the product and the alternative product it was paired with. For example, because Chobani and Snickers were presented together in the choice task, both were presented individually in the judgement task but had the same scale of prices with the midpoint being $1.24. As in the endowment literature, each price was listed in increments along the total range of the scale. Specifically, each point on the scales was incremented by adding or subtracting a dollar amount that was 20% of the scale midpoint to the adjacent point on the scale. That is, for Chobani and Snickers, the scale ranged from $0.50 – $1.98 in approximately $0.248 increments. Presentation order of the items during the value judgement task was randomized for all participants. Each participant saw the items that they made choices about, individually (i.e., not in pairs) and in a random order.

Procedure

Participants performed this experiment remotely using their own computers, rather than in our research lab, but the procedure for this experiment was identical to that of Experiment 2 through the end of the choice decision tasks. Following this set of tasks, participants were shown, individually, each brand and a description of the product and asked to imagine that they did not currently own the item but would like to purchase it, then to select the maximum amount of money (in U.S. dollars) they would be willing to pay to obtain that item. It was specified that we were not asking them to estimate how much the item would cost in a store but rather the greatest amount of

money that they would pay to purchase the product (even if price was above or below the amount that they think a store would charge for it). They made their decisions by clicking on a button that corresponded to a price on the provided 7-item scale. Following this value judgement task participants performed a free recall test like the ones described in Experiments 1 and 2.

Baseline Group

Because the stimuli and scales used in this experiment had not been used to measure perceptions of value previously, and because of the subjective nature of the choice task, we created a baseline no-choice condition as a way to measure participants' perceptions of value for the items irrespective of the effects of choice and preference. Instead of performing a choice task, this additional group of 50 participants viewed the pairs of brand/advertisements and visually imagined what corresponding video advertisements for each might look like. In addition, they were asked to think about how the imagined ads might be similar or different. Our rational for using this task was that it would induce a comparison between the advertisements that would be similar to which subjects might do in the choice task, but in the absence of making a choice or decision. Aside from this change, all other aspects of the experiment were the same as those described in the previous section.

Results and Discussion

We conducted two 2 x 2 repeated measures ANOVA, with choice (chosen vs. not chosen) and preference (prefer vs. don't prefer) as within-subject factors, one in which the dependent variable was perceived value and the other in which it was performance on the free recall test. Because the dollar amounts associated with the points of the scale differed across the pairs of items, perceived value was measured using the scale point report (1-7) rather than the corresponding dollar value. Values below 4 indicated that the maximum amount participants would be willing to pay to purchase the product was less than the estimated full price of the item in a store. Similarly, values over 4 indicated that the maximum amount of money participants would be willing to pay to purchase the product was greater than what a store might charge for the item. Average value judgements based on preference and choice are plotted in Figure 6.

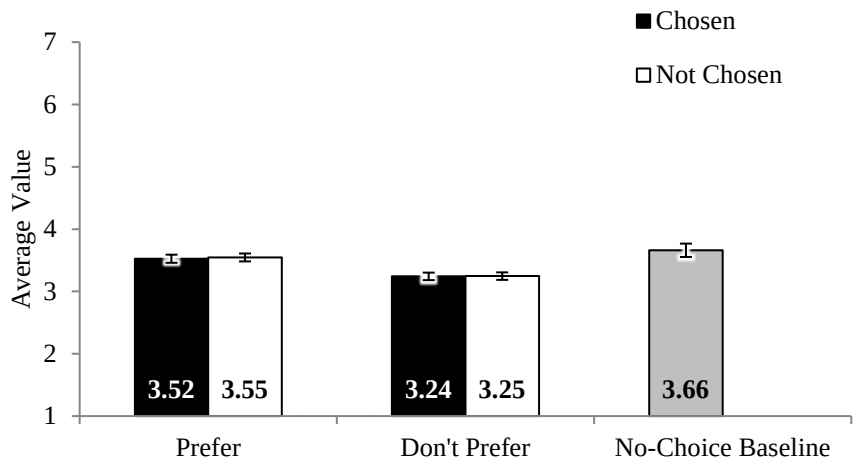

Figure 6. Perceived value judgements from Experiment 3 as a function of choice and preference. Prefer-Chosen is the average value rating of brand names that were chosen in the "more prefer" task. Prefer-Not Chosen is the average value rating of brand names that were not chosen in the "less prefer" task. Don't Prefer-Chosen is the average value rating of brand names that were chosen in the "less prefer" task. Don't Prefer-Not Chosen is the average value rating of brand names that were not chosen in the "more prefer" task. No-Choice Baseline is the average rating of all brands by the participants in the baseline group. Error bars represent the standard error of the mean.

Looking first at the ANOVA for value, we found a main effect of preference $F(1, 199) = 44.63$, $MSE = 0.38$, $p < .001$, $\eta_p^2 = .18$, such that participants indicated a greater willingness to pay for products whose advertisements they would more prefer to watch ($M = 3.54$, $SD = .82$) than products whose advertisements they would less prefer to watch ($M = 3.24$, $SD = .76$). However, there was neither a significant main effect of choice, $F(1, 199) = 0.08$, $MSE = 0.39$, $p = .78$, $\eta_p^2 < .01$ nor an interaction between choice and preference $F(1, 199) = 0.05$, $MSE = 0.26$, $p = .82$, $\eta_p^2 < .01$. Although we expected the chosen-item effect to extend to value, we found no evidence that choosing a brand has an effect of how valuable it is perceived to be. We did find evidence that preferred brands are perceived as being more valuable than those that were not preferred.

Although on average participants gave ratings that were below 4, indicating that the maximum amount they would be willing to pay for the products was, on average, slightly below their full retail price, this is not entirely surprising given that the participants were college undergraduates who presumably have a limited income. Additionally, some products may be items that they would typically only purchase if they were on sale. Interestingly, despite ratings being

strongly correlated across both conditions (r = .95), indicating that participants are highly consistent in how valuable they consider one brand's product to be relative to the other brands' products, the baseline condition produced higher value ratings (M = 3.66, SD = .76) than the choice condition (M = 3.39, SD = .72). It is hard to interpret these differences in value judgements across the two groups because the processing required to make decisions about which advertisement would be more preferable is likely different from the processing used to imagine the potential similarities and differences between the advertisements. For instance, it is possible during the choice task participants are more likely to consider the aspects of each advertisement that might be undesirable and weigh those, in addition to positive aspects, for one advertisement against the other advertisement to make their decisions. For example, a participant might imagine that one advertisement is likely to have an annoying jingle or slogan because other advertisements for that brand do. It's possible that these aspects of the advertisements are less likely to come to mind when participants are merely considering how two advertisements might be similar/different. Of course, this is purely speculation, but it is differences like these that could explain the overall value rating differences across the choice condition and the no-choice baseline.

There was a strong correlation between the proportion of times a brand was chosen in the "more prefer" and the proportion of times it was not chosen in the "less prefer" condition (r = .90) indicating that there is a high degree of consistency across participants in which brands they prefer (see Figure 7). Crucially, though, this means that main effect of preference in the value judgments could be due merely to an item-selection confound. Items that happened to be preferred, by chance, might also be items that tended to be more highly valued. However, using the no-choice baseline data we were able to rule out this possibility. In a new analysis, we replaced each person's value rating from the choice condition with that brand's average value from the baseline task—that is, where no preference judgement was actually made (see Figure 8). For example, in the choice condition, participant 1 chose Cheez-It over Skippy as being more preferred and gave them respective ratings of 4 and 3. For this new analysis those rating were replaced by their corresponding averages from the baseline condition; 3.98 and 3.82 respectively.

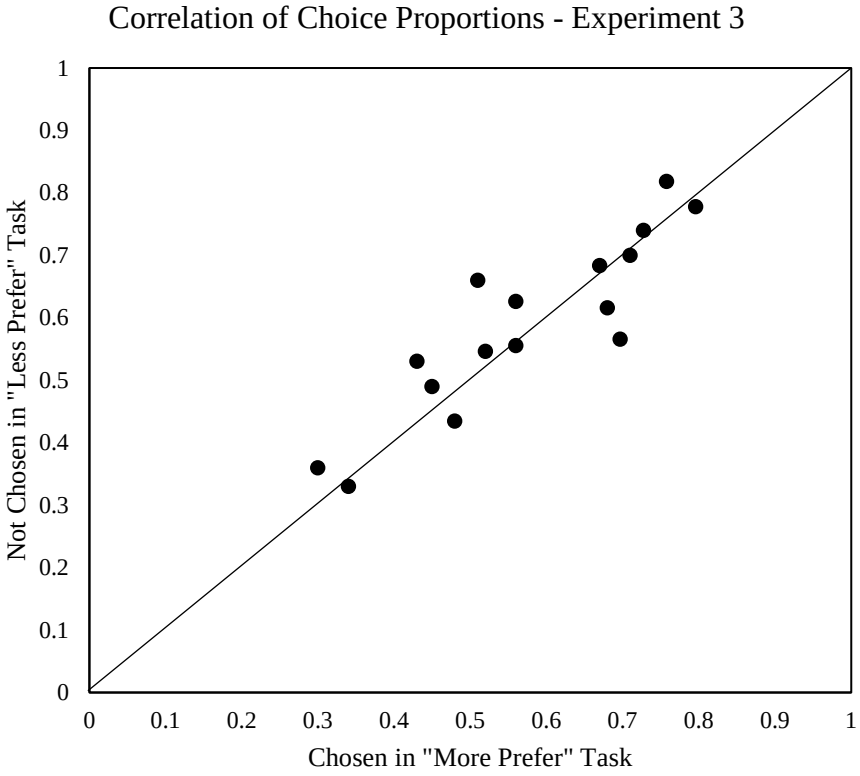

Figure 7. Plot of proportion of time the left brand in a pair was chosen in the "more prefer" task relative to the proportion of time it was not chosen in the "less prefer" task. The diagonal line represents an equal proportion of times being chosen in the “more prefer” task as not chosen in the “less prefer” task.

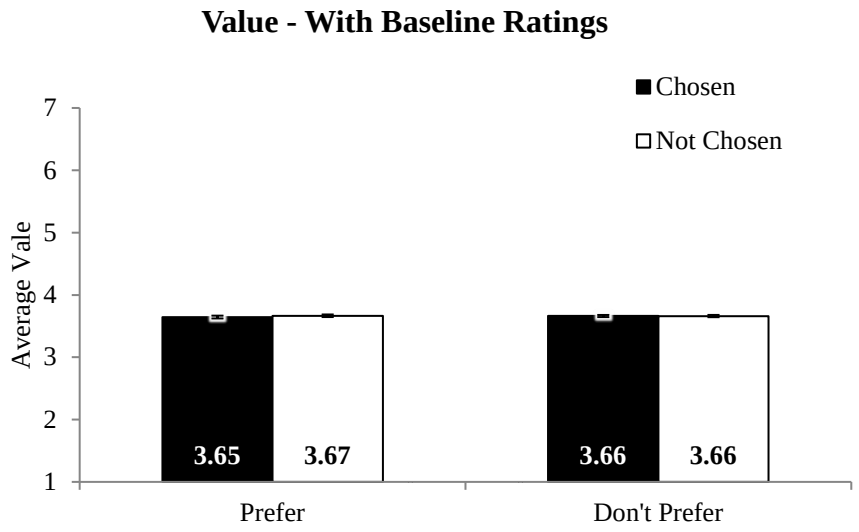

Figure 8. Average value judgements from the Baseline condition of Experiment 3 plotted as a function of choice and preference indicated by participants during the non-baseline condition. Prefer-Chosen is the average value rating of brand names that were chosen in the “more prefer” task. Prefer-Not Chosen is the average value rating of brand names that were not chosen in the “less prefer” task. Don’t Prefer-Chosen is the average value rating of brand names that were chosen in the “less prefer” task. Don’t Prefer-Not Chosen is the average value rating of brand names that were not chosen in the “more prefer” task. Error bars represent the standard error of the mean.

We then conducted the same 2 x 2 repeated measures ANOVA described previously but with the baseline values. If the pattern of effects observed previously were due to an item-selection confound, then we would expect the same pattern of effects to be present when using the value ratings from the baseline task—there should still be a main effect of preference. However, we did not find a main effect of preference, $F(1, 199) = 0.09$, $MSE = 0.08$, $p = .770$, $\eta_p^2 < .01$. We also did not find a main effect of choice, $F(1, 199) = 0.21$, $MSE = 0.10$, $p = .646$, $\eta_p^2 = .01$ or an interaction between choice and preference $F(1, 199) = 0.19$, $MSE = 0.12$, $p = .660$, $\eta_p^2 = .01$. These results indicate that the main effect of preference observed in this experiment is due to an effect of preference on perceptions of value rather than an artifact of the particular items that were more often preferred.

Clearly, one's preference to view a video advertisement for one brand over another does influence perceptions of the value of the product being advertised, but whether a brand was chosen or not doesn't affect people's perceptions of value. Although these findings are counter to our predictions, they still provide useful information about why the chosen item effect occurs in memory. Specifically, they rule out value as a possible mechanism for the chosen-item effect. This conclusion is discussed in more depth in the general discussion.

Following the value judgement task participants performed a final free recall test of the brands (see Figure 9). This was included purely for exploratory purposes because the recall data are confounded by the earlier value test. Interestingly, the results of the 2 X 2 repeated measures ANOVA for recall mirrored those found in the value task. There was a main effect of preference, $F(1, 199) = 20.65$, $MSE = 0.03$, $p < .001$, $\eta_p^2 = .09$, but no effect of condition, $F(1, 199) = 0.18$, $MSE = 0.03$, $p = .677$, $\eta_p^2 < .01$, and no interaction between choice and preference, $F(1, 199) = 0.08$, $MSE = 0.04$, $p = .782$, $\eta_p^2 < .01$. In other words, it appears that making a value judgement following the choice task may eliminate the chosen-item effect in memory. Comparing recall in the choice condition to the no-choice baseline, it appears that participant remembered numerically more in the choice condition ($M = .45$, $SD = .13$) than in the no-choice baseline ($M = .43$, $SD = .13$). As in the case of value, these differences are hard to interpret and may be simply due to the fact that we do not know what type(s) of processing is taking place in the choice task as compared to the baseline task. It is also worth noting that although overall recall performance was higher in this experiment than Experiment 2, this is likely due to participants seeing each brand name twice, once during the choice task, and again during the value judgment task.

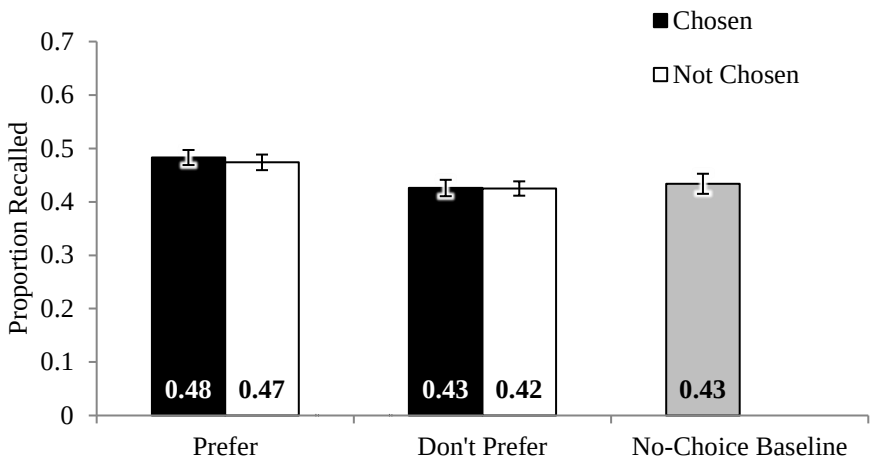

Figure 9. Free recall performance for Experiment 3 as a function of choice and preference. Prefer-Chosen is the proportion of brand names recalled that were chosen in the "more prefer" task. Prefer-Not Chosen is the proportion of brand names recalled that were not chosen in the "less prefer" task. Don't Prefer-Chosen is the proportion of brand names recalled that were chosen in the "less prefer" task. Don't Prefer-Not Chosen is the proportion of brand names recalled that were not chosen in the "more prefer" task. No-Choice Baseline is the average proportion of brand names recalled by the participants in the baseline condition. Error bars represent the standard error of the mean.

EXPERIMENT 4

The purpose of this experiment was to replicate the results of Experiment 3 with objective rather than subjective choices and with a new choice task. This experiment included two sub experiments: 4a and 4b. Experiment 4a follows the same general design as Experiment 3 in that participants performed a choice task, followed by a value judgement task, and finally a free recall test. Experiment 4b included all the same tasks, but participants performed the free recall test prior to the value judgement task. By having both conditions we were able to look both at the effect of choice on memory and on value without having one task confound the performance of the other.

The key new feature of this experiment is the choice task which differed from the preference task used in the previous three experiments. In this experiment we asked participants to choose items based on their relative size rather than preference. For half of the trials, participants were asked to choose the item that was larger and for the other half they were asked to choose the item that was smaller. For each pair one item was larger than the other item so there was a correct item and an incorrect item. That is, which item should be chosen was outside of the control of the participant. Coverdale and Nairne (2019) demonstrated a mnemonic benefit for chosen items after a similarly constrained decision task, one in which participants made their choices based on which item was more/less representative of a given category.

In Experiment 3 we found that chosen items were not perceived to be more valuable than not chosen items. Experiment 4 was designed to see whether this null effect would replicate in a situation in which the choice the participant made was constrained and to see whether we could obtain a chosen-item effect in memory with a constrained and non-semantic decision task. Such a demonstration would make inducing choice a useful tool for companies seeking to increase the memorability of their products because they would be able to dictate which brand/product will be chosen by the participant. Furthermore, using a new choice task allowed us to see if the chosen-item effect generalizes to tasks that do not depend on making a preference decision for the brands/products. If we find a choice-based memory effect with this type of choice task, it means that people looking to apply this effect have more flexibility in the possible methods they can use to induce it.

Method

Participants

We collected data from 400 Purdue University undergraduates who were sampled from an introductory psychology course for which they gained partial course credit by participating in this experiment. Half of these participants were assigned to Experiment 4a and half were assigned to experiment 4b. The justification for the sample size for this experiment is the same as for Experiment 3. As in the previous experiments all participants were native-English speakers.

Materials

The materials for this experiment were identical to those used in Experiment 3 except that the brands were paired based on size such that no pair had items of approximately equal size. Additionally, each pair was presented with a prompt to choose the product (described below the brand name) that was either smaller (in half the trials) or larger (in the other half of the trials).

Procedure

As noted above, the procedure for this experiment was similar to the procedure described in Experiment 3 except that for the initial choice decision task. Rather than making choices based on which of two advertisements they would more/less prefer to see, participants made their choices based which of the two advertised products was larger/smaller. Additionally, for half the participants (those in 4b), the value judgement task was presented after the free recall test. All other procedures were identical to those used in Experiment 3.

Results and Discussion

Experiment 4a

As in Experiment 3, we performed two 2 x 2 repeated measures ANOVAs, one looking at value judgements and the other looking at performance on the free recall test with choice (chosen vs. not chosen) and size (larger vs. smaller) as within-subject factors. As in previous experiments, choice was determined by which brand was selected by the participant. If the participant indicated

that they thought the product for the left brand was larger, then the value and recall for that item were included in the group Chosen-Larger, even if objectively it was the smaller item. Although participants were typically accurate in their judgements of size (M = 85%, SD = .12), scoring the data in this way kept the experiment consistent with the previous experiments; moreover, importantly, the results and our interpretation of them did not change when the data were scored based on the objective rather than subjective size difference.

We replicated the results found in Experiment 3 for both value (Figure 10) and memory (Figure 11). Specifically, we found no choice effect in either the value task $F(1, 199) = 0.42$, $MSE = 0.37$, $p = .520$, $\eta_p^2 < .01$ or the recall test $F(1, 199) = 1.07$, $MSE = 0.03$, $p = .303$, $\eta_p^2 = .01$. We did find a significant effect of size, in both value $F(1, 199) = 247.27$, $MSE = 0.26$, $p < .001$, $\eta_p^2 = .56$ and memory $F(1, 199) = 15.35$, $MSE = 0.03$, $p < .001$, $\eta_p^2 = .07$, such that larger items (M = 3.91, SD = .89) were perceived as being more valuable than smaller items (M = 3.34, SD = .88) and were more memorable during free recall (M = .44, SD = .16) than smaller items (M = .39, SD = .16). This main effect was not qualified by an interaction between size and choice for either value $F(1, 199) = 3.16$, $MSE = 0.23$, $p = .077$, $\eta_p^2 = .02$, or memory $F(1, 199) = 1.28$, $MSE = 0.04$, $p = .259$, $\eta_p^2 = .01$.

These results in combination with those of the previous experiment suggest that the chosen-item effect does not extend to perceptions of value. In addition, it appears that when participants perform a value judgment prior to recalling brand names the chosen-item effect in memory is eliminated. Instead, it appears that the pattern of results in memory generally mirrors that of the value task. Surprisingly, we also observed a robust effect of size on perceptions of value and memory. Perhaps inducing participants to think about a product as being “large” leads them to think of the product as representing a larger quantity than they would otherwise. If participants believe they are getting more of a product then it may seem more reasonable for them to pay more to purchase it. Looking at the value judgements for the larger items it appears that, numerically, they are valued more than both the preferred items in Experiment 3 and the baseline items. Although the effect of size was unexpected it was quite robust and worthy of further investigation.

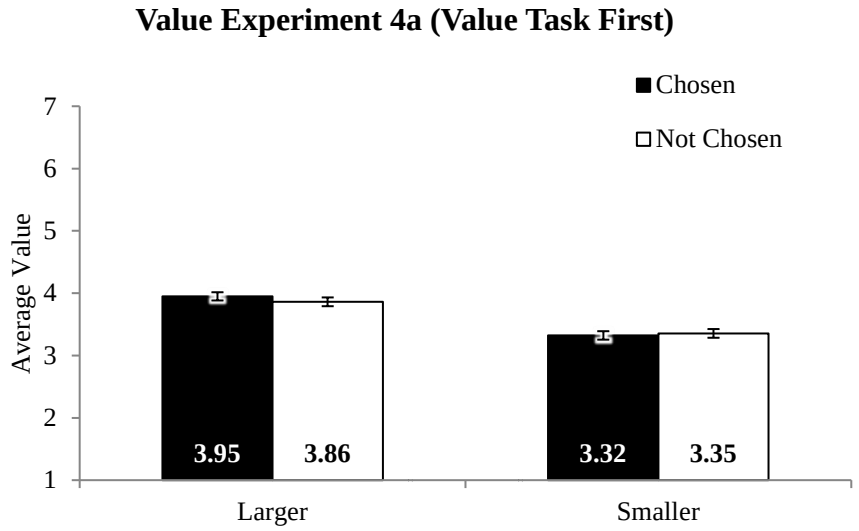

Figure 10. Perceived value judgements from Experiment 4a as a function of choice and size. Larger-Chosen is the average value rating of brand names that were chosen in the "Larger" task. Larger-Not Chosen is the average value rating of brand names that were not chosen in the "smaller" task. Smaller-Chosen is the average value rating of brand names that were chosen in the "smaller" task. Smaller-Not Chosen is the average value rating of brand names that were not chosen in the "larger" task. Error bars represent the standard error of the mean.

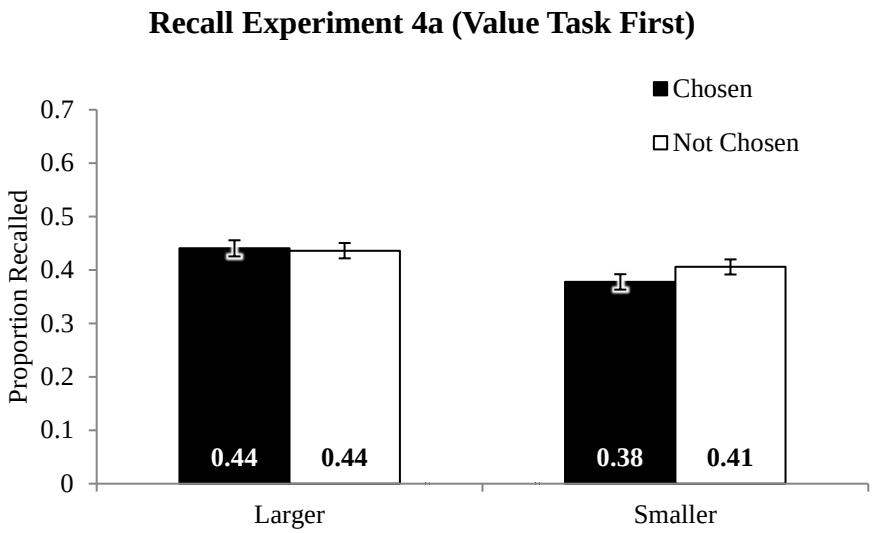

Figure 11. Free recall performance for Experiment 4a as a function of choice and preference. Larger-Chosen is the proportion of brand names recalled that were chosen in the "Larger" task. Larger-Not Chosen is the proportion of brand names recalled that were not chosen in the "smaller" task. Smaller-Chosen is the proportion of brand names recalled that were chosen in the "smaller" task. Smaller-Not Chosen is the proportion of brand names recalled that were not chosen in the "larger" task. Error bars represent the standard error of the mean.

Experiment 4b

Once again, we conducted two 2 x 2 repeated measures ANOVAs, one for value (Figure 12) and one for memory (Figure 13). As in Experiment 4a, choice was scored based on the subject's decision rather than what the correct response should have been.

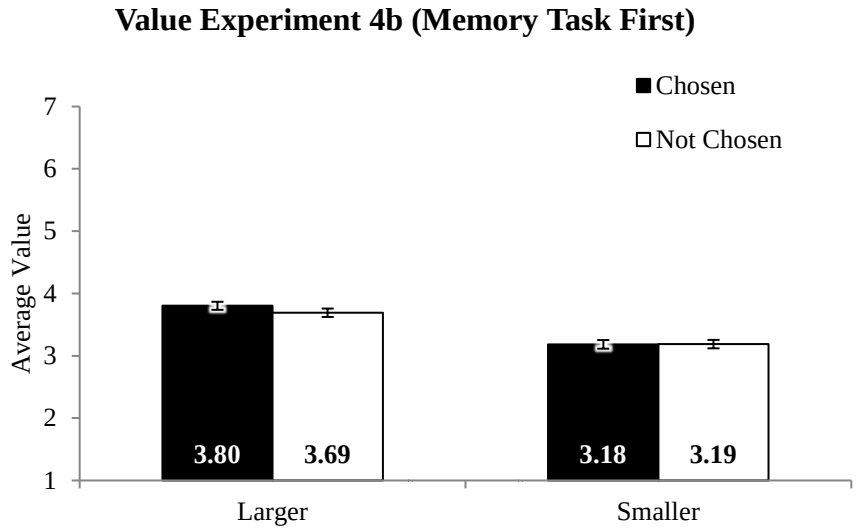

Figure 12. Perceived value judgements from Experiment 4b as a function of choice and size. Larger-Chosen is the average value rating of brand names that were chosen in the "Larger" task. Larger-Not Chosen is the average value rating of brand names that were not chosen in the "smaller" task. Smaller-Chosen is the average value rating of brand names that were chosen in the "smaller" task. Smaller-Not Chosen is the average value rating of brand names that were not chosen in the "larger" task. Error bars represent the standard error of the mean.

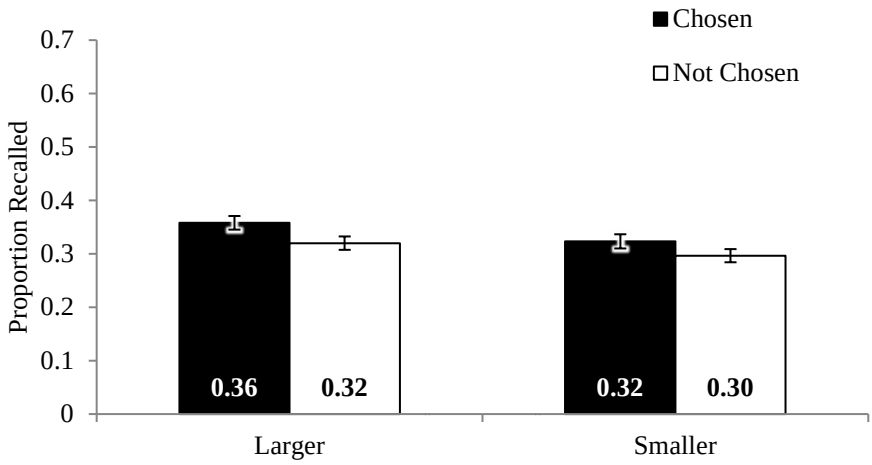

Figure 13. Free recall performance for Experiment 4b as a function of choice and preference. Larger-Chosen is the proportion of brand names recalled that were chosen in the "Larger" task. Larger-Not Chosen is the proportion of brand names recalled that were not chosen in the "smaller" task. Smaller-Chosen is the proportion of brand names recalled that were chosen in the "smaller" task. Smaller-Not Chosen is the proportion of brand names recalled that were not chosen in the "larger" task. Error bars represent the standard error of the mean.

When memory was tested first, unlike in Experiment 4a, we replicated the chosen-item effect in memory $F(1, 199) = 9.92$, $MSE = 0.02$, $p = .002$, $\eta_p^2 = .05$. Chosen items ($M = .34$, $SD = .14$) were more memorable than not chosen items ($M = .31$, $SD = .14$). However, we replicated the null choice effect in value that was observed in Experiments 3 and 4a, $F(1, 199) = 1.61$, $MSE = 0.36$, $p = .21$, $\eta_p^2 = .01$. There was also a main effect of size for both memory $F(1, 199) = 8.36$, $MSE = 0.02$, $p = .004$, $\eta_p^2 = .04$, and for value $F(1, 199) = 229.45$, $MSE = 0.27$, $p < .001$, $\eta_p^2 = .54$, such that larger items ($M = .34$, $SD = .14$) were more memorable than smaller items ($M = .31$, $SD = .14$) and were rated as more valuable ($M = 3.75$, $SD = 86$) than smaller items ($M = 3.19$, $SD = 86$). There was not a significant interaction between choice and size for either memory $F(1, 199) = 0.24$, $MSE = 0.03$, $p = .327$, $\eta_p^2 < .01$ or value $F(1, 199) = 2.33$, $MSE = 0.29$, $p = .129$, $\eta_p^2 = .01$.

As in Experiments 1 and 2, chosen items were more memorable than the not chosen counterparts. When people are given a memory test before the value task, we replicated the chosen-item effect. Importantly, we replicated this effect with consumer-related stimuli using a novel, objective decision task. Comparing across Experiments 4a and 4b, memory performance was lower when participants did the recall task before the value task. This result is most likely due to

the subject having seen each brand twice when the value task was presented first, although comparisons of this type across the two experiments should be interpreted with caution.

Unexpectedly, there was a significant effect of size on memory. However, the relative size of this effect is much smaller in memory ($\eta_p^2 = .04$) than it is in value ($\eta_p^2 = .54$). In Experiments 3 and 4a, having a value judgement precede the free recall task eliminated the chosen-item effect in memory. Interesting, the reverse is not true of the pattern of results for value. The general pattern of effects for value are the same regardless of whether they are made before or after the recall test.

SUMMARY AND GENERAL DISCUSSION

This project aimed to investigate the chosen-item effect using products and brand names and to determine whether the effect extends beyond memory to the assessment of value. Previous research has demonstrated that chosen items are more memorable than not chosen items (Coverdale & Nairne, 2019). Experiments 1 and 2 extended this finding to products and brand names embedded in actual advertisements. In showing that the chosen item effect can be obtained with consumer related stimuli we have shown that the chosen item effect is relevant to the field of consumer behavior. Memory is an important factor in advertising. As discussed earlier, memory is used both as a measure of the effectiveness of advertisements and as an indicator of future purchasing behavior. By improving memory for chosen brands and products, the chosen-item effect can be used by companies to increase the memorability of the brands and potentially increase sales of their products. Importantly, we have shown that inducing people to choose a brand increases memorability for that brand not only when the choice is based on the participant's own subjective interests and preferences but also when the choice is predetermined and objective.

In Experiment 4b we found that choosing a product based on its size relative to another product led to better memory for the chosen product. This is important because a company using choice to improve memory would want to ensure that their brand is selected. Not only have we shown that choosing a product in an objective choice task leads to better memory, but we also found this benefit despite the choice task being a relatively shallow encoding task (size). All previous research on the chosen-item effect has used semantic based choices for their encoding task. This is the first time that a chosen-item effect has been obtained following a nonsemantic encoding task. Knowing that it is not necessary to use a semantic choice task opens additional implementation possibilities for someone looking to use a choice task to improve consumer memory.

These experiments build on the existing literature related to the effects of choice on memory. Currently, the proximate mechanism behind the chosen-item effect is not known. Coverdale and Nairne (2019) ruled out congruity between the item and the encoding context by providing evidence that choice and congruity both affect memory, but do not interact. Similarly, the current experiments allow us to assess whether preference and choice interact, which furthers our understanding of how the chosen-item effect occurs. We found in Experiments 1 and 2 that

the chosen-item benefit does not depend on whether the item was preferred or not. That is, the effect of choice does not interact with the effect of preference (with evidence in favor of the null hypothesis). Based on these findings we can rule out preference as a proximate mechanism for the chosen-item effect.

Beyond replicating the chosen-item effect with ecologically valid stimuli and contexts we investigated whether it could be extended to the assessment of value. In Experiments 3 and 4 we looked at the effect of choice on perception of value and found that brands associated with products that were chosen previously were not perceived as more valuable than those that were unchosen. Within the consumer behavior and behavioral economics literatures there are numerous effects that lead to changes in the value of items, including the endowment effect – an increase in value for owned items relative to unowned items. Additionally, there is research looking at the relationship between the opportunity to make choices and memory. However, prior to this project, no one had looked at the effect that choosing compared to not choosing has on an item's perceived value.

In Experiments 3 and 4 we found no evidence that choice influences perceptions of value. This finding is somewhat surprising given that other laboratories have shown a relationship between choice and value and between value and memory. Prior research has shown that people prefer the opportunity to make choices (Bown, et al., 2003) and are even willing to pay for the ability to make choices and to have more alternatives to choose amongst (Fujiwara et al., 2013; Szrek & Baron, 2007). We predicted that beyond valuing the ability to choose, that people would also value items that were chosen more than those that were not.

Research on value-directed remembering has shown that people preferentially remember high value information relative to low value information. Based on this, we predicted that the mnemonic benefit of choosing might be due to differential values for chosen items relative to unchosen items. Specifically, choosing an item might increase the perceived value of the item which would then lead to an increase in memory for that item. This type of relationship could also explain the observed relationship between ownership, value, and memory. It has been shown that things that are owned are considered more valuable by their owners than things they do not own (i.e., the endowment effect). Additionally, the mere ownership effect suggests that things a person owns are more memorable to them than things they do not own. It is possible that the increased value associated with owned items is also what drives their mnemonic benefit. While this may be

the case for mere ownership (more research is needed to determine if this hypothesis is supported), it appears that this is not true for chosen items.

Our current findings suggest that value is not a mechanism for the chosen-item effect. If choosing an item increased perception of that item's value, then one could argue that it was the increased value that produced the mnemonic benefit for chosen items. However, choice did not lead to any changes in value, at least not with the value judgment measurement that we used. At the same time, it seems likely that there may be a disconnect between value defined as the amount of money that one is willing to pay to buy something and "value" in a more adaptive sense. Our memory systems may well be tuned to remember things that are perceived as important in terms of one's survival or in achieving a goal. Survival processing effects in memory are a case in point. Thinking about how an item is relevant to your own survival leads you to think of it as being more important (because it could save your life). Similarly, prior retrieval might signal importance which may be an explanation of retrieval practice effects. If you have needed to retrieve something in the past, you are more likely to need to retrieve it in the future, so the act of retrieving indicates that the information is important and therefore should be prioritized in memory.

A similar argument has been made by Anderson and Schooler (1991). They proposed that our memory systems make information available based on the likelihood that it will be needed at a given point in time. Specifically, they present evidence that availability of information in memory mimics the probability of information occurring in the environment and suggest that this is because or memory systems are adapted to the environment. It is possible that choosing something signals that it is more likely to occur again. If things that we choose have a higher tendency to reoccur in our environment, then our memory system may prioritize information about chosen items because it is more likely that we will need to remember that information in the future.

Likewise, if we know a piece of information is more useful or adaptive, or that remembering it will lead to a bigger payout, we may be biased to prioritize it over information that is not as useful. During our daily lives when we choose one thing over another, usually, it is because that thing is more important. It is less common for us to choose things because they are unimportant. We may have a learned or innate bias towards assuming chosen items are more important than unchosen alternatives because, on average, they do tend to be relatively more important. Although we did not find an effect of choice on value it may be that if we were to measure perceptions of importance in a more adaptive sense, we could explain the chosen-item

effect. This is a potential future direction for understanding how and why chosen items are more memorable than unchosen ones.

Applications and Conclusions

Given that we were able to extend the chosen-item effect to brand names in addition to products, this work should serve as an impetus for additional consumer memory experiments. In the described experiments, we compared chosen items to unchosen alternatives, but all items (chosen and unchosen) were processed within the context of choice. As described in the introduction, items presented in a choice condition are generally more memorable than those presented in no choice controls (e.g., Markant et al., 2014; Murty et al., 2015, 2018). Based on such findings one would predict that the brand and products presented in the current experiments, both chosen and unchosen, would be more memorable than if we were to present them as part of a neutral (no choice) control. Thus, both the chosen and unchosen items might be more memorable because they were part of a choice. Most advertisements that we encounter in our daily lives are passively presented in the form of TV and radio commercials, billboards along the road, or ads on the side of a webpage. It is possible that by asking consumers to make choices about the advertisements they will see (e.g., select the brand that the advertisement will be about) memory will be improved not only for the chosen item but also for the alterative(s) that was presented with it. An experiment comparing chosen items and unchosen alternatives to control items that are passively presented (not in the context of a choice) would be relevant not only to consumer memory but also to researchers interested in other types of choice effects in memory (e.g., self-directed learning and the self-choice effect).

However, it is difficult to develop the proper control because all factors except for choice need to be held constant across conditions. Notably, the no-choice baseline condition from Experiment 3 would have made for a much more interesting comparison if we had been able to equate attention, motor engagement (like mouse clicking), and type of processing to look at the effect of choice relative to no choice at all. If choosing an item provides a memory enhancement for both items relative to a no-choice control, then it would be especially advantageous to provide consumers with choice. Alternatively, if being unchosen reduces recall for the unchosen alternative then one would need to be strategic about what brands/products are used as alternatives. Firm conclusions and specific suggestions for consumer applications will need to await further research.

From an applied perspective determining whether the chosen-item effect extends to products and brands, and occurs in value as well as memory, was relevant in determining the uses and possible benefits/limitations of the choice procedure. Because we did not find a change in monetary value due to choice, it is unlikely that having someone choose a brand will increase the amount of money they are willing to pay for it. However, we did find evidence that having participants notice that a product is relatively larger in size than a different product led to an increase in perceptions of value for those products compared to the smaller alternatives. One explanation for this unexpected finding is that people tend to equate size with quantity, thereby leading the participants to believe that they were getting more with the larger products. In this sense, companies might benefit from pairing their products with smaller products and having people make choices based on their size.

As noted throughout, this project aimed to extend existing research on the chosen-item effect in memory to both products and brand names. It also sought to determine if it the chosen-item effect extends beyond memory to perceived value. We found that choosing either products or brands lead to better memory for the chosen items relative to their unchosen alternatives both when a subjective preference choice task was used and when an objective size judgement task was used. These findings are novel in that no prior work had demonstrated the chosen-item effect with complex consumer-relevant stimuli. Additionally, this is the first demonstration that the chosen-item effect can be obtained using a shallow (i.e., nonsemantic) choice task.

Although the chosen-item effect does not appear to extend to value, the nonsignificant effect of choice on value provides the field with useful information about the mechanism responsible for the chosen item effect. Specifically, it suggests that it may be important to distinguish among types of value—e.g., adaptive, goal-directed, or monetary—in discussing the relationship between value and remembering. While the proximate cause of the chosen-item effect remains unknown, our data does rule out perceived monetary value as a mediator for the benefit of chosen items in memory. We hope that this research will serve both as a foundation for more research related to the chosen-item effect and as an additional bridge between the fields of psychology and consumer behavior.

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APPENDIX A – EXPERIMENT 1 STIMULI

Word Lists	
1	2
blanket	bank
boat	beer
boot	book
broom	bread
camera	candle
candy	car
chair	cereal
cheese	circus
church	clock
coffee	couch
computer	hotel
desk	juice
hammer	ladder
library	lamp
mattress	movie
medicine	phone
pen	refrigerator
razor	restaurant
resort	shirt
ring	skillet
soda	soap
stove	tobacco
toy	umbrella
zoo	vacuum

APPENDIX B – EXPERIMENT 2 BRANDS

Word Pairs	
Nikon	Swiffer
Budweiser	Excel
Snickers	Nike
Chase	Glade
Coke	Levi’s
Samsung	Claritin
Colgate	Dyson
Jeep	Cheerios
Tide	Lay’s
Starbucks	Shell
Pilot	Kleenex
Bounty	Chipotle
Wonder	Dawn
Dove	Febreze
Tropicana	Trek
Sealy	Craftsman

APPENDIX C – EXPERIMENT 3 AND 4 BRANDS AND PRODUCTS

Brand	Product
Bounty	an 8 count package of Bounty paper towels
Budweiser	a bottle of Budweiser beer
Burt's Bees	a stick of Burt's Bees lip balm
Cheerios	a 12 oz box of Cheerios cereal
Cheez-It	a 12.4 oz box of Cheez-Its crackers
Chipotle	a Chipotle burrito
Chobani	a 5.3 oz cup of Chobani yogurt
Claritin	a 10 count box of Claritin allergy medicine
Coke	a 12 pack of Coca-Cola soda
Colgate	a 4.8 oz tube of Colgate toothpaste
Dawn	a 28 fluid oz bottle of dawn dish soap
Degree	a 2.7 oz stick of Degree deodorant
Dove	2 bars of Dove soap
Febreze	a 8.8 oz bottle of Febreze air freshener
Glade	a 3.8 oz Glade scented candle
Heinz	a 32 oz bottle of Heinz tomato ketchup
Kleenex	a box of Kleenex tissues
Kraft	a 8 oz bag of Kraft shredded cheese
Lay's	a 8 oz bag of Lay's potato chips
NyQuil	a 12 fluid oz Nyquil cold and flu medicine
Orbit	a 12 count pack of Orbit gum
Oreo	a 20 oz family-sized package of Oreo cookies
Pace	a 16 oz jar Pace salsa
Pantene	a 12.6 fluid oz bottle of Pantene shampoo
Pilot	a 3 pack of Pilot pens
Shell	a gallon of Shell gasoline
Skippy	a 16.3 oz jar of Skippy peanut butter

Snickers	a full-sized Snickers candy bar
Starbucks	a tall Starbucks freshly brewed coffee
Tide	a 92 fluid oz bottle of Tide laundry detergent
Tropicana	a 59 fluid oz carton of Tropicana orange juice
Wonder	a loaf of Wonder bread