Temporal Shifts in Perceived Similarity Affect Consumer Valuation and Choice

Oleg Urminsky (oleg.urminsky@chicagobooth.edu)
University of Chicago Booth School of Business
5807 S. Woodlawn Ave., Chicago, IL 60637 USA

Daniel M. Bartels (dmb2199@columbia.edu)
Columbia University, Uris 502
3022 Broadway, New York, NY 10027 USA

Abstract

Building on research that examines the nature of similarity processes, we suggest that (i) assessments of the similarity between objects shifts systematically depending on the basis used to evaluate similarity, which is influenced by contextual factors; (ii) judgments and choices can be affected by the perceived similarity relations between items in a set; and (iii) such shifts in similarity can therefore play a key role in inferences impacting valuation and choice. In three studies, we show that changes in temporal framing (near future vs. distant future) impact evaluation and choice due to shifts in the basis of perceived similarity, leading to effects that would otherwise be unanticipated. In particular, we find that manipulating temporal context impacts evaluation and choice via its influence on which attributes form the basis of perceived similarity between choice alternatives, in addition to any direct influence it might have on preferences.

Introduction

Similarity is implicated in nearly every fundamental cognitive process (e.g., perception—Wertheimer 1923, recall—Hintzman 1984; categorization—Medin and Schaffer 1978; inductive inference—Hummel and Holyoak 1997; analogy—Gentner and Markman 1997). Therefore, any factor that influences perceived similarity is likely to have a profound impact on cognition more generally and on decision making specifically. Despite the parallels between similarity and choice processes, as well as the role of similarity in structuring informational inputs to decisions (Medin, Goldstone and Markman 1995; Markman and Loewenstein 2010), similarity has played a far less central role in research on evaluation and choice than other factors, such as subjective utility and decision weights. In early work, similarity was often treated as simply another fixed attribute, determined by concrete features of the objects under consideration. Thus, for example, work on the substitutability of objects often implicitly assumes that the comparative similarity in features determines choice cannibalization (i.e., the degree to which two alternatives swap out for each other in a market; Rumelhart and Greeno 1971; Huber and Puto 1983). Similarly, research has suggested that the degree to which consideration of one item influences predictions and estimates about a second item depends on the degree of comparative similarity, defined over the features of the items (Gilovich 1981; Read 1983; Loken, Ross and Hinkle 1986).

In recent years, decision researchers have explored the impact of a wide range of contextual factors external to the decision (as opposed to the context defined by the choice options themselves). One particularly influential stream of research has been work on how different forms of psychological distance (including temporal context) affect construal level and shift relative preference for concrete vs. abstract benefits (see Trope, Liberman and Wakslak 2007 for a detailed review). According to construal level theory, contextual factors that induce a sense of psychological distance (including but not limited to time) prompt a higher level of abstraction in subsequent judgments. Therefore, when people are thinking about concepts at great psychological distance (e.g., in a distant future context), they tend to think of them in abstract, holistic, and gist-like terms. In contrast, when thinking of concepts at greater psychological proximity (e.g., in a near future context), people think in more concrete, more detailed terms.

There is some initial evidence that construal level can affect how people think about similarity. Day and Bartels (2008) asked participants to judge the similarity of pairs of events, such as visiting the dentist and joining a health club (which are both health-promotion behaviors) or visiting the dentist and getting a tattoo (which share the concrete features of a reclining chair, needles and pain). They found that pairs of events sharing abstract commonalities (e.g., dentist and health club) were judged more similar with greater temporal distance while the opposite trend held for pairs sharing low-level concrete features (e.g., dentist and tattoo). These similarity findings suggest an unstudied impact of construal level on representation, distinct from the widely studied impact of construal on how abstract and concrete benefits are valued.

We propose that people thinking about distant future choices are likely to engender more abstract representations of the choice alternatives and thus put more emphasis on attributes with abstract or intangible benefits when judging similarity and that people thinking about near future choices are more likely to engender more detailed, concrete representations and thus put more emphasis on attributes with concrete tangible benefits in evaluating similarity. These shifts in the similarity relations between choice alternatives, in turn, can affect the inferences underlying valuation and choice.

Study 1: Shifts in the Basis of Similarity Due to Temporal Context Affect Willingness to Pay

In this study, we demonstrate a parallel between how an "ideal" option (with high values on all the relevant attributes) influences both similarity and preference evaluations (Medin, Goldstone and Markman 1995; Kaplan

and Medin 1997). Furthermore, we show that temporal context can affect the perception of similarity between products within a category, with consequences for how an ideal option influences judgments about other choice options. In particular, when a product is seen as more similar to a high-priced ideal product, we predict that people will have a higher willingness-to-pay for the product, compared to when it seems less similar to the ideal.

We will contrast features that relate to practical concerns (e.g., the durability of the object) and those features that relate directly to the enjoyment of consuming the object. This distinction is closely linked to an early distinction drawn in the literature on construal level theory between "feasibility" and "desirability" (Liberman and Trope 1998). In those terms, desirability concerns to the value of an experience (e.g., "that's a fun car to drive), whereas feasibility concerns the ease or difficulty of achieving the experience (e.g., "but it's always in the repair shop"). Previous studies have shown that people give more weight to feasibility-related concerns for near future choices and more weight to desirability-related concerns for distant future choices.

In this study, we manipulate similarity via changes in temporal context and show that this change in the underlying similarity relations produces changes in people's valuation of choice alternatives. If thinking about the near future makes pragmatic feasibility considerations more prominent as a basis of similarity, the products that perform similarly on dimensions relating to the practical use of the product should be perceived as relatively more similar in the near future than in the distant future. In contrast, if thinking about products in the distant future leads to a focus on desirability, then products which are similarly enjoyable should be perceived as relatively more similar in the distant future than in the near future.

Table 1: Stimuli Used In Study 1

	Durability	Ride Feel	Retail Price
Bike J	4.4	3.7	$350
Bike K	8.5	9.3	$1,300
Bike L	6.7	9.3	?
Bike M	8.5	6.8	?

Method.

One hundred twelve participants filled out a brief questionnaire in exchange for a nominal cash payment. This study employed a two-condition (temporal context: near vs. distant future), between-subjects design. Participants were asked to imagine buying a bicycle either in a week (near future condition) or in a year (distant future condition). Then, they rated the similarity (on a nine point scale) of an ideal object in the category (Bike K, with the highest ratings on both durability and ride feel) and each of three other objects. The exact attribute rating values were provided to the participants and retail prices were provided for the two non-target items (see Table 1). Providing the actual values helps to control for possible effects of temporal context on different inferences or interpretations that might occur with more natural feature descriptions. Participants then indicated their willingness to pay for the ideal object and both target objects.

The objects were described such that Bike J was dominated by all three competing objects. Bike L matched the ideal object (Bike K) on the desirability attribute (ride feel) but was inferior on the pragmatic, feasibility dimension (durability). Conversely, Bike M matched the ideal object on the feasibility dimension but was inferior on the desirability dimension. The test of our hypothesis was whether Bike L (the more desirable, less practical option) and Bike M (the less desirable, more practical option) would be perceived as relatively more or less similar to the relatively expensive ideal object, and whether these similarity relations would then affect people's willingness to pay for Bikes L and M.

Results and Discussion.

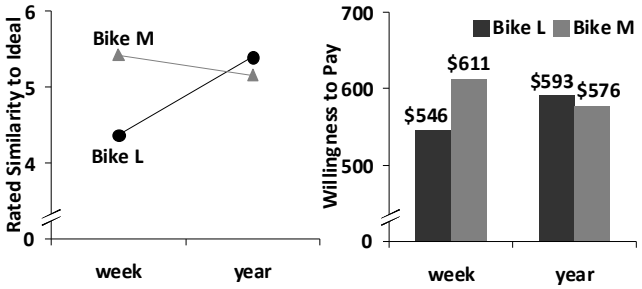

Figure 1: Effect of time on similarity, willingness to pay

Pretest. As part of a larger separate study, 82 participants were presented with two attributes for each of a set of product categories and were asked to rate "to what extent does this attribute determine the product's desirability" versus "to what extent does this attribute determine the product's feasibility" on a one (desirability) to six (feasibility) scale. On the basis of this pretest, we selected bicycles described in terms of durability and ride feel for the main study. In particular, participants distinguished durability ($M = 4.77$) from ride feel ratings ($M = 2.77$, paired-t (81) = 8.34, $p < .001$) along the feasibility and desirability dimensions. Durability was rated significantly above the midpoint of the scale (and thus, seen as determining the product's feasibility; $t = 8.31$, $p < .001$) and ride feel was rated significantly below the midpoint of the scale (seen as determining desirability; $t = -4.34$, $p < .001$).

Similarity ratings. In the study itself, as can be seen in the left panel of Figure 1, in the near future the high feasibility, low desirability bike is seen as more similar to the ideal than the low desirability, high feasibility bike. In the distant future, the pattern reverses. A 2 (condition: near vs. distant future) x 2 (object: Bike L vs. Bike M) ANOVA finds two main effects and the predicted interaction. Overall, people thought Bike M was more similar to the ideal ($M = 5.42$) than was Bike L ($M = 5.02$, $F(1, 110) = 5.79$, $p < .05$), and

they perceived greater similarity overall in the distant future than in the near future ($F(1,110) = 4.69$, $p < .05$). Most importantly, the perceived relative similarity of the two target objects to the ideal shifted over time, as revealed by the significant interaction term ($F(1,110) = 14.84$, $p < .001$)

Willingness to pay. As predicted, temporal context shifts the relative willingness to pay for the two target objects. As can be seen in the right panel of Figure 3, in the near future, people are willing to pay more for the high feasibility, low desirability bike than the low desirability, high feasibility bike. In the distant future, however, the pattern reverses. A 2 (condition: near vs. distant future) x 2 (object: Bike L vs. Bike M) ANOVA finds the only the predicted interaction ($F(1, 110) = 6.36$, $p < .0$) and no main effects for object or temporal context (both *p*s > .1).

We next ran a mediation analysis using each participant's difference in rated similarity (ΔSim_{ML}= rated similarity of Bike M to the ideal - rated similarity of Bike L to the ideal) and each participant's difference in buying prices for the focal objects (ΔWTP_{ML} = willingness to pay for Bike M - willingness to pay for Bike L). Using a Sobel test, we find that the effect of the manipulation is significantly reduced when controlling for difference in similarity ($z = 2.18$, $p = .02$), suggesting that it is the shift in similarity that mediates the impact of the timing manipulation on willingness to pay.

Study 1 demonstrates that temporal context systematically changes the willingness to pay for bikes defined by feasibility vs. desirability benefits. Moreover, our findings suggest that temporal context operates by changing the underlying perceived similarity within the option set, between the target objects and the ideal object. This supports our proposition that temporal context can affect valuation indirectly via representational change, rather than by directly affecting the perceived value of attributes.

Study 2: Shifts in Similarity Due to Attribute Range Affect Willingness to Pay

A limitation of Study 1 is that we cannot fully distinguish our proposed order of causality (construal affects similarity, which influences willingness to pay) from other possible relationships. To provide further support, in this study, we manipulate the attributes of a clearly inferior option to demonstrate that changes in the comparisons prompted by the consideration set impact how similar to the ideal a target product seems to be, which, in turn, drives valuations of the target product. In this study, we demonstrate this effect using a range manipulation which manipulates similarity directly, but does not involve temporal construal.

Method.

One hundred thirteen participants completed this study. We employed a two-condition between-subjects design, manipulating the perceived range of either the durability ratings or the ride-feel ratings by changing the attribute values of an inferior option while holding all other options constant. Participants were asked to imagine buying a bicycle in the intermediate future (in six weeks). Then, they were shown the durability and ride feel ratings for four bikes, with an ideal bike K and an inferior bike J. In the extended durability condition, item J was inferior due to a very low rating on durability. In the extended ride-feel condition, item J was inferior due to a very low rating on ride feel. The stimuli each participant saw consisted of Bikes K, L and M from Study 1 (Table 1), as well as one of the two new versions of Bike J (Table 2), depending on the condition.

Table 2: Stimuli Used For Bike J in Study 2

	Durability	Ride Feel	Retail Price
Extend durability:	1.2	9.3	$350
Extend feasibility:	8.5	1.2	$350
Bike K, L, M as in Table 1			

Participants rated the similarity on a nine point scale between the ideal product in the category (Bike K) and each of three other products. Then, they indicated their willingness to pay for the ideal product and both target products. We assume that Bike J's low score will extend the range on one dimension (either durability or ride feel, depending on the condition) and will therefore make the target bike that scores high on that dimension seem more similar to the ideal (cf. Parducci 1965). Thus, we predicted that Bike L (the more desirable, less practical option) would seem more similar to the ideal and be higher valued in the extended ride-feel condition and that Bike M (the less desirable, more practical option) would seem more similar to the ideal product and would have higher valuation in the extended durability condition.

Results and Discussion.

Similarity ratings. The high feasibility, low desirability Bike M is seen as directionally more similar to the ideal Bike K in the extended ride-feel condition (when Bike J has low ride-feel) than in the extended durability condition (when Bike J has low durability; $M = 5.2$ vs. $M = 6.0$). Conversely, the high desirability, low feasibility Bike L is seen as directionally more similar to the ideal Bike K in the extended durability condition than in the extended ride-feel condition ($M = 6.6$ vs. $M = 6.3$). A 2 (condition: extended ride-feel vs. durability) x 2 (product: Bike L vs. Bike M) mixed ANOVA finds a significant interaction ($F(1,111) = 8.1$, $p < .01$), as well as a significant main effect of the product ($F(1,111) = 36.3$, $p < .01$). There was no main effect of manipulating the attribute values of the inferior option Bike J (e.g., extending ride-feel vs. durability, $F < 1$). Thus, we conclude that the manipulation was successful in shifting the perceived similarity of the two products to the ideal product.

Willingness to pay. Correspondingly, the manipulation of the inferior option shifts the relative willingness to pay for the two target products. A 2 (condition: extended ride-feel vs. durability) x 2 (product: Bike L vs. Bike M) ANOVA finds the predicted interaction ($F(1, 111) = 6.1$, $p < .05$) as well as a main effect of the product ($F(1, 111) = 23.4$, $p < .01$), but no main effect of the manipulation ($F < 1.5$, $p > .1$). In particular, consumers had a higher valuation for the desirable Bike L than for the feasible Bike M, but the difference was fairly small in the extended ride-feel condition and was much larger in the extended durability condition (where Bike L was seen as more similar to the ideal). We have argued that this occurs because manipulating the range shifts the perceived similarity to the more expensive ideal product, impacting the degree to which the price of the ideal bike is incorporated into the judgment of willingness to pay.

To further support this interpretation, we ran a mediation analysis using each participant's difference in rated similarity (ΔSimML= rated similarity of Bike M to the ideal - rated similarity of Bike L to the ideal) and each participant's difference in buying prices for the focal products (ΔWTPML = willingness to pay for Bike M - willingness to pay for Bike L). First, we confirm that the range manipulation (extending durability vs. ride-feel) impacts the difference in similarity ($\beta = .68$, $t = 2.9$, $p < .01$) in a simple regression. Second, we confirm that the range manipulation likewise impacts the difference in willingness to pay ($\beta = 66.3$, $t = 2.5$, $p < .05$) in a simple regression. Lastly, in a multiple regression predicting difference in willingness to pay, we find a significant effect of difference in similarity ($\beta = 34.5$, $t = 3.4$, $p < .01$) and a non-significant effect of the attribute range manipulation ($\beta = 42.9$, $t = 1.6$, $p = .11$). Using a Sobel test, we find that the effect of the manipulation is significantly reduced when controlling for difference in similarity ($z = 2.2$, $p < .05$), suggesting that it is the shift in similarity that mediates the impact of the timing manipulation on willingness to pay.

Study 3: Shifts in the Basis of Similarity and Differential Substitution

In the prior study, we demonstrated that shifts in similarity due to temporal context yield changes in how the price of an ideal impacts valuation. Next, we investigate how temporal construal interacts with similarity-based context effects in a choice set. In Study 3, we distinguish between the direct effect of temporal context on preferences in two item choices (where we replicate prior effects) and how temporal context impacts three-item choices via shifts in similarity among the options, yielding patterns of choice different from what is predicted as a direct effect of temporal context.

Participants were asked to choose the internship they would prefer from a set of possible internships, which varied along the dimensions of how enjoyable the everyday experiences were and how consistent or inconsistent the internship was with the participants' higher-order goals. Our design makes use of the distinction between commonalities in concrete experiences vs. commonalities in how behaviors relate to higher-order abstractions (goals). Internships with commonalities in features relating to everyday experiences are expected to be perceived as more similar in the near future than in the distant future (Day and Bartels 2008).

While such shifts in similarity are not likely to impact choices between two items, the addition of a third option to the choice set induces a more complex assessment that can hinge on the similarity relations between items in a set (see, e.g, Dhar and Glazer 1996). We focus primarily on substitution effects (i.e., similarity effects, per Tversky 1972, Huber and Puto 1983), in which one choice option can differentially cannibalize choice of the more similar-seeming of two other options. The "desirable" internship (**A**) was designed to be relatively unattractive with respect to daily activities (feasibility) but attractive in terms of the intern's higher-order goals (desirability). A second "feasible" internship (**B**) was designed to be relatively attractive with respect to daily activities but be relatively unattractive in terms of the participant's higher-order goals. Some participants were also offered a third internship (**C**), designed to have intermediate levels for both dimensions.

We expect that, in the binary choice conditions, temporal distance will have a direct effect on preferences, such that thinking about internships in the distant future will increase the relative share of the most desirable internship (Liberman & Trope, 1998). We predict that relative choice will reverse with the addition of a third (intermediate) option, due to a higher tendency to cannibalize the most desirable internship.

Method.

One hundred thirteen native-English speaking undergraduate participants who self-identified as politically moderate or liberal completed a short survey in a campus-wide research lab for monetary compensation. This study employed a 2 (temporal context: near vs. distant future) x 2 (choice set: 2 vs. 3 options), between-subjects design. Participants were either asked to choose between serving one of two (A or B, below) or between one of three internships. After making their choice, they were asked to rate all pair-wise similarities among the options they had read about. The descriptions were as follows:

A: *"Carnegie Endowment for International Peace, Administrative Intern—Interns provide clerical assistance (copying, filing and maintaining office supplies) and receptionist support to Associates working on the Carnegie Endowment's projects such as non-proliferation, democracy building, trade, China-related issues, South Asian issues and Russian/Eurasian studies."*

B: *"Exxon, Advertising and Social Events Intern—Exxon is the world's largest publicly traded international oil and gas company. Interns provide day to day direction to ad agency counterparts on project basis, attend filming of commercials and organize social events."*

C: *"Target Corporation, Marketing Intern—Target is the fifth largest retailer in the U.S. Interns will assist in the development of marketing programs, analyze current consumer trends, business results and competitor activities and help develop presentations to the object management teams."*

In the 2-choice conditions, we expect to replicate the findings of Liberman and Trope (1998), such that temporal distance induces a preference for the desirable (A) over the feasible (B) internship. Half of our participants read about these two internships while half considered all three. Participants imagined having to make a choice about which one to serve starting either next week or next year. We will compare how temporal context affects the similarity relations among the internships and relative choice shares of internships A and B in the two vs. three-choice conditions.

Table 3: Results of Study 3

Share of Choice (%):		Carnegie (A)	Exxon (B)	Target (C)
Two options	Week	43	57	--
Three options	Week	61	14	25
Relative share:		81	19	
Two options	Year	60	40	--
Three options	Year	34	22	44
Relative share:		61	39	

Results and Discussion.

Two-choice conditions. We predicted that because people would focus more on higher-order aspects than on everyday experiences in the distant future, people would prefer internship A over internship B in this condition. For the near future condition, we predicted that people would focus more on concrete experiences than on the broad implications, and thus would prefer the enjoyable job (B) over the goal-congruent job (A). We observed a non-significant effect in the predicted direction. Participants favored internship A (over internship B) when it started in a year, but not when it started in a week (60% vs. 43%, p = .17, one-tailed exact test). This is in the same direction as the original Lieberman and Trope finding, but not significant due to the small sample size.

Three-choice conditions: similarity. Next, we analyze the similarity relations between the intermediate option (C) and each of the focal options. A pretest indicated that internship C was rated higher for "concrete experiences" than for "broad implications", similar to internship B. However, internship C's ratings for "broad implications" were similar in value to internship A. Thus, we predict that in the distant future, people would base their similarity judgments more on the higher-order aspects of the job and therefore see C as intermediate between A and B. However, in the near future, when concrete experiences are highlighted, people would see C as more similar to B than to A. A 2 (near vs. distant future) x 2 mixed within-between ANOVA (similarity of C to A vs. B) finds the predicted interaction ($F = 5.0$, $p < .05$) as well as a main effect of comparison internship ($F = 94.7$, $p < .001$) but no main effect of temporal context ($F < 1$). In the near future, the intermediate internship C is seen as more similar to internship B than it is to internship A (M = 3.5 vs. M = 1.9). In the distant future, however, the difference in internship C's similarity to internship B vs. similarity to internship A is significantly reduced (M = 3.2 vs. 2.1), based on a 2 x 2 mixed within-between ANOVA ($F = 5.0$, $p < .05$).

Three-choice conditions: choice shares. Among those who chose either A or B in the distant future condition, the relative choice share for B over A was 61% (vs. 60% in the two-choice condition). In the near future, however, when people focus more on the concrete experiences as the basis for similarity, internship C is viewed as substantially more similar to the internship B than it is to internship A. The choice share results indicate that this shift in perceived similarity creates a substitution effect whereby C cannibalizes the share of B more than the share of A. Among those who chose either A or B in the distant future condition, the relative choice share for B (over A) was only 19% (down from 57% in the two-choice condition; $p < .01$, Fisher exact test). A logistic regression confirms that the degree of cannibalization differs in the near future vs. distant future conditions. We found a significant interaction (time x choice set, $\beta_{INT} = -1.7$, Wald = 3.3, $p < .05$ one-tailed) as well as main effects of choice set and time ($\beta_{SET} = 2.4$, Wald = 3.2, $p < .10$ and $\beta_{TIME} = 3.4$, Wald = 5.3, $p < .05$).

Note that people's preferences in the three option conditions cannot be explained by construal level differentially affecting decision weights for lower-order and higher-order attributes, which would instead predict polarization—that people would instead choose the option which dominates the other two on the dimension highlighted by the temporal context. Rather, our results are explained by the shift in the basis of similarity judgments—in the near future, the intermediate option does not affect the choice share of the original options, but in the distant future this option is seen as highly similar to one and thus differentially cannibalizes its share.

Discussion

In this paper, we have argued that the malleability of perceived similarity plays an important, and under-studied, role in people's valuations and choices. Changes in temporal context, in particular, affect the basis of perceived similarity, shifting from a focus on concrete, feasibility attributes to more abstract, desirability attributes, which then has downstream effects on decision making processes.

The similarity of an item to a salient ideal version has been discussed as a potential key factor in judgments (Barsalou 1985, Kahneman and Miller 1986) and choices (Medin, Goldstone and Markman 1995). In Study 1, we presented direct evidence for exactly such a role, demonstrating that the perceived similarity to a category ideal impacts willingness to pay, holding constant the objective features of the objects. Furthermore, the perceived similarity to the ideal is malleable, shifting systematically

with the temporal context. This finding is further supported by Study 2, in which we directly manipulate similarity. While we explicitly present an ideal object in the option set in our studies, in general, the consideration of such ideals may be spontaneously prompted by recalled objects or by ideals implied by the combination of the best attribute values present in the choice set, yielding similar effects on valuation.

Our findings support the view that similarity to options within the choice set is implicated in some context effects (Dhar and Glazer 1996). In particular, while cannibalization (or, equivalently, similarity) effects have been found to be relatively weak when providing quantified attribute information (Huber and Puto 1983), we provide evidence for this effect in a choice set with naturalistic descriptions (e.g., where attribute levels are inferred from the description, rather than explicitly provided). Furthermore, we provide evidences that this effect on choice depends, in part, on factors in the external context (e.g., temporal framing), which change the perceived similarity among the choice options.

These findings also have implications for research on psychological distance. It is important to note that the effects we demonstrated are not necessarily limited to the impact of temporal context. Our hypotheses arise from the general effects of psychological distance on similarity and, via shifts in similarity, on decision making. We would predict that other dimensions of psychological distance, such as physical or social distance, probability, or hypotheticality, are likely to produce similar effects. In fact, these studies suggest that the psychological-distance-based effects of such factors on decision making might be thought of as either a direct effect of construal level (e.g., as changing the weights given to features involved in desirability and feasibility) or as an indirect effect, via shifts in similarity among either the explicit choice options themselves or between choice options and spontaneously generated comparison items.

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