Representation Across Time: Generalizing Temporal Effects on Perceived Similarity

Samuel B. Day (s-day2@northwestern.edu)
Department of Psychology, Northwestern University
2029 N. Sheridan Drive Evanston, IL 60208-2710 USA

Daniel M. Bartels (d-bartels@northwestern.edu)
Department of Psychology, Northwestern University
2029 N. Sheridan Drive Evanston, IL 60208-2710 USA

Abstract

Recent research suggests that the distance of a described event in the future can affect the way in which it is construed. In a previous paper, we demonstrated that temporal distance can influence the perceived similarity between two events by differentially highlighting their abstract and concrete attributes. The current paper extends and clarifies these findings, demonstrating similar effects for events that are described as taking place in the past, and ruling out alternative explanations based on planning and coordination of actions. Taken together, the results of these studies suggest a general effect of temporal distance, which makes certain kinds of information more or less available.

Introduction

One of the hallmarks of human cognition is our ability to think beyond the present moment. In fact, a large portion of our cognitive lives is spent predicting and planning for the future, and reviewing and reconstructing the past. Importantly, these thought processes can have a profound impact on our present lives, directly influencing our goals, beliefs, and desires. For example, any significant decision that an individual makes will almost certainly draw on their representations of the possible future outcomes that might occur, predictions about their own responses to those outcomes, memories of similar situations from their past, and so forth. If we are to understand human cognition, then, it is crucial that we understand representation in a temporal context.

Most psychological research has neglected this source of cognitive variance, but what work has been done suggests important differences between our thinking about the present relative to the future or past. For instance, research suggests that people consistently assign greater value to entities and events in the near relative to the distant future (see Frederick, et al, 2002, for a recent review). Other findings show that individuals are generally quite poor at making accurate predictions about their future emotional states in various circumstances, often exaggerating the degree and longevity of both positive and negative responses (e.g., Gilbert et al., 1998).

More relevant for the current studies, research also suggests that representations of temporally local and distant events differ in the kind of information they contain. Specifically, construal level theory (CLT; Trope & Liberman, 2003) proposes that events in the distant future will be represented in a way that highlights abstract, central, goal-related features, while representations of closer events will focus more on concrete, contextual information. These are respectively referred to as *high-level* and *low-level* construals, and they have been shown to lead to important differences in people's attitudes, decisions and behavior. For instance, consider the prototypical example of an individual agreeing to give a conference talk at some point in the distant future. When the decision is made, and the event is still several months away, the individual is likely to be focusing on the event's abstract features, which in this case are largely positive—the opportunity to receive feedback on one's work, the chance for public exposure, and so forth. As the date of the talk approaches, however, the focus may begin to shift to some of the concrete, contextual details that were absent in the initial representation, such as the time and effort that are involved in preparation. In this case, the fact that the high-level construal is more positive than the low-level one suggests that one's overall evaluation of the event may grow more negative over the course of time, as the event gets closer and its representation is enriched with more concrete details.

Research has examined these intuitive effects more systematically. One study (Liberman & Trope, 1998) gave participants descriptions of events that, like the conference talk example, had opposite evaluative valences for high- and low-level construals. For instance, participants might hear about a lecture that was on an interesting topic but was scheduled at an inconvenient time, or about a less interesting lecture that was scheduled more conveniently. In other words, the scenarios pit the high-level attribute of the lecture topic against the low-level contextual information of its timing. When they asked participants to predict their likelihood of attending the talk, they found that they gave relatively more weight to the low-level information (the lecture time) when the event was described as being nearer in the future.

While much of the work on temporal construal has relied on indirect measures such as preference, other research has attempted to examine intertemporal representations more directly. For example, Liberman, Sagristano, & Trope (2002) asked participants to imagine a particular event (e.g., a camping trip) in the near or distant future. They then asked them to sort a set of items that would be involved in that event (e.g., *flashlight*, *canteen*) into mutually-exclusive, meaningful categories. They found that when an event was described in the distant future, people divided the objects into fewer categories, each containing a greater number of members. This was interpreted as reflecting classifications that were based on simpler, more abstract object representations, consistent with construal level theory.

In a previous paper (Day & Bartels, 2004), we examined the effects of temporal distance on the perceived similarity between events. That experiment used pairs of events that shared either abstract high-level commonalities (e.g., *going to the dentist* and *joining a gym*, which both involve health benefits) or concrete low-level commonalities (e.g., *going to the dentist* and *getting a tattoo*, which both involve needles, hoses, discomfort, reclining in a chair, etc.). Participants were told that each pair of events represented plans that some fictional individual had for the future (either the current week or the following year), and they were asked to indicate how similar they felt the events were to each other. We predicted that the temporal distance of the events would affect the relative salience of the different levels of information, thereby affecting their perceived similarity. As predicted, and consistent with construal level theory, we found that participants' similarity judgments gave relatively less weight to low-level commonalities when the events were described as being in the distant future.

This finding is relevant for at least two reasons. First, it provides the most direct evidence to date of actual representational change as a function of temporal distance. Since similarity is assumed to be computed as a function of featural and structural commonalities between representations, changes in similarity imply changes in representation. Second, the finding demonstrates that these changes are pronounced enough to affect perceived similarity, which is a foundational construct in psychology. For instance, similarity is thought to play a critical role in memory and reminding (Hintzman, 1984; Ross, 1984), categorization (Hintzman, 1986; Medin & Schaffer, 1978; Nosofsky, 1984), and inferencing and knowledge transfer (e.g., Novick, 1988; Osherson, et al, 1990; Ross, 1984). The finding that temporal distance can influence similarity therefore greatly expands the role that it may play in cognition more generally.

Temporal distance or strategic planning?

The research on temporal construal has generated robust findings, and seems to be reflecting real changes in people's mental representations, but some important questions remain. Perhaps foremost among these is the difficulty in disentangling the effects of simple temporal distance from the possible effects of strategic planning processes. Construal level theory asserts that an event's distance in time is directly responsible for the observed representational differences. However, it could also be the case that events in the near future are simply more likely to cause participants to actively reason about the planning and coordination of the described actions. This planning would then lead to activation of the specific contextual details of the event. In that case, the differences in representational content would be a secondary, indirect result of temporal distance. This issue is relevant even for a conceptual task such as the free sorting classification study described above, since immediate planning for a camping trip would demand attention to concrete factors such as the acquisition and packing of the items, rather than to their more abstract functions. The issue of planning and coordination is also clearly relevant to our previous results, as will be discussed shortly.

One clear way to circumvent this issue would be to examine representations of events in the near and distant past, rather than future. Presumably, consideration of events that have already occurred would be much less likely to result in reasoning about planning, and should therefore provide a better test of purely temporal effects. Surprisingly, although this approach has been suggested (e.g., Liberman, Sagristano, & Trope, 2002), all of the studies reported to date have looked only at representations of the future.

Although there are many benefits to the similarity rating task used in our previous study (Day & Bartels, 2004), notably in its fairly direct examination of mental representation, our methodology was particularly open to issues of strategic planning. This is because it did not explicitly differentiate between the temporal distance of the events from the present, and the temporal distance between the events themselves. That is, if one is told that two events are planned for the current week, then it is clear that they are both near to the present date, and near to one another. On the other hand, if two events are simply described as being planned for the following year, not only are they distant from the current moment, it is also likely that they will be more distant from each other, perhaps months apart. Events that are temporally close to one another would clearly demand more consideration of concrete details for the coordination of their mutual planning, confounding a straightforward temporal interpretation of our results. In order to make strong conclusions about purely temporal effects, then, it would be necessary to replicate our previous study while explicitly controlling for the interval between events.

Experiments

In this paper, we present two experiments that address these issues and attempt to distinguish between direct effects of temporal distance and possible intervening effects of strategic planning. Experiment 1 looks for the first time at temporal effects on the construal of events that are described as taking place in the past. Experiment 2 looks at the effects of inter-event distance by independently controlling the interval between the events and the present, and between the events themselves.

Since both of the current studies use the same general task and design as Day & Bartels (2004), we will first discuss its logic and motivation in more detail. As noted, our design involved asking participants to judge the similarity between two events. There were a number of reasons that we opted for this approach. First, similarity judgments seem to reflect distinctly cognitive processes. Although other theories have suggested some differences in intertemporal representations (e.g., Loewenstein, et al, 2001; Brendl, Markman & Messner, 2003), these have largely relied on evaluative content, such as differences in the amount or valence of affective information included. Construal level theory (formerly *temporal construal theory*; Liberman & Trope, 1998) is the first approach to provide a purely cognitive

description of these intertemporal effects, namely, differences in the abstractness and centrality of the content. In spite of this, much of the existing research on CLT has still relied on materials with evaluative content, using dependent measures such as changes in preference at different time intervals. Similarity appears to provide a straightforward cognitive measure that is divorced from evaluative judgment. It also provides perhaps the most direct measurement of mental representation. Similarity is generally believed to involve the computation of featural and structural commonalities and differences between two activated mental representations (e.g., Medin, Goldstone & Gentner, 1993). If the perceived similarity between two things changes systematically, it provides strong evidence that one or both of the participating representations has changed as well. Finally, as noted, similarity is a ubiquitous concept in cognitive science, and is thought to play a role in such integral processes as memory, categorization and learning. Evidence that a factor influences perceived similarity is therefore an indication that it could have important consequences for cognition more broadly.

There are many different ways in which two things may be similar to one another. In addition to simple featural overlap (e.g., Tversky, 1977), research has shown that people are sensitive to more abstract, structural commonalities (Gentner & Markman, 1997; Markman & Gentner, 1993). These different kinds of commonalities map well to the notions of low-level and high-level construals. If temporal distance is making one or the other of these kinds of information more salient in two representations, it should affect the outcome of any similarity computations between them.

The test materials in our study consisted of pairs of events sharing commonalities primarily at one of the two construal levels. For instance, one item described a high school student who was planning to call various colleges to request information packages, and also planning to take the SAT. These two events are clearly similar, but only in a very abstract way. They both involve the general goal of attending college, but the specific actions they require and contexts in which they take place are quite different. Other participants saw a different version of this item, in which the student was planning to call colleges, but also planning to call hotels to arrange a summer vacation in Mexico. In this case, the two planned events are quite similar in their concrete details, but share very little in a deeper, more substantive way. If representations of events in the distant future are indeed highlighting more abstract information, and nearer events are emphasizing concrete details, we should find different patterns of similarity based on when these events are described as taking place. Consistent with CLT, we found a significant interaction between the kinds of commonalities and temporal distance. Specifically, event pairs sharing low-level commonalities were rated as significantly more similar when described in the near than distant future, and high-level pairs were rated as more similar in the distant than the near future.

Experiment 1

As discussed, an important issue in the study of temporal construal is the role played by participants' consideration of planning and coordinating the actions. Construal level theory proposes that temporal distance itself is affecting people's mental representations. However, it is also possible that thinking about events in the near future makes participants more likely to initiate reasoning processes about how to accomplish specific actions. It could be these thoughts that in turn lead to consideration of the concrete details, making temporal distance only an indirect factor. One way to compare these alternatives is by examining people's mental representations of events that are described as having taken place in the past. Since events that have already been accomplished should be considerably less likely to lead to reasoning about planning those events, findings of construal effects in those cases would provide evidence for the direct temporal interpretation.

Effects for events in the past are an explicit—though untested—prediction of construal level theory (e.g., Liberman et al, 2002; Trope & Liberman, 2003). Its authors have noted indirect evidence from the fact that memories of recent events contain more concrete detail than more distant memories, which are more abstract (e.g., Bartlett, 1932; Wyer & Srull, 1986), although they acknowledge that this may be the result of memory processes rather than differences in construal (Thompson et al., 1996).

Event Standard	Low-level comparison	High-level comparison
Read and coded research questionnaires	Did taxes	Conducted telephone surveys
Went door-to-door distributing leaflets about the environment	Went trick-or-treating with daughter	Wrote letters to congressmen and local council members
Went to the dentist	Got a tattoo	Joined a health club
Bought diamond necklace for wife	Bought expensive watch for self	Took wife out for gourmet meal
Called colleges requesting information packets	Called hotels to arrange Summer trip to Mexico	Took the SAT

Table 1. Sample events. Low-level comparison sentences were designed to share concrete features and procedures with the standard, while High-level comparisons share more abstract commonalities.

In this study, we test this claim directly by collecting similarity ratings for pairs of events that are described as having taken place in the past. As in our previous work, these events share either abstract, high-level features or concrete, low-level ones, and are described as occurring in the recent or distant past.

Participants Forty-three undergraduate students from Northwestern University participated in this study for partial course credit.

Materials and Procedure The materials for this experiment consisted of sentence pairs describing two actions that a fictitious character had accomplished. Each test item included a standard sentence, and one of two comparison sentences. These comparison sentences were constructed to share either high-level or low-level commonalities with the standard, but not both. Sample materials are given in Table 1. In addition to these test items, the material set included several filler sentence pairs, which were either literally similar, sharing both high- and low-level features, or non-similar, sharing neither.

Additionally, these events were described as taking place either in the recent past ("this week") or the distant past ("last year"). This distinction acted as a between-subjects factor, with all events for a particular participant being described at the same temporal distance. Commonality level served as a repeated-measures factor, with half of the standards randomly being paired with high-level comparison sentences and the other half with low. Thus, the experiment was a 2 (temporal distance: recent vs. distant past) × 2 (commonality level: high vs. low pairing) mixed design.

In total, 10 test items (five at each commonality level) and 13 filler items were presented in a completely randomized order (different for each participant), with the exception that all participants were given the same two initial items (one literally similar, and one non-similar) to help "anchor" their rating range and reduce variability. Within each item, sentence order was randomized, with the standard appearing first in approximately half of the pairs. A typical test item might read as follows: "This week, Karen went to the dentist. This week she also joined a health club."

The experiment was implemented as a computer-based task. After instructions, the first sentence pair appeared on the screen, followed by the prompt "How similar do you think these activities are to each other?" Beneath this prompt was a horizontal bar, with endpoints labeled "very dissimilar" and "very similar". Participants were instructed to click a location on this bar to indicate their perception of the similarity of the two events. This response was converted to a value between 0 and 1, for the "dissimilar" and "similar" endpoints, respectively. To ensure that participants were attending to the task, response latencies of less than 3 seconds for any item resulted in the warning "Too Fast" appearing on the screen, followed by a delay of several seconds before proceeding to the subsequent item.

Results and Discussion A 2 × 2 ANOVA revealed an interaction between temporal distance and commonality level, F (1, 41) = 6.01, $p < .05$, $\eta^2 = .13$. Participants rated high-level pairs as more similar in the distant past condition (M = 0.69, SD = 0.09) than in the recent past condition (M = 0.63, SD = 0.16). Conversely, low-level pairs were rated as more similar in the recent past condition (M = 0.50, SD = 0.18) than in the distant past condition (M = 0.41, SD = 0.14).

A main effect of commonality level was also observed. Participants rated high-level pairs as more similar (M = 0.66, SD = 0.13) than low-level pairs (M = 0.45, SD = 0.17) overall, F (1, 41) = 53.06, $p < .001$, η^2 =.56. This preference for high-level commonalities was also found in our prior study, and is consistent with other data showing a general preference for relational over attributional similarity (e.g., Gentner & Clement, 1988; Goldstone, Medin, & Gentner, 1991).

The results of this experiment are consistent with the claim that temporal distance itself is responsible for the observed representational changes. Since the events described had already been completed, there is no reason to assume that participants would have engaged in planning strategies when construing them. The actual distance in

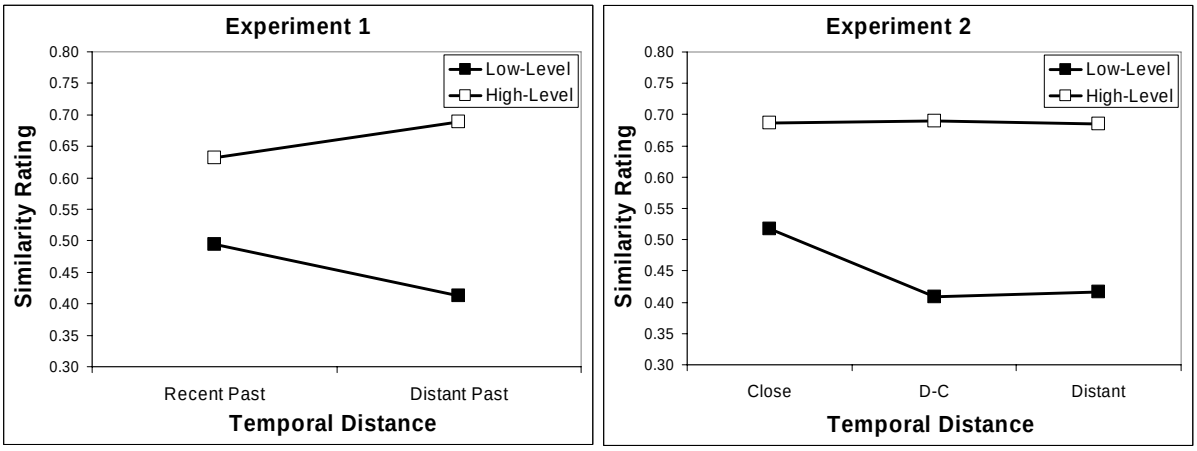

Figure 1. Results: Interactions between commonality level and temporal distance.

time, regardless of the direction of that distance, appears to be altering the information that people activate when thinking about an event. This finding bolsters the suggestion that these effects reflect a fairly general cognitive mechanism, perhaps mapping onto some notion "psychological distance." Interestingly, the specific pattern of results found here is quite similar to that found in our previous study, which looked at events planned for the future. This again suggests general effects of temporal distance.

Experiment 2

The results so far are consistent with the claim that events that are distant in time are represented differently than closer events, containing relatively more abstract information and less concrete contextual detail. However, the similarity task used thus far leaves itself open to an important confound, in that two events that are both in the near future are also explicitly near to one another, while events in the distant future are not. It could be the case that thinking about two events that are temporally close to one another leads participants to consider issues about coordinating the actions required in accomplishing them, causing the focus on concrete details. The results observed thus far may therefore be the result of the temporal relationship between the events themselves, rather than between each event and the current moment.

Experiment 2 attempts to distinguish between these two possibilities by including a condition with explicit information about the temporal relationship between events. This condition describes events that are in the distant future, but are temporally close to one another. If this condition leads to responses similar to those for events in the near future, it would imply that the distance between events, rather than their distance from the present, is the critical factor behind the previous results. If, on the other hand, the pattern of results resembles that observed for construals of distant events without explicit inter-event information, it would provide evidence for representational differences based on distance from the present, as proposed by CLT.

Participants Fifty-nine undergraduate students from Northwestern University participated in this study for partial course credit.

Materials and Procedure The materials and design for this study were identical to those of Experiment 1, with two important exceptions. First, the event pairs were described as plans that individuals had for the future, rather than actions they had already accomplished. Also, a third between-subjects condition was added to the design. In addition to conditions in which events were described in the near and distant future, Experiment 2 included a condition describing events that were temporally distant from the present, but explicitly close in time to each other. For example, participants might read "Next year, Karen plans to go to the dentist. That same day next year, she also plans to get a tattoo." This is referred to as the D-C (Distant-Close) condition. As in the first study, participants rated the similarity of the described events, and were warned if a response was made too quickly.

Results and Discussion A 3×2 omnibus ANOVA revealed a marginally significant interaction between temporal distance and commonality level, F (2, 56) = 2.82, p = .068, η^2 = .09. As in prior research, a large main effect of commonality level was also observed, F (1, 56) = 125.62, p < .01, η^2 = .69.

The tests of primary interest in this study were the comparisons between the individual conditions. A difference score was calculated for each participant by subtracting average similarity ratings for low-level pairs from average ratings for high-level pairs. Independent sample t-tests performed on these scores therefore reflect the interaction between commonality level and temporal distance. A comparison between the Close and Distant conditions revealed a significant difference, replicating our previous findings, t (1, 37) = 2.09, p < .05, d = .67. The novel question for this study was whether the D-C condition would more closely resemble the Distant or the Close condition. Tests showed the D-C condition to be significantly different from the Close condition (t (1, 37) = 2.16, p < .05, d = .69), but not different from the Distant condition (t (1, 37) < 1, p > .10). An intuitive look at the data (Figure 1) confirms that the D-C participants performed virtually identically to those in the Distant condition, while the Close participants displayed a noticeably different pattern. This finding supports the suggestion that the effects observed in previous studies using this task were the result of the events' temporal distance from the present, not of their distance from one another. When events are described as taking place in the distant future, even when they are explicitly described as near to each other, participants seem to focus on their abstract rather than concrete attributes.

It is interesting to note that the effects in Experiment 2 were entirely due to changes in the ratings of low-level pairs, with high-level pairs producing similar scores at all temporal distances. Similar results were observed in our previous paper, and have been found in some other pilot data. This may again reflect a general preference for abstract, relational commonalities, which may seem more meaningful to participants. It is also consistent with the details of Liberman and Trope's initial claims (1998), where they suggested that temporally distant representations contain less concrete detail, while closer events are more "enriched," possessing both concrete and some abstract information.

General Discussion

These studies replicate and extend prior findings demonstrating representational changes resulting from temporal distance. When events are described as being distant from the present moment, participants appear to give relatively less weight to their specific concrete details, and instead focus primarily on more abstract, central, goal-related aspects. This was found to be true whether the events were described as plans for the future or accomplishments from the past. The effects did not appear to vary with the distance between the described events, but

rather reflected the distance of the events from the present moment. Together, these findings support the proposal that these differences in representational content are a direct result of an event's distance in time, and are not a byproduct of engaging in reasoning about planning and the coordination of actions.

These results provide important insights about the way individuals think about the future and past in relation to the present. Developmental psychologists have noted the importance of "psychological distancing" in mental representation, in which children "take a step back" from a situation and try to construe its meaning independent of the specific current context (e.g., Cocking & Renninger, 1993; Zelazo & Lourenco, 2003). By leading to a focus on the abstract, central properties of a situation, temporal distance seems able to accomplish a similar feat for adults. The demonstration of these effects on the perceived similarity between events extends this phenomenon even further. Specifically, it suggests that with greater temporal distance, the way that individuals classify, are reminded of, and make inferences from a situation will depend on the event's more abstract, meaningful attributes. In this way, distance in time seems to provide us the opportunity to see beyond the details of our immediate context, and to focus on the things that matter.

Acknowledgements

This work was supported by ONR award N00014-02-1-0078. Thanks to Dedre Gentner, Jason Jameson, Jennifer Asmuth, and the Northwestern Similarity and Analogy group.

References

Bartlett, F. C. (1932). *Remembering: An experimental and social study.* Cambridge: Cambridge University Press.

Brendl, C. M., Markman, A. B., & Messner, C. (2003). The devaluation effect: Activating a need devalues unrelated objects. *Journal of Consumer Research*, 29, 463–473.

Cocking, R., & Renninger, K. (Eds.). (1993). *The development and meaning of psychological distance*. Hillsdale: Lawrence Erlbaum.

Day, S. B., & Bartels, D. M. (2004). Temporal distance, event representation, and similarity. *Proceedings of the Twenty-sixth Annual Meeting of the Cognitive Science* Society, 274–278.

Gentner, D., & Clement, C. (1988). Evidence for relational selectivity in the interpretation of analogy and metaphor. In G. H. Bower (Ed.), *The psychology of learning and motivation: Advances in research and theory* (Vol. 22, pp. 307-358). New York: Academic Press.

Gentner, D., & Markman, A. B. (1997). Structure mapping in analogy and similarity. *American Psychologist*, 52, 45–56.

Gilbert, D. T., Pinel, E. C., Wilson, T. D., Blumberg, S. J., & Wheatley, T. P. (1998). Immune neglect: A source of durability bias in affective forecasting. *Journal of Personality and Social Psychology*, 75, 617-638.

Goldstone, R. L., Medin, D. L., & Gentner, D. (1991). Relational similarity and the non-independence of features in similarity judgments. *Cognitive Psychology*, 23, 222–264.

Hintzman, D. L. (1984). Minerva 2: A simulation model of human memory. *Behavior Research Methods: Instruments & Computers*, 16, 96–101.

Hintzman, D. L. (1986). Schema abstraction in a multiple-trace memory model. *Psychological Review*, 93, 411–428.

Liberman, N., & Trope, Y. (1998). The role of feasibility and desirability considerations in near and distant future decisions: A test of temporal construal theory. *Journal of Personality and Social Psychology*, 75, 5–18.

Liberman, N., Sagristano, M. D., & Trope, Y. (2002). The effect of temporal distance on level of mental construal. *Journal of Experimental Social Psychology*, 38, 523–534.

Loewenstein, G. F., Weber, E. U., Hsee, C. K., & Welch, N. (2001). Risk as feelings. *Psychological Bulletin*, 127, 267–286.

Markman, A. B., & Gentner, D. (1993b). Splitting the differences: A structural alignment view of similarity. *Journal of Memory and Language*, 32, 517–535.

Medin, D. L., and Schaffer, M. M. (1978). Context Theory of Classification Learning, *Psychological Review*, 85, 207–238.

Medin, D. L., Goldstone, R. L., & Gentner, D. (1993). Respects for similarity. *Psychological Review*, 100(2), 254–278.

Nosofsky, R. M. (1984). Choice, similarity, and the context theory of classification. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 10, 104–114.

Novick, L. R. (1988). Analogical transfer, problem similarity, and expertise. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 14, 510–520.

Osherson, D. N., Smith, E. E., Wilkie, O., Lopez, A., and Shafir, E. (1990). Category-based induction. *Psychological Review*, 97, 185–200.

Read, D. (2004). Intertemporal choice. In D. J. Koehler & N. Harvey (Eds.), *Blackwell handbook of judgment & decision making* (pp. 424-443). Malden, MA: Blackwell Publishing.

Ross, B. H. (1984). Remindings and their effects in learning a cognitive skill. *Cognitive Psychology*, 16(3), 371–416.

Thompson, C. P., Skowronski, J. J., Larsen, S. F., & Betz, A. (Eds.). (1996). *Autobiographical memory: Remembering what and remembering when*. Mawah, NJ: Lawrence Earlbaum.

Trope, Y., & Liberman, N. (2003). Temporal construal. *Psychological Review*, 110, 403–421.

Tversky, A. (1977). Features of similarity. *Psychological Review*, 84, 327–352.

Wyer, R. S., & Srull, T. K. (1986). Human cognition in its social context. *Psychological Review*, 93, 322–359.

Zelazo, P. D., & Lourenco, S. F. (2003). Imitation and the dialectic of representation. *Developmental Review*, 23, 55–78.