

Future Events Are Far Away: Exploring the Distance-on-Distance Effect

Dengfeng Yan
University of Texas at San Antonio

Four dimensions of psychological distance (temporal, social, spatial, and probabilistic) have been widely studied. This research examines the distance-on-distance effect where an event that is close or distal along one dimension of psychological distance will be judged to be close or distal along other dimensions. For example, individuals will perceive greater likelihood to win a lottery (probabilistic distance) if they sit closer to the prize (spatial distance). Drawing on 2 streams of findings in the construal level literature, I propose that this distance-on-distance effect is mediated by construal level induced by the known distance and only occurs when the psychological distance is egocentric. Five studies provide evidence supporting the basic effect, its underlying mechanism, and the boundary condition. These findings have important implications for the construal level literature, together with the research on distance perceptions.

Keywords: psychological distance, construal level, egocentricity, distance perceptions

Imagine that two shopping malls are using lucky draw as promotion. Consumers who spend more than \$100 a day will be entitled to enter a lucky draw. The only difference between the two malls is when the result will be revealed. Consumers in Mall A will play the lucky draw and know the outcome immediately, whereas those in Mall B will be informed of the result after several weeks when the promotion is completed. A question then arises: Will the perceived likelihood of winning the prize be similar between these two malls? If not, consumers in which mall will perceive a higher winning likelihood and indicate greater willingness to participate? Consider another example: Jane, an undergraduate student in Chicago, is planning to watch the 2014 World Cup in Rio de Janeiro. Her friend Miranda is thinking of going on a trip there next week. They both estimate the distance between Chicago and Rio de Janeiro. Will their estimates be similar? If not, what would be the difference and why?

These seemingly unrelated examples are actually manifestations of a much broader question: whether and how one type of psychological distance of a target can influence individuals' perception of that target along other distance dimensions. Despite evident theoretical and practical importance, this issue has not been examined until very recently (Fiedler, Jung, Wänke, & Alexopoulos, 2012; Stephan, Liberman, & Trope, 2011; Wakslak, 2012). However, there are several important questions that need to be addressed.

First, these findings are not always consistent, sometimes even contradictory. For example, in one study (Fiedler et al., 2012), participants were asked to imagine themselves engaging in a specific social behavior and write down their mental imagery. Later on, they were asked to indicate the psychological distance of this particular event along four dimensions (e.g., whether this

event happened in the near or distant future, at a distant or near place, etc.). The results showed that the average correlations among the four distance ratings were significantly positive (for similar findings, see Stephan et al., 2011). However, two sets of studies revealed the opposite, showing that shorter temporal distance actually decreased participants' probability estimation (Gilovich, Kerr, & Medvec, 1993; Nussbaum, Liberman, & Trope, 2006). In addition, some scholars found the relationship among different distances to be asymmetric, with spatial distance being able to influence other aspects, but not the other way around (Zhang & Wang, 2009). I go back to these inconsistencies in the General Discussion.

Second, although symmetric, positive distance-on-distance relationships were more likely to be observed, these studies were usually focused on limited distance aspects (for an exception, see Fiedler et al., 2012). For example, Wakslak (2012) examined how individuals' spatial (where) and temporal distance (when) perception was affected by the probability of the target event. Thus, whether those findings are restricted to specific circumstances or generalizable remains unclear. In the present work, I assessed the robustness of this effect by examining the predictions using a variety of distance combinations such as spatial-probabilistic, temporal-spatial, and social-temporal.

More importantly, the psychological mechanisms underlying these effects have not been articulated and tested yet. As Fiedler et al. (2012) noted, "the convergence of all four distance aspects may appear puzzling, because it is hard to see why on a-priori ground time and space should be interdependent, or why low probability should be related to personal distance" (p. 1020). The important contribution of the present work, thus, is to propose and empirically test one possible mechanism.

Because construal level theory (CLT; Trope & Liberman, 2003, 2010) has been shown as a powerful platform to study psychological distance, the present research naturally uses CLT as the conceptual framework. Considerable research in this field has demonstrated the effects of psychological distances on construal levels (Fujita, Henderson, Eng, Trope, & Liberman, 2006; Liber-

Correspondence concerning this article should be addressed to Dengfeng Yan, Department of Marketing, University of Texas at San Antonio, 1 UTSA Circle, San Antonio, TX 78249-1644. E-mail: dengfeng.yan@utsa.edu

man, Sagristano, & Trope, 2002; Todorov, Goren, & Trope, 2007), and the reverse effects of construal level on the perceptions of psychological distance (Liberman & Förster, 2009; Liberman, Trope, McCrea, & Sherman, 2007; Wakslak & Trope, 2009). Combining these two strands of literature leads to my theorizing that the known psychological distance shifts levels of mental construal, which, in turn, influences people's perceptions of other dimensions of distance.

Moreover, understanding the psychological mechanism allows for the identification of an important boundary condition for prior findings. Briefly to say, Liberman and Förster (2009) found that construal level could influence individuals' perceptions of egocentric distance (i.e., anchored at the zero point of self in the here and now) only but not that of nonegocentric ones. Because I argue that it is construal level driving the distance-on-distance effect, egocentricity should moderate my prediction as well. In line with this moderation hypothesis, I found that the distance examined in extant literature showing similar distance-on-distance effects was indeed egocentric. The present work completes the picture by examining both egocentric and nonegocentric ones.

The Distance-on-Distance Effect

The Effects of Psychological Distance on Levels of Mental Construal

Existing research in the construal level area can be broadly categorized into two groups: one that examines how psychological distances affect the construal level and downstream consequences and another that examines how the levels of mental construal influence distance perception. Built on the notion that abstraction is required for predicting and planning for what is not present, CLT proposes that psychological distance influences how individuals mentally construe events. Specifically, psychologically distant stimuli are represented at a higher level, which is characterized by superordinate goals, primary features, more abstraction, and context-independence. Psychologically proximal stimuli, in contrast, are represented at a lower level, which is characterized by subordinate goals, secondary features, less abstraction, and context-dependence (Liberman & Trope, 1998; Trope & Liberman, 2003; Trope, Liberman, & Wakslak, 2007). Liberman and Trope (1998), for example, demonstrated how temporal distance influences construal level. In one study, participants were asked to imagine themselves engaging in seven activities (e.g., reading a science fiction book) either "tomorrow" or "next year" and to describe these activities. As predicted, high-level descriptions (e.g., broadening of horizon) were more frequent in the "next year" condition, whereas low-level descriptions (e.g., flipping pages) were more common in the "tomorrow" condition. Later research replicated these findings with spatial distance (Fujita et al., 2006), social distance (Liviatan, Trope, & Liberman, 2008), and probability (Wakslak, Trope, Liberman, & Alony, 2006).

A related stream of research has extended these findings to examine how psychological distance could influence a variety of downstream consequences such as preference and choice (Liberman & Trope, 1998), persuasion (H. Kim, Rao, & Lee, 2009; Zhao & Xie, 2011), negotiation (Henderson, Trope, & Carnevale, 2006), metacognition (Tsai & Thomas, 2011), self-control (Fujita, Trope,

Liberman, & Levin-Sagi, 2006), and memory (Y.-J. Kim, Park, & Wyer, 2009).

Effects of Construal Levels on Perceptions of Psychological Distance

Construal theorists argued that psychological distance influences construal level because of a learned association. This association initially came from the fact that individuals often do not have much information about psychologically distant events and thus have to construe them more abstractly. Such vague representation also leaves room for potential adjustment due to information change in the future. With repeated use, the association between psychological distance and construal becomes overlearned and generalizes even to conditions in which there is no information difference between proximal and distal targets (Liberman & Förster, 2009; Trope & Liberman, 2010). This learned association account implies that not only psychological distance can influence level of construal, but levels of mental construal should also be able to affect individuals' perception of distance. This is because individuals learn that "creating and understanding any abstract construct requires mentally moving beyond the currently experienced object in time and space" (Liberman & Förster, 2009, p. 204).

Several recent studies have provided supportive evidence for this reverse link. Liberman et al. (2007), for example, found that compared with those primed with low-level construal, participants who were primed with high-level construal expected the events to happen in more distant future. In one study, participants were asked to read a series of different actions (e.g., Ron is considering opening a bank account) and think about either "why" or "how" the person would perform this activity. They then estimated the length of time until the person would actually perform each activity. Consistent with the prediction, participants in the "why" condition made a longer temporal distance estimation than those in the "how" condition (Liberman et al., 2007). Similarly, researchers found that an event recalled in a more concrete way felt subjectively closer than those recalled in an abstract manner (Kyung, Menon, & Trope, 2010). Construal levels can influence individuals' judgments of not only temporal distance but also other dimensions such as probabilistic distance. For example, it is found that participants who had been led to adopt a high-level construal mindset made lower probability assessments than did those who had been led to adopt a low-level construal mindset (Wakslak & Trope, 2009).

Egocentricity as a Moderator

Combining the two aforementioned strands of literature logically yields the foundational hypothesis in the present study regarding the distance-on-distance effect. However, previous research suggests that this effect is not always true. Specifically, Liberman and Förster (2009) differentiated two types of distance: the egocentric and the nonegocentric. Egocentric distances are mentally represented distances "from oneself (social distance)," "from here (spatial distance)," "from now (temporal distance)," and "from reality (probabilistic distance)." Distances that are presented in other ways (either with a different reference point or along a different direction), in contrast, are conceptualized as

“nonegocentric.” The authors argued that construal level should only influence egocentric distance because construing the target more abstractly requires mentally moving the perceiver away from the target “in time, in space, in social perspective, or across counterfactual alternatives” (p. 204). For example, if the perceiver wants to see the forest, she needs to step away from the trees, leading to greater physical distance. However, this has no implications for nonegocentric distances (e.g., distances between the trees and other objects). One may argue that individuals can recalculate the nonegocentric distance by first estimating the egocentric one. However, empirical evidence from different studies suggests that people usually do not do so (Codol, 1990; Liberman & Förster, 2009).

Because the hypothesized distance-on-distance effect is mediated by construal level, it should be moderated by egocentricity as well. That is, this effect should happen for egocentric distances but not for nonegocentric ones. In addition to serving as a moderator, the egocentricity construct also helps to rule out an alternative account. Specifically, this semantic priming account argues that manipulating psychological distance may make related concepts more accessible, which subsequently influences the judgment of other distance. For example, those primed with a longer spatial distance will judge temporal distance as longer because the concept of “far” or “distal” becomes more accessible. If the distance-on-distance effects are indeed due to this semantic priming mechanism, then it should happen for both egocentric and nonegocentric distance. If my proposition is true, however, only the estimation of egocentric ones will be affected.

The Present Research

Five experiments were conducted to test the hypotheses, using a variety of distance combinations, including spatial-probabilistic (Study 1), temporal-spatial (Study 2), probabilistic-spatial (Study 3), and social-temporal (Studies 4–5). In addition, multiple studies examined the moderating role of egocentricity (Studies 1–2) and the underlying mechanism (Studies 1, 4, and 5). Specifically, in Studies 1 and 4, I evaluated the mediation model by measuring the mediator, whereas in Study 5, the underlying mechanism was examined via a moderation-of-process design (Spencer, Zanna, & Fong, 2005).

Study 1: Sitting Closer to the Prize Increases Perceived Winning Likelihood

Study 1 was conducted to demonstrate the basic distance-on-distance effect, the moderating role of egocentricity, and the underlying mechanism. Specifically, I examined whether spatial distance would affect individuals’ estimation of probability. To this end, a lottery scenario was used in which the spatial distance between prize and participants was varied. Egocentricity was manipulated by asking participants to imagine either *themselves* (egocentric) or *someone they didn’t know* (nonegocentric) being in the scenario. Study 1 also assessed the underlying mechanism by measuring participants’ memory for particular information. Recent research suggested that priming low-level construal enhanced individuals’ memory for concrete information, whereas priming high-level construal improved people’s memory of abstract information (Y.-J. Kim, Park, & Wyer, 2009). Thus, I provided two

pieces of information about the prize (a laptop computer): one is a consumer report rating and another is the size of memory (RAM). Yan and Sengupta (2011) found that summary indices such as consumer report ratings were more abstract because they allow people to draw global inferences about the product’s overall value. In contrast, information about specific attributes like the size of RAM was perceived as more concrete. If the theorizing in the present study is true, then participants should memorize the concrete attribute better in the spatially close as compared with distant condition. Conversely, their memory for the abstract attribute should be better in the distant versus close condition.

Method

Participants ($N = 124$; 54 women) were recruited from Amazon’s Mechanical Turk website. Their ages ranged from 20 to 70, with an average age of 32 ($SD = 10$) years. They were randomly assigned to conditions according to a 2 (spatial distance: close vs. distant) \times 2 (egocentricity: egocentric vs. nonegocentric) between-subjects design. All participants were told that this study sought to understand how individuals responded to lotteries. On this pretense, they were instructed to imagine that a lottery was being held in a room and that only one participant would win the prize, which was placed on the front table. All participants were informed that the prize was a laptop computer, which had 8 GB memory (4 GB \times 2) and a consumer report rating of 9.2. Each participant then saw a picture of the room setting where the position of the prize and a chair were highlighted. In the short distance condition, a chair in the front row was highlighted, whereas in the long distance condition, a chair in the back row was highlighted. Participants in the egocentric condition were asked to imagine that “you are sitting in the highlighted chair,” whereas those in the nonegocentric condition were asked to imagine that “someone you don’t know is sitting in the highlighted chair.” Next, we asked all participants to estimate their own or the target person’s likelihood of winning the lottery along a 101-point scale anchored by 0 (*clearly unlikely*) and 100 (*for sure*). We also asked them to judge the distance from the highlighted chair to the prize (1 = *very close*; 7 = *very distant*). Finally, after submitting answers to previous measures and completing a 30-min filler task, participants came to a new webpage where their memory of product information was assessed. For each attribute, they were asked to choose from three options (memory: 4 GB, 4 GB \times 2, 8 GB \times 1; consumer report rating: 9.1, 9.2, 9.3). The options were presented in a random sequence.

Results

Manipulation check. The results of a 2 \times 2 analysis of variance (ANOVA) on perceived seat-to-prize distance only revealed a significant effect of the spatial distance manipulation, $F(1, 120) = 511.57, p < .001$. Specifically, participants in the distant condition ($M = 6.29, SD = 1.28$) judged the seat-to-prize distance to be longer than those in the close condition ($M = 1.55, SD = 1.04$), indicating that our manipulation worked as intended. In addition, it is worth highlighting that neither the effect of egocentricity, $F(1, 120) = 0.10, p = .75$, nor the two-way interaction, $F(1, 120) = 1.69, p = .20$, reached significance. This helps to rule out a potential alternative explanation for the subsequent

findings in the present study. Specifically, [Maglio, Trope, and Liberman \(2013\)](#) recently found that individuals' sensitivity to distance decreases such that the distance between far and farther is less than that between near and far. Thus, this argument may explain why the effect of spatial distance on probability estimation is unlikely to be obtained in the nonegocentric conditions. That is, participants in these conditions are less sensitive to the spatial distance manipulation because the targets are already distant along the social dimension. If this alternative hypothesis is true, then an impact of egocentricity on the perception of spatial distance should be observed. Specifically, the perceived seat-to-prize distance should be shorter in the nonegocentric condition than that in the egocentric condition. However, this was not the case. Therefore, this alternative hypothesis was ruled out. Nevertheless, these results do not necessarily contradict [Maglio et al.'s \(2013\)](#) findings. Specifically, I speculate that a possible reason could be that spatial distance was manipulated by explicitly presenting participants with a picture. This manipulation was very salient and strong, thereby very likely to override the distance-insensitivity effect.

Likelihood of winning. Participants' winning likelihood estimates were submitted to a 2×2 ANOVA. The analysis revealed three marginally significant effects. First, consistent with past literature on self-serving bias ([Dunning & Hayes, 1996](#); [Kruger, 1999](#)), the effect of egocentricity, $F(1, 120) = 3.18, p = .08$, implies that participants rated their own winning likelihood ($M = 22.87, SD = 23.19$) to be higher than that of an unknown person ($M = 15.39, SD = 17.81$). Second, the main effect of spatial distance, $F(1, 120) = 2.79, p = .10$, suggests that participants in the close condition reported higher winning likelihood ($M = 22.35, SD = 22.68$) than their counterparts in the distant condition ($M = 15.60, SD = 18.38$). More important, this main effect is qualified by its interaction with egocentricity, $F(1, 120) = 3.41, p = .07$. As predicted, when participants imagined *themselves* playing the lottery (egocentric condition), a shorter distance to the prize ($M = 28.42, SD = 25.36$) increased their perceived winning likelihood rather than a longer distance ($M = 15.48, SD = 17.82$), $t(120) = 2.49, p = .01$. However, when participants imagined *someone they did not know* participating in the lottery (nonegocentric condition), the winning likelihood did not significantly differ between close ($M = 15.07, SD = 16.63$) and distant conditions ($M = 15.71, SD = 19.15; t < 1$), supporting the moderating hypothesis and ruling out the semantic priming hypothesis.

Process measure. Because participants' memory for concrete and abstract information was measured using choice, logistic regression was used to examine the prediction in the present study. All the answers were coded into two categories, with 1 indicating correct answers and 0 indicating incorrect ones. First, it was found that participants' memory for concrete attributes was jointly determined by spatial distance and egocentricity (Wald = 3.13, $p = .08$). In line with the prediction in the present study, when the distance was egocentric, participants in the near condition (28/36, or 78%) were better memorizing concrete information than those in the distant condition (15/27, or 56%), $\chi^2(1) = 3.52, p = .06$. However, no significant difference was found when the distance was not egocentric (18/30, or 60% vs. 21/31, or 68%), $\chi^2(1) < 1, p > .50$. Although in support of the present hypothesis, this result per se is subject to an alternative explanation. That is, the greater perceived winning likelihood might have made participants in the close condition process information in a more involved way. As a

consequence, they had better memory for *all the information*. If this account is true, then a parallel pattern for abstract information should be observed. However, this is not the case. Follow-up analysis for the interaction between spatial distance and egocentricity (Wald = 3.15, $p = .08$) showed that when the distance was egocentric, participants in the distant condition (23/27, or 85%) memorized the consumer report rating better than those in the close condition (20/36, or 56%), $\chi^2(1) = 6.25, p = .01$. However, no significant difference was found when the distance was not egocentric (19/30, or 63% vs. 20/31, or 65%), $\chi^2(1) < 1, p > .90$.

Mediation analysis. To test the present hypothesis that the effect of spatial distance on probability estimation in the egocentric condition was driven by construal level, participants' memory performance was first transformed into a construal level index, with large numbers indicating high-level construal. Specifically, if the participant's answer for abstract attributes was correct but the answer for concrete attributes was wrong, his or her score was coded as "3." If the participants correctly recalled both concrete and abstract attribute, his or her score was "2." Finally, if the participant's answer for concrete attributes was correct but the answer for abstract attributes was wrong, his or her score was coded as "1."

The mediation analysis was conducted using the PROCESS macro developed by [Hayes \(2013; Model 8\)](#). This procedure involves generating a number of resamples from the data, and the indirect effect (mediation effect) is calculated each time. The significance of the mediation model in bootstrapping is determined by the distribution of all the indirect effects generated. If the 95% confidence interval (CI) does not include zero, then there is statistically significant mediation. In the present case, the bootstrapping involving generating 5,000 resamples from the data revealed that whether the impact of spatial distance on probability estimation was mediated by construal level was conditional on egocentricity. Specifically, when the distance was egocentric, the indirect effect was significant, with a 95% CI excluding zero [$-10.61, -1.26$]. However, when the distance was nonegocentric, I did not obtain evidence for the mediating role of construal level because the 95% CI included zero [$-1.44, 3.66$]. Thus, these results support the theorizing in the present study that it is construal level that underlies the impact of spatial distance on probability judgments when the distance was egocentric.

Discussion

Thus, Study 1 provided good support for the hypothesis that different dimensions of psychological distance could influence each other. Specifically, the present results showed that varying the spatial distance to the lottery shifted participants' perceived likelihood of getting the prize. This effect, however, only occurred in the egocentric condition. In addition, this study also supported my proposed underlying process by showing that the distance-on-distance effect was mediated by construal level triggered by spatial distance.

However, the significance level associated with some effects was marginal, which may lead to the question of whether the present findings were robust. First of all, it is important to clarify that many of those marginal results were unpredicted or unrelated to my theorizing. For instance, whether the main effect of spatial distance is significant is contingent on the relative strength of the

simple effect in the egocentric conditions. Further, I speculate that, as implied by the data, the high value of the prize may have triggered self-enhancement motivation. This motivation may have weakened the present effects by increasing the depth of information processing. Thus, the recall accuracy was relatively high across *all* conditions. The fact that I still obtained supportive results under this circumstance suggests that my proposed mechanism was a robust one. Consistent with my speculation and as previously reported, the data indicated that participants indeed rated their own likelihood of winning to be higher than that of an unknown person.

In addition, the self-enhancement motivation also helps to resolve the seemingly inconsistency between Study 1's results and Wakslak's (2012) finding that individuals expected unlikely events to more often happen in distant contexts and likely events in near contexts. Her finding thus implies that because winning the lottery is an unlikely event, participants in the nonegocentric and spatially distant conditions should perceive the winning likelihood to be higher than those in the egocentric and spatially close conditions. First, I suggest that Wakslak's (2012) proposition was based on the assumption that the events are neutral. For example, as demonstrated in her study, if a cat was found to have a rare protein in its blood (i.e., an unlikely event), participants were more likely to think this cat belongs to a friend who lives very distal (vs. close) from them. However, this assumption did not hold in the present study, which explains the opposite effect of egocentricity. Second, Wakslak's theorizing was about the comparison between likely and unlikely events. This factor, however, was not varied in the present study. Instead, probability served as a dependent variable, meaning that some participants might perceive the winning likelihood as high, whereas others might perceive it as low. In other words, the premise that winning a lottery is an unlikely event did not hold neither. Thus, it would be inappropriate to directly apply Wakslak's (2012) findings to the present study.

Study 2: London Becomes Closer When the Olympics Is Approaching

Study 2 had two objectives. First, Study 1 only examined the present framework in the context of spatial and probabilistic distance. To assess the robustness of the present findings, the hypothesis should be tested using different combinations of psychological distances. In Study 2, I investigated whether temporal distance could influence people's estimation of spatial distance. Second, in the previous study, I varied the actual distance. In Study 2, I varied the subjective distance perception while keeping the actual distance constant. To this end, I manipulated temporal distance by asking participants to indicate how many *years* or *days* the London Olympic Games were from that point in time. Prior literature suggested that a small as compared with a large scale segments the target distance into more units, which leads to longer estimated length (Maglio & Trope, 2013). For example, participants in one study were asked to estimate the length of a curved line in millimeters, centimeters, or decimeters. In line with the previous notion, participants who used centimeters estimated the line to be significantly shorter than those who used millimeters, but longer than those who used decimeters (Maglio & Trope 2013, Study 2). Drawing on such evidence, I predicted that in the present study,

participants in the year condition would perceive the temporal distance to be shorter than those in the day condition.

Method

A 2 (temporal distance: close vs. distant) \times 2 (egocentricity: egocentric vs. nonegocentric) mixed design was used in this experiment, with the former factor being manipulated between subjects. Sixty-five undergraduate students (mean age = 20 years, $SD = 1$) from a university in Hong Kong were randomly assigned to either the temporally close or the distant condition. Participants in the proximal condition were asked to indicate how many *years* the London Olympic Games were from that point in time, whereas participants in the distant condition were asked to indicate the time until the Olympics in terms of *days*. All participants were then asked to estimate the physical distance (in kilometers) between Hong Kong and London (egocentric) and the physical distance between Paris and London (nonegocentric). The sequence of these two estimates was counterbalanced. Finally, as a manipulation check, participants indicated how close the London Olympics were using a 7-point scale ranging from 1 (*very close*) to 7 (*very far*).

Results

Manipulation check. The results of a one-way ANOVA revealed that measurement unit significantly influenced estimates of temporal distance, $F(1, 63) = 17.70, p < .001$. Compared with the year framing ($M = 3.76, SD = 1.10$), a day framing ($M = 4.90, SD = 1.08$) made participants perceive the London Olympic Games as temporally further. Thus, these results indicated that the present manipulation of temporal distance was successful.

Estimates of egocentric distance between Hong Kong and London. Participants' estimates of both egocentric and nonegocentric distance were not normally distributed. Thus, earlier research (Liberman et al., 2007) was followed to perform the logarithmic transformation to normalize the distribution. The mean spatial distance estimates before logarithmic transformation are summarized in Figure 1. The results of a one-way ANOVA on the transformed estimates of egocentric distance revealed a significant effect, $F(1, 63) = 4.38, p = .04$. Consistent with my prediction, participants in the year condition ($M = 8.71$) judged the distance

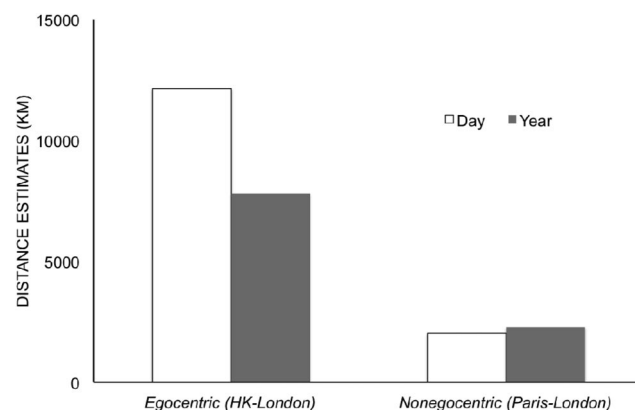


Figure 1. Study 2: Mean-estimated spatial distance as a function of temporal distance and egocentricity. HK = Hong Kong.

between Hong Kong and London to be shorter than those in the day condition ($M = 9.11$).

Estimates of nonegocentric distance between Paris and London. The above result, although supportive for the present prediction, is subject to two alternative explanations. In addition to the semantic priming hypothesis previously mentioned, the second account is about anchoring (Wong & Kwong, 2000). Specifically, it argues that participants' estimates of spatial distance were anchored at their answers to the temporal distance manipulation where participants in the year condition reported smaller numbers than those in the day condition. Both alternative explanations could be disentangled from my theorizing by examining participants' estimates of nonegocentric distance. The results of a one-way ANOVA on the nonegocentric distance estimation between Paris and London showed that different temporal framings had little impact ($M_{Year} = 6.54$ vs. $M_{Day} = 7.04$), $F(1, 63) = 2.55$, $p > .10$, which is inconsistent with the alternative interpretations.

Discussion

By obtaining the same results using a different combination of psychological distance, Study 2 increased my confidence in the foundational effect and the underlying mechanism. In addition, although previous research examining the effects of psychological distance usually varied objective distance, the present results indicated that varying subjective perception could have the same impact.

Study 3: Uncertain Things Will Happen at Distant Places

In Study 3, I sought to examine the effects of probabilistic distance on spatial distance. Following previous literature (Liberman et al., 2007), I asked participants to read a series of short descriptions and then guess where (i.e., an on-campus vs. an off-campus location) these actions would occur. To manipulate the probability, the participants were told that a person was considering doing or had decided to do the activity. For example, participants in the low-probability condition read that "Ron is considering opening a bank account," whereas those in the high-probability condition read that "Ron has decided to open a bank account."

Method

Stimuli. Six behaviors were selected on the basis of pretesting, in which participants were asked to choose six actions (from a list) that they would do both on campus and off campus at similar frequency. The actions selected were "opening a bank account," "seeing the dentist," "having dinner at McDonald's (the university has an on-campus McDonald's restaurant)," "learning to play the piano," "getting a haircut," and "buying a book."

Participants and design. One hundred ten undergraduates participated in this study. They were randomly assigned to either the high- or the low-probability condition. Each participant received HK\$100 (about US\$13) for participating in a 1-hr study session.

Procedure. All participants were informed that the study sought to examine how people interpreted different events they read about and what general impressions were created by different narratives.

In other words, we are interested in how people imagine actions and events they read about. Following is a list of short descriptions of different actions that people might consider doing (have decided to do). Please simply read each description, imagine that person is actually considering doing (has decided to do) the action, and answer the questions that follow.

Next, participants were asked to choose between two options about where the action would take place (one option being on-campus and the other being off-campus). Take the "getting a haircut" scenario, for example. Participants were asked to guess where Angela was considering getting (had decided to get) a haircut, either the on-campus salon or an off-campus one.

Results

Participants' choices are summarized in Table 1. My theorizing predicted that individuals who believed that the events were very likely to occur would infer the events to happen at spatially closer locations. Conversely, if the events were perceived as unlikely, participants will infer that they would happen in a distal location. Consistent with the present prediction, the results indicated that participants in the "decided condition" (232/342, or 68%) were more likely to predict target behaviors to take place on campus than those in the "considering condition" (137/318, or 43%), $\chi^2(1) = 40.96$, $p < .001$. This is true for all items except that the difference in the "learn to play the piano" scenario was marginally significant ($p = .06$).

Study 4: Turning Thoughts Into Action

Study 4 had two objectives. First, I continued assessing the generalizability of my hypothesis by using a different distance combination. Specifically, I examined whether the behavior of socially distant individuals was also perceived as temporally distant. Second, I continued to examine the underlying mechanism. In Study 1, I measured construal level indirectly. Here, I used a standard construal level measure that had been widely used in prior literature.

Method

Materials. Similar to Study 3, six hypothetical events (e.g., Ron is considering opening a bank account, Angela is considering subscribing to a newspaper) used in previous literature (Liberman et al., 2007) were selected as stimuli. To manipulate social dis-

Table 1

Study 3: Number of Participants Choosing On-Campus Options in the Low- and High-Probability Conditions

Stimuli	Probability	
	Low ($n = 53$)	High ($n = 57$)
To open a bank account	28	42
To get a haircut	22	36
To learn to play the piano	17	28
To have dinner at McDonald's	29	43
To buy a book	20	41
To see the dentist	21	42
Sum	137	232

tance, the original stimuli were revised by adding different surnames (Zhang & Wang, 2009). Specifically, because this study was conducted in Hong Kong, common Chinese surnames were used to represent close social distance and Western surnames were used to represent long social distance. Participants in the control condition did not receive any surname information. For example, participants in the close social distance (long social distance, control) condition read that "Ron Chan (Ron Girard, Ron) is considering opening a bank account."

Design, participants, and procedure. The participants were 106 Hong Kong undergraduates (average age = 20.57 years) who were randomly assigned to three conditions. All participants were informed that the study sought to examine how people would interpret different events they had read about and what general impressions were created by different narratives.

In other words, we are interested in how people imagine actions and events they read about. Following is a list of short descriptions of different actions that people might consider doing. Please simply read each description, imagine that person is actually considering doing the action, and answer the questions that follow.

Next, we asked participants to predict how many days from that point in time would the person perform the action. As a manipulation check, for each item, participants also indicated how close or distant they felt to the target person using a 7-point scale anchored by 1 (*very distant*) and 7 (*very close*). Next, I assessed the level of action construal via the Behavior Identification Form (BIF; Valacher & Wegner, 1989). This form consisted of 25 items, each of which asked respondents to select between two descriptions of the same behavior (e.g., ringing a doorbell): one that comprised higher level construals related to goals or "why" considerations (e.g., "seeing if someone is home") and another that comprised lower level construals related to means or "how" considerations (e.g., "moving your finger").

It is possible that participants' estimated temporal distances may influence their BIF scores. In order to control for this confound, the sequence of the temporal distance measure and BIF was counterbalanced in this study. Nevertheless, it is suggested that the difference in participants' estimates of temporal distance might be too small to elicit its influence on construal levels. As presented in Table 2, the difference between participants' temporal distance estimates in the close condition and that in the distance condition ranged from a few days to about 20 days at a maximum. In earlier literature demonstrating the influence of temporal distance on construal level (Liberman & Trope, 1998), however, temporal distance was typically operationalized as "tomorrow" versus "next year," the difference between which is much larger than that in the present study.

Results

Manipulation check. Because participants' perceived distance to each target person was highly correlated ($\alpha = .85$), I averaged them to form a single index. Consistent with prior literature, analysis on this index shows that participants in the Chinese surname condition ($M = 5.02$, $SD = .56$) judged themselves to be closer to the target than those in the Western surname ($M = 2.85$, $SD = .52$), $t(103) = 12.77$, $p < .001$, and control condition ($M = 3.32$, $SD = .96$), $t(103) = 10.07$, $p < .001$. These results suggest that the manipulation of social distance was successful.

Table 2

Study 4: Mean-Estimated Temporal Distance (Days) as a Function of Manipulated Social Distance

Stimuli	Social distance		
	Control	Near	Distant
	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)
Open a bank account	5.78 (6.09)	4.20 (4.00)	7.97 (8.10)
Enroll in a fitness program	11.61 (8.23)	10.14 (9.07)	15.03 (11.33)
Go to a driving school	29.63 (25.20)	19.46 (21.45)	33.26 (33.18)
Subscribe to a newspaper	4.69 (5.01)	8.17 (11.53)	13.43 (17.34)
Learn to play the piano	24.25 (17.69)	25.69 (31.79)	45.85 (40.85)
Buy a computer	16.61 (13.27)	11.60 (7.80)	22.82 (18.30)
Normalized Index	-0.37 (3.43)	-1.46 (3.67)	1.88 (3.76)
BIF score	15.14 (3.67)	13.60 (3.79)	17.17 (3.91)

Note. BIF = Behavior Identification Form.

Temporal distance estimates. Because the estimates of temporal distance for some items were positively skewed, I first log-transformed the raw estimates. These log-transformed scores were then mean transformed into z scores and added to form a single index ($\alpha = .75$). Table 2 presents the raw estimates for each activity before transformation. The results of a 3 (social distance: close vs. distant vs. control) \times 2 (order: BIF before distance estimation vs. BIF after distance estimation) ANOVA on this index revealed a main effect of social distance only, $F(2, 100) = 7.79$, $p = .001$. Neither the main effect of order, $F(1, 100) = 1.25$, $p = .27$, nor the Order \times Social Distance interaction, $F(2, 100) < 1$, $p = .71$, reached significance. Thus, the remaining analyses were conducted without including order as a factor. Consistent with the present prediction, planned contrast analysis indicated that participants estimated all events to take place sooner in the Chinese surname condition ($M = -1.46$, $SD = 3.67$) than those in the Western surname condition ($M = 1.88$, $SD = 3.76$), $t(103) = -3.85$, $p < .001$. The estimate in the control condition ($M = -0.37$, $SD = 3.43$) was significantly smaller than that in the Western surname condition, $t(103) = -2.61$, $p < .05$, but not significantly different from that in the Chinese surname condition, $t(103) = 1.27$, $p = .20$. The difference between socially distant and proximal condition is significant for four events, marginally significant for one event, and nonsignificant for the remaining one (yet, the pattern is consistent with my prediction).

BIF score. The composite BIF score was obtained by summing up responses to all 25 items in the BIF form (for each item, 1 = high level construal, 0 = low level construal). The results of a 3 (social distance: close vs. distant vs. control) \times 2 (order: BIF before distance estimation vs. BIF after distance estimation) ANOVA on BIF indicated that order had no significant influence on this measure, showing that the main effect, $F(1, 100) < 1$, $p = .50$, and its interaction with social distance, $F(2, 100) < 1$, $p = .65$, was not significant. Thus, order was excluded from subsequent analyses. Supporting my proposed underlying process, participants in the Western surname condition scored higher ($M = 17.17$, $SD = 3.91$) than those in the Chinese surname condition ($M = 13.60$, $SD = 3.79$), $t(103) = 3.88$, $p < .001$, and control condition ($M = 15.14$, $SD = 3.67$), $t(103) = 2.26$, $p < .05$. The difference between

the latter two conditions was marginally significant, $t(103) = 1.74$, $p = .09$.

Mediation analysis. Finally, similar to what I did in Study 1, I used the bootstrap procedures to test the mediation using the PROCESS macro (Model 4). For this purpose, only participants in the experimental conditions were included ($N = 70$). This analysis revealed that the path from social distance (close = 0, distant = 1) to construal level was significant ($\beta = 3.57$, $SE = .92$), $t(68) = 3.88$, $p < .001$, and the path from construal level to temporal distance estimation (the normalized index) was also significant ($\beta = .79$, $SE = .07$), $t(67) = 11.55$, $p < .001$. The direct path from social distance to the estimates of temporal distance, however, was reduced to insignificant ($\beta = .52$, $SE = .57$), $t(67) < 1$, $p = .36$). The bootstrapping involving generating 5,000 resamples from the data revealed that the mediation model was significant, with a 95% CI excluding zero [1.48, 4.19]. Thus, these results support my theorizing that it is construal level that underlies the impact of social distance on the inference about temporal distance.

Discussion

Study 4 thus supported the present theorizing by replicating the distance-on-distance effect using a different pair of distance and showing the underlying mechanism via directly measuring the mediator. Nevertheless, an alternative explanation merits mentioning. That is, the manipulation of social distance may have activated the concept of ingroup (Chinese surnames) versus outgroup (Western surnames). Because carrying out actions quickly (i.e., do not procrastinate) is socially desirable, participants in the close social distance condition might be motivated to report a shorter temporal distance. Although acknowledging this possibility, I suggest that an opposite prediction is equally possible. That is, if someone takes longer to turn thoughts into action, it implies that she reached her decision after thorough consideration. In contrast, if someone acts shortly after formulating the plan, he might be perceived as cursory. If this is the case, then Study 4 was a conservative test for my hypothesis. If both accounts were operating, we may not observe any impact because the two opposing effects simply get “cancelled out.” However, it is most likely that such identity-based motivated reasoning might exert little impact in this study. Extant literature suggests that the self-enhancing motivation is more likely to be activated in situations involving social comparison (e.g., in intergroup interaction) or when the activity is important to the identity (e.g., taking care of kids is central to a female identity but eating and drinking is not). However, none of these conditions was met in the present study.

In addition, I conducted a supplementary study to empirically evaluate this alternative hypothesis. Recruited from the same subject pool, 57 undergraduate participants were randomly assigned to either socially close or distant condition. The key difference between this study and Study 4 is that I measured perceptions of *nonegocentric* temporal distance. For example, one item used in the study was: “On November 12, 2010” (the present study was conducted in 2013), “Ron was considering opening a bank account.” For each item, participants were asked to estimate how many days from that point in time the person actually performed the action. We have argued, and empirically demonstrated, that the distance-on-distance effect only applies for egocentric distances, but not for nonegocentric ones. Specific to this study, the present

manipulation of social distance would only influence perceptions of temporal distance that is anchored by “now,” but not the temporal distance that is anchored by a time point in the past or future. However, those alternative accounts predict the same pattern for *both* egocentric and nonegocentric distances. Inconsistent with the alternative explanations, the results of a one-way ANOVA on the distance perception index ($\alpha = .62$) did not reveal significant difference between the socially close ($M = -0.65$, $SD = 3.87$) and distant condition ($M = 0.63$, $SD = 2.92$), $F(1, 55) = 1.97$, $p > .15$. These results thus offered additional support to the construal-based mechanism.

Study 5: Manipulating the Mediator

Studies 1 and 4 tested the underlying mechanism using a measurement-of-mediation approach. Recent research suggests that mediation analysis with unmanipulated mediators are prone to bias (Bullock, Green, & Ha, 2010). Study 5 thus sought to provide more support for the causal role of construal level in driving the distance-on-distance relationship through manipulating the mediator. The rationale for this approach is that if the distance-on-distance effect is indeed mediated by construal level, then “blocking” the mediator should prevent the effect from happening. To this end, in this study, I manipulated the proposed mediator (i.e., construal level) along with the independent variable (social distance). If the manipulation of construal level will reduce or eliminate the effect of social distance on the perception of temporal distance, it provides support for the proposed causal relationship. This design is conceptually identical to the moderation-of-process approach (Spencer et al., 2005).

Method

Design and participants. The participants were 122 Hong Kong undergraduates who were randomly assigned to conditions using a 2 (social distance: Chinese surnames vs. Western surnames) \times 2 (construal level: low vs. high) between-subjects design.

Procedure. The experiment consisted of two phases. Phase 1 manipulated the construal level by using a category-exemplar generation task (Fujita, Trope, et al., 2006). Specifically, participants in the high-construal-level condition were asked to generate a superordinate category for a list of 12 nouns. Conversely, those in the low-construal-level condition were asked to generate subordinate exemplars. Take “dog” for example. A superordinate category of dog could be “animal,” whereas a subordinate category could be “Chihuahua.” Existing literature revealed that repeatedly thinking in terms of a superordinate category activates high-level construal, whereas thinking subordinate exemplars encourages low-level construal (Hong & Lee, 2010). Following the construal level manipulation, we assessed the level of construal via the BIF. This ended Phase 1. Participants then moved to an “unrelated” task in which the stimuli and procedure were the same as in Study 4.

Results

Manipulation checks. First, the results of a 2 (social distance) \times 2 (construal level) ANOVA on the BIF score revealed only a significant effect of the construal level manipulation, $F(1,$

118) = 6.08, $p < .05$. Suggesting that the construal level manipulation was successful, participants primed with the superordinate mindset ($M = 16.25$) scored higher than those primed with the subordinate mindset ($M = 14.54$). No other effects were found. Second, a similar two-way ANOVA on the index of social distance ($\alpha = .90$) yielded a main effect of distance manipulation only, $F(1, 118) = 588.74$, $p < .001$. As predicted, participants judged targets with Chinese surnames ($M = 4.94$, $SD = .42$) to be closer than those with Western names ($M = 2.95$, $SD = .48$). Although prior literature suggests that manipulating construal level may also influence participants' social distance judgments (Liberman & Förster, 2009), neither construal level manipulation nor its interaction with social distance had an impact on the perceptions of social distance in this study ($ps > .15$). I suggest that the effect of construal level priming on the perception of social distance is more likely when the distance is ambiguous or no direct information is available. However, in the present study, participants could directly rely on the surnames to infer social distance. Thus, mindset priming had limited impact.

Hypothesis testing. It is predicted that the effect of social distance on temporal distance estimation would diminish or disappear once construal level was independently manipulated. Instead, there should be an effect of construal level on distance estimation. To test these predictions, I followed the procedure used in Study 4 to create an index of temporal distance estimates ($\alpha = .75$). Table 3 presents the raw estimates. The results of a 2×2 ANOVA on this index revealed a significant main effect of the construal level manipulation only, $F(1, 118) = 23.70$, $p < .001$. Consistent with the present prediction, participants in the superordinate condition ($M = 1.81$) indicated a higher temporal distance than those in the subordinate condition ($M = -1.58$), and this was true regardless of whether the surname was Chinese ($M_{\text{Superordinate}} = 1.88$ vs. $M_{\text{Subordinate}} = -1.81$), $t(118) = 4.07$, $p < .001$, or Western ($M_{\text{Superordinate}} = 1.36$ vs. $M_{\text{Subordinate}} = -1.26$), $t(118) = 2.83$, $p < .01$. However, the effect of social distance disappeared ($M_{\text{Chinese}} = -.20$ vs. $M_{\text{Western}} = .22$), $F(1, 118) < 1$, $p > .90$, and this was true in both the high- ($M_{\text{Chinese}} = 1.88$ vs. $M_{\text{Western}} = 1.36$; $t < 1$, $p > .50$) and the low-level construal condition ($M_{\text{Chinese}} = -1.81$ vs. $M_{\text{Western}} = -1.26$; $t < 1$, $p > .50$).

In addition to examining the predictions at aggregate level, I also tested these hypotheses with each scenario. Indicating the robustness of the present results, for all the scenarios, the main effects of the construal level were significant ($ps < .05$), whereas

the effects of social distance were insignificant. Further, in the "learning piano" scenario, an unexpected two-way interaction was obtained in that the effect of construal level on the temporal distance estimate was stronger in the Chinese surname condition than in the other group ($M_{\text{Diff}} = 1.05$ vs. 0.29), $F(1, 118) = 4.84$, $p < .05$.

Discussion

By manipulating the construal level along with social distance, Study 5 provided further evidence for the crucial role that construal level plays in driving the distance-on-distance effects. I found that once psychological distance and construal level were manipulated orthogonally, the effect of psychological distance was replaced by an effect of construal level such that priming high-versus low-level construal leads to longer distance estimation, suggesting that the effect of psychological distance on another distance perception is driven by construal level.

It is noteworthy, however, that the present prediction was that the manipulation of construal level would attenuate the impact of social distance. But the degree of attenuation is a calibration issue, depending on the relative strength of two manipulations. In addition, this study further rules out the alternative hypothesis that participants are motivated to judge their ingroup members to act more quickly than outgroup members. If this account is true, then manipulating construal level should not knock out this effect because there is little reason to expect the level of mental construal to reduce such motivation.

General Discussion

This research examined the question of whether one aspect of psychological distance would influence the perceptions of distance along other dimensions. I hypothesized a positive distance-on-distance relationship such that events that are psychologically close on one dimension are also judged to be close along other dimensions. Further, this effect is mediated by construal level and moderated by egocentricity of the distance. Five experiments provide supporting evidence for this proposition, the underlying mechanism, and the boundary condition. It is noteworthy that convergent support for the present predictions was obtained across a variety of distance combinations such as spatial-probabilistic (Study 1), temporal-spatial (Study 2), probabilistic-spatial (Study

Table 3
Study 5: Mean-Estimated Temporal Distance (Days) as a Function of Manipulated Social Distance and Construal Levels

Stimuli	Low-level construal		High-level construal	
	Chinese	Western	Chinese	Western
Open a bank account	4.60 (4.76)	4.65 (3.98)	9.33 (7.46)	8.24 (6.91)
Enroll in a fitness program	11.34 (9.09)	10.04 (8.22)	16.52 (10.72)	14.44 (9.13)
Go to a driving school	20.66 (20.73)	24.65 (24.30)	26.74 (20.41)	32.65 (22.04)
Subscribe to a newspaper	4.66 (2.56)	8.38 (9.16)	15.56 (16.66)	13.85 (15.68)
Learn to play the piano	21.23 (18.76)	27.69 (32.64)	48.81 (40.72)	32.68 (21.81)
Buy a computer	15.83 (11.70)	11.15 (6.04)	17.30 (12.94)	20.50 (16.94)
Normalized Index	-1.81 (3.81)	-1.26 (3.41)	1.88 (3.00)	1.36 (3.75)

Note. Standard deviations appear in parentheses.

3), and social-temporal (Studies 4–5). These converging findings suggest that the obtained results are robust and generalizable. Below, I discuss how these findings make contributions to CLT and other literatures. In addition, I also resolve the seemingly inconsistency between the current results and findings in the earlier literature.

Implications for CLT

CLT proposes that different dimensions of psychological distance are interconnected (Trope & Liberman, 2003). For example, Bar-Anan, Liberman, Trope, and Algom (2007) demonstrated such a relationship using a Stroop task. Specifically, participants were presented with stimuli containing a picture and a word. The pictures implied depth, with the words appearing relatively close to or distant from the observer. The participants classified the spatial distance of words faster when the implicit psychological distance of the word matched its spatial distance (e.g., a geographically close word was classified faster when it was *friend* than when it was *enemy*). These results suggest that there might be associations among different distance dimensions. The present work adds to this literature by establishing the *causality*.

Second, although there has been some recent research showing the effects of one dimension of distance on judgments about another dimension (Fiedler et al., 2012; Wakslak, 2012), to my best knowledge, the underlying mechanism has not been articulated and tested yet. The present work fulfills the gap by proposing one possible explanation. That is, the known distance shifts the level of construal, which in turn influences individuals' perception of other unknown distance. In multiple studies, the mediator was measured in different ways and consistent evidence for this mechanism was obtained.

Third, understanding the underlying mechanism allowed for the identification of one boundary condition for the distance-on-distance effect such that it only occurs when the distance is egocentric. Interestingly, I found that recent work showing similar distance-on-distance effects actually studied egocentric distance only, which is consistent with the present theorizing. For example, participants in Fiedler et al. (2012) were asked to imagine *themselves* engaging in different behaviors and then estimate various distances of each event. Similarly, in Wakslak (2012), the temporal and spatial distances participants were asked to estimate were egocentric as well because their reference points were “here” and “now.” I completed the picture by showing that the distance-on-distance effects did not occur when the distance was nonegocentric.

Implications for Other Literature on Distance Perceptions

In addition, the present research has important implications for several strands of literature pertaining to each distance dimension. Previous literature on spatial perception has largely focused on the characteristics of physical stimuli. For example, nonstraight paths with a shorter direct distance between endpoints were estimated to be shorter than equally long paths with a larger direct distance (Raghubir & Krishna, 1996). The present findings add to this literature by identifying other dimensions of psychological distance (e.g., temporal distance) as another antecedent. In addition,

the present results, combined with the recent finding that spatial distance could be influenced by self-construal (Krishna, Zhou, & Zhang, 2008), suggest that the way individuals think about the world could influence not only conceptual judgment but also purely perceptual tasks. Additionally, the theme of time perception has attracted considerable attention in psychology (Gorn, Chattopadhyay, Sengupta, & Tripathi, 2004; Lynch & Zauberman, 2007). The present findings offer a fresh perspective toward examining these issues. Take waiting perception, for example. In many situations, marketers are motivated to reduce customers' subjective perception of the duration of waiting. The present results suggest that one possible way would be to let the customers sit closer to the waiting area such that a shorter spatial distance would lead to shorter time perception.

Multiple Paths May Underlie the Distance-on-Distance Effect

Despite the supportive evidence I found in this research regarding the mediating role of construal level in driving the distance-on-distance effect, psychological distance may enter distance perceptions in multiple ways and lead to diverging outcomes. Consider the impact of temporal distance on probability judgment as an example. As mentioned previously, some research revealed a negative relationship between these two dimensions, showing that participants' perceptions of probability decreased when the event is approaching. For example, Gilovich et al. (1993) asked participants to predict their performance in a task twice: one was collected way before the task and another on the test day. The results showed that participants judged themselves to be less likely to succeed when they were closer to the “moment of truth.” The authors suggested that as the time to perform approaches, participants feel more “accountable” because the outcome becomes immediately consequential. Although the current results seem to contradict their findings, it is useful to clarify that these results are supplementary rather than contradictory. Specifically, my conceptualization is about how different aspects of psychological distance *of the same target* influence each other. However, in Gilovich et al. (1993), the independent variable was the temporal distance to the *task*, whereas the dependent variable was the likelihood to achieve (i.e., the probabilistic distance to) *good performance*.

In addition, participants in the present studies had little information about the unknown distance. In such circumstances, the construal-based distance-on-distance effect found in the present research is more likely to happen. If participants had some information, other mechanism may come into play. For example, when multiple cues are available, temporal distance may change probability judgment by shifting the weight attached to different types of information. Specifically, when the event is psychologically distant, individuals rely more on abstract information to estimate the likelihood of that event, with the reverse being true for concrete information. Nussbaum, Liberman, and Trope (2006), for instance, asked participants to read short descriptions of five classic findings in psychology (e.g., primacy and recency effect). After that, the participants were asked to imagine themselves conducting the same experiments either the following morning or 1 year from that point in time. Participants were then asked to indicate the likelihood that they would be able to replicate those classic findings. The results showed that participants in the temporally distant

condition indicated a greater likelihood of replication than those in the temporally close condition. Given that classic findings in psychology are associated with a high base rate (i.e., the finding has been replicated many times), the findings of Nussbaum et al. (2006), therefore, imply that abstract information (e.g., base rate) was used more when the probability judgment was temporally distant rather than being proximal.

Symmetric or Asymmetric?

Finally, the present results also seem to contradict with Zhang and Wang's (2009) finding that the relationship between different psychological distances is asymmetric. Specifically, they demonstrated that spatial distance could influence other aspects of psychological distance. For example, a distal (e.g., "foreign") as compared with close (e.g., "local") prime along the spatial dimension led participants to perceive greater distance along the other three dimensions. However, priming distance along other dimensions often would not affect individuals' judgment of spatial distance. The reason is that people understand temporal, social, and probabilistic distance in terms of spatial distance. Different from this asymmetric influence, the distance-on-distance effects found in this research is symmetric. A closer examination revealed a key difference between their work and the present research. That is, the superiority of spatial distance was found in a typical priming context in which participants were only exposed to some general words and later asked to judge the psychological distance of an unrelated event. In other words, the participants did not *construe* a particular event in the first place so that the focal distance manipulation could not change their construal levels. However, in the present case, the manipulated distance and estimated distance were about the *same target*. This implies that psychological distance is more likely to influence construal level when it is about a specific event. Otherwise, it may function like a prime.

Conclusion

Five studies demonstrated the distance-on-distance effect: If individuals perceive the target event as close along one dimension of psychological distance, they will judge the event to be close along other distance dimensions. These findings are consistent with CLT in many ways. First, it not only supports the view that different types of psychological distance are connected but also shows the causal nature of such interconnection. Second, results from several studies demonstrate the mediating role of construal level in driving the distance-on-distance effect. Third, my findings are in line with CLT's conception of psychological distances as egocentric, showing that the distance-on-distance effects only occur for egocentric distances but not for nonegocentric ones.

References

- Bar-Anan, Y., Liberman, N., Trope, Y., & Algom, D. (2007). Automatic processing of psychological distance: Evidence from a Stroop task. *Journal of Experimental Psychology: General*, 136, 610–622.
- Bullock, J. G., Green, D. P., & Ha, S. E. (2010). Yes, but what's the mechanism? *Journal of Personality and Social Psychology*, 98, 550–558. doi:10.1037/a0018933
- Codol, J. (1990). Studies on self-centered assimilation process. In J. Caveri, J. Fabre, & M. Gonzalez (Eds.), *Cognitive bias* (pp. 387–400). Amsterdam, the Netherlands: North-Holland.
- Dunning, D., & Hayes, A. F. (1996). Evidence for egocentric comparison in social judgment. *Journal of Personality and Social Psychology*, 71, 213–229. doi:10.1037/0022-3514.71.2.213
- Fiedler, K., Jung, J., Wänke, M., & Alexopoulos, T. (2012). On the relations between distinct aspects of psychological distance: An ecological basis of construal-level theory. *Journal of Experimental Social Psychology*, 48, 1014–1021. doi:10.1016/j.jesp.2012.03.013
- Fujita, K., Henderson, M. D., Eng, J., Trope, Y., & Liberman, N. (2006). Spatial distance and mental construal of social events. *Psychological Science*, 17, 278–282. doi:10.1111/j.1467-9280.2006.01698.x
- Fujita, K., Trope, Y., Liberman, N., & Levin-Sagi, M. (2006). Construal levels and self-control. *Journal of Personality and Social Psychology*, 90, 351–367. doi:10.1037/0022-3514.90.3.351
- Gilovich, T., Kerr, M., & Medvec, V. H. (1993). Effect of temporal perspective on subjective confidence. *Journal of Personality and Social Psychology*, 64, 552–560. doi:10.1037/0022-3514.64.4.552
- Gorn, G. J., Chattopadhyay, A., Sengupta, J., & Tripathi, S. (2004). Waiting for the web: How screen color affects time perception. *Journal of Marketing Research*, 41, 215–225. doi:10.1509/jmkr.41.2.215.28668
- Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. New York, NY: Guilford Press.
- Henderson, M. D., Trope, Y., & Carnevale, P. J. (2006). Negotiation from a near and distant time perspective. *Journal of Personality and Social Psychology*, 91, 712–729. doi:10.1037/0022-3514.91.4.712
- Hong, J., & Lee, A. Y. (2010). Feeling mixed but not torn: The moderating role of construal level in mixed emotions appeals. *Journal of Consumer Research*, 37, 456–472. doi:10.1086/653492
- Kim, H., Rao, A. R., & Lee, A. Y. (2009). It's time to vote: The effect of matching message orientation and temporal frame on political persuasion. *Journal of Consumer Research*, 35, 877–889. doi:10.1086/593700
- Kim, Y.-J., Park, J., & Wyer, R. S. (2009). Effects of temporal distance and memory on consumer judgments. *Journal of Consumer Research*, 36, 634–645. doi:10.1086/599765
- Krishna, A., Zhou, R., & Zhang, S. (2008). The effect of self-construal on spatial judgments. *Journal of Consumer Research*, 35, 337–348. doi:10.1086/588686
- Kruger, J. (1999). Lake wobegon be gone! The 'below-average effect' and the egocentric nature of comparative ability judgments. *Journal of Personality and Social Psychology*, 77, 221–232. doi:10.1037/0022-3514.77.2.221
- Kyung, E. J., Menon, G., & Trope, Y. (2010). Reconstruction of things past: Why do some memories feel so close and others so far away? *Journal of Experimental Social Psychology*, 46, 217–220. doi:10.1016/j.jesp.2009.09.003
- Liberman, N., & Förster, J. (2009). Distancing from experienced self: How global-versus-local perception affects estimation of psychological distance. *Journal of Personality and Social Psychology*, 97, 203–216. doi:10.1037/a0015671
- 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. doi:10.1016/S0022-1031(02)00535-8
- 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. doi:10.1037/0022-3514.75.1.5
- Liberman, N., Trope, Y., McCrea, S. M., & Sherman, S. J. (2007). The effect of level of construal on the temporal distance of activity enactment. *Journal of Experimental Social Psychology*, 43, 143–149. doi:10.1016/j.jesp.2005.12.009
- Liviatan, I., Trope, Y., & Liberman, N. (2008). Interpersonal similarity as a social distance dimension: Implications for perception of others' actions. *Journal of Experimental Social Psychology*, 44, 1256–1269. doi:10.1016/j.jesp.2008.04.007

- Lynch, J. G., & Zauberger, G. (2007). Construing consumer decision making. *Journal of Consumer Psychology*, 17, 107–112. doi:10.1016/S1057-7408(07)70016-5
- Maglio, S. J., & Trope, Y. (2011). Scale and construal: How larger measurement units shrink length estimates and expand mental horizons. *Psychonomic Bulletin & Review*, 18, 165–170. doi:10.3758/s13423-010-0025-1
- Maglio, S. J., Trope, Y., & Liberman, N. (2013). Distance from a distance: Psychological distance reduces sensitivity to any further psychological distance. *Journal of Experimental Psychology: General*, 142, 644–657. doi:10.1037/a0030258
- Nussbaum, S., Liberman, N., & Trope, Y. (2006). Predicting the near and distant future. *Journal of Experimental Psychology: General*, 135, 152–161. doi:10.1037/0096-3445.135.2.152
- Raghubir, P., & Krishna, A. (1996). As the crow flies: Bias in consumers' map-based distance judgments. *Journal of Consumer Research*, 23, 26–39. doi:10.1086/209464
- Spencer, S. J., Zanna, M. P., & Fong, G. T. (2005). Establishing a causal chain: Why experiments are often more effective than mediational analyses in examining psychological processes. *Journal of Personality and Social Psychology*, 89, 845–851. doi:10.1037/0022-3514.89.6.845
- Stephan, E., Liberman, N., & Trope, Y. (2011). The effects of time perspective and level of construal on social distance. *Journal of Experimental Social Psychology*, 47, 397–402. doi:10.1016/j.jesp.2010.11.001
- Todorov, A., Goren, A., & Trope, Y. (2007). Probability as a psychological distance: Construal and preference. *Journal of Experimental Social Psychology*, 43, 473–482. doi:10.1016/j.jesp.2006.04.002
- Trope, Y., & Liberman, N. (2003). Temporal construal. *Psychological Review*, 110, 403–421. doi:10.1037/0033-295X.110.3.403
- Trope, Y., & Liberman, N. (2010). Construal-level theory of psychological distance. *Psychological Review*, 117, 440–463. doi:10.1037/a0018963
- Trope, Y., Liberman, N., & Wakslak, C. (2007). Construal levels and psychological distance: Effects on representation, prediction, evaluation, and behavior. *Journal of Consumer Psychology*, 17, 83–95. doi:10.1016/S1057-7408(07)70013-X
- Tsai, C. I., & Thomas, M. (2011). When does feeling of fluency matter? How abstract and concrete thinking influence fluency effects. *Psychological Science*, 22, 348–354. doi:10.1177/0956797611398494
- Vallacher, R. R., & Wegner, D. M. (1989). Levels of personal agency: Individual variation in action identification. *Journal of Personality and Social Psychology*, 57, 660–671. doi:10.1037/0022-3514.57.4.660
- Wakslak, C. J. (2012). The where and when of likely and unlikely events. *Organizational Behavior and Human Decision Processes*, 117, 150–157. doi:10.1016/j.obhdp.2011.10.004
- Wakslak, C. J., & Trope, Y. (2009). The effect of construal level on subjective probability estimates. *Psychological Science*, 20, 52–58. doi:10.1111/j.1467-9280.2008.02250.x
- Wakslak, C. J., Trope, Y., Liberman, N., & Alony, R. (2006). Seeing the forest when entry is unlikely: Probability and the mental representation of events. *Journal of Experimental Psychology: General*, 135, 641–653. doi:10.1037/0096-3445.135.4.641
- Wong, K. F. E., & Kwong, J. Y. Y. (2000). Is 7300 m equal to 7.3 km? Same semantics but different anchoring effects. *Organizational Behavior and Human Decision Processes*, 82, 314–333. doi:10.1006/obhd.2000.2900
- Yan, D., & Sengupta, J. (2011). Effects of construal level on the price-quality relationship. *Journal of Consumer Research*, 38, 376–389. doi:10.1086/659755
- Zhang, M., & Wang, J. (2009). Psychological distance asymmetry: The spatial dimension vs. other dimensions. *Journal of Consumer Psychology*, 19, 497–507. doi:10.1016/j.jcps.2009.05.001
- Zhao, M., & Xie, J. (2011). Effects of social and temporal distance on consumers' responses to peer recommendations. *Journal of Marketing Research*, 48, 486–496. doi:10.1509/jmkr.48.3.486

Received December 31, 2012

Revision received January 2, 2014

Accepted January 7, 2014 ■