Predicting the Near and Distant Future

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Four studies investigated individuals' confidence in predicting near future and distant future outcomes. Study 1 found that participants were more confident in theory-based predictions of psychological experiments when these experiments were expected to take place in the more distant future. Studies 2–4 examined participants' confidence in predicting their performance on near and distant future tests. These studies found that in predicting their more distant future performance, participants disregarded the format of the questions (e.g., multiple choice vs. open ended) and relied, instead, on their perceived general knowledge (e.g., history knowledge). Together, the present studies demonstrate that predictions of the more distant future are based on relatively abstract information. Individuals feel more confident in predicting the distant future than the near future when the predictions concern outcomes that are implied by relatively abstract information.

Keywords: time distance, construal level theory (CLT), prediction, confidence, overconfidence

Effective planning often requires predicting outcomes that are expected in the relatively distant future. For example, planning a vacation often requires predicting a long time in advance the weather conditions at the destination of the trip. Similarly, class registration requires predicting a long time in advance whether the selected courses would live up to one's expectations. The question then is whether and how temporal distance from future outcomes affects individuals' predictions about those outcomes. Does temporal distance affect the confidence with which predictions are made? Temporal distance from future outcomes ordinarily reduces the accuracy with which those outcomes can be predicted. Are individuals sensitive to these temporal differences in accuracy?

There is a large amount of research on how individuals predict the future and the factors that influence those predictions (see, e.g., Griffin, Dunning, & Ross, 1990; Kahneman & Lovallo, 1991; Sherman, 1980; Wilson, Wheatley, Meyers, Gilbert, & Axsom, 2000). However, this research has typically compared predictions with actual outcomes. There is relatively little research on how temporal distance from future outcomes affects predictions about those outcomes. In an early study addressing this issue, Nisan (1972) asked participants to estimate their chances of correctly answering a random question from a test they expected to take on the same day or 4 weeks later. The results showed that greater temporal distance enhanced expectancy of success and risk-taking, particularly by individuals who were success rather than failure oriented. More recently, Gilovich, Medvec, and their colleagues

(Gilovich, Kerr, & Medvec, 1993; Savitsky, Medvec, Charlton, & Gilovich, 1998) reported a series of studies showing that individuals had higher performance expectancies for distant future tasks as compared with near future tasks, a phenomenon they labeled "cold feet." For example, participants expected to perform better on a variety of tasks (e.g., lie detection, solving anagrams, and persuading other students to participate in a research) when the time of performance was temporally distant than near.

This research demonstrates that temporal distance can affect prediction of future outcomes. It further suggests that predictions made from a distant time perspective are more optimistic than those made from a proximal time perspective. However, several questions still remain unanswered. Does temporal distance determine the kind of information on which individuals base their predictions? If so, does this always lead to optimism? How does temporal distance affect predictions that are unrelated to optimism?

The present article addresses these questions within the framework of construal level theory (CLT; see Liberman & Trope, 1998; Trope & Liberman, 2000, 2003). Like other theories of intuitive prediction (e.g., Gilbert & Wilson, 2000; Griffin & Ross, 1991; Sherman, 1980), CLT assumes that individuals' predictions of future events depend on how they mentally construe those events. Therefore, in order to understand how temporal distance affects future prediction, individuals' construal of near versus distant events needs to be taken into account. According to CLT, individuals use higher level, more abstract construals to represent distant future events than to represent near future events. High-level construals are schematic decontextualized representations that extract the gist from the available information. These construals consist of a few superordinate, core features of events. Low-level construals are more concrete, contextualized representations of information about events. They include subordinate and incidental features of events. Thus, whereas representations of near future events are rich in details, some of which are incidental or peripheral, representations of distant future events achieve abstraction by omitting secondary and incidental features of events. For example,

a dog is a more abstract representation than a poodle, and is achieved by omitting some features (e.g., its curly hair) that are thus rendered less central.

Consistent with CLT, research on temporal shifts in construal has found that when an event is expected in the more distant future (e.g., tomorrow vs. a month from now), it is more likely to be classified and described more abstractly in terms of (a) superordinate features, (b) few broad categories, and (c) general prototypes (Liberman, Sagristano, & Trope, 2002; Liberman & Trope, 1998). For example, one of these studies found that when an activity (e.g., going on a camping trip) was expected in the distant future rather than in the near future, objects related to that activity (e.g., potato chips, boots, rope) were classified into fewer and broader categories (Liberman et al., 2002, Study 3). Another study asked participants to rate the attractiveness of different experiences (e.g., meeting different people) in the near future or in the distant future (Liberman et al., 2002, Study 4). Multidimensional scaling analyses of these ratings showed that fewer dimensions were needed to fit the structure of distant future ratings than the structure of near future ratings. Similarly, Liberman et al. (Study 2) found that participants anticipated their positive and negative experiences to be more prototypical; namely, less variable and more extreme when these experiences were imagined happening in the more distant future.

These temporal construal findings suggest that individuals are likely to base their predictions on higher level construals of the available information when the predictions concern distant future outcomes than when they concern near future outcomes. A few schematic features of outcomes may underlie distant future predictions, whereas more concrete and contextualized details may underlie near future predictions. For example, a student may think of an upcoming math test in terms of high-level, central aspects such as his or her general math ability. Alternatively, the student may think of the test in terms of lower level, more incidental aspects such as the number of questions in the test and their format. The student may have the same information about the test whether it is expected in the near future (e.g., next week) or in the more distant future (e.g., 2 months later). Nevertheless, the student's perceived math ability may have a greater impact on his or her performance expectancies if the test is expected to take place in the more distant future, whereas the format of the questions may have a greater impact on his or her expectancies if the exam is to take place in the more immediate future. Thus, if high confidence stems from high-perceived math ability, then it would increase over temporal distance. If, however, confidence stems from an easy format of the exam, it will decrease with temporal distance.

The idea that individuals base their predictions on time-dependent construals has implications for the confidence with which the predictions are made. Normatively, predictions of distant future outcomes should allow for greater uncertainty regarding unknown factors, and should therefore be made with less confidence than predictions of near future outcomes. Temporal construal may produce systematic violations of this requirement. That is, to the extent that high-level construals (compared with low-level construals) are associated with high certainty, temporal shifts toward greater reliance on high-level construals would act to produce greater confidence in predicting the distant future than the near future. In our example, a high-level construal of performance on a math test in terms of perceived math ability is relatively simple and may afford a sense of certainty in predicting the outcome (e.g., "I am good/poor in math, and therefore I am certain to get a high/low grade"), whereas a low-level construal in terms of specific aspects of the format of the test and contextual details is more complex and may create more uncertainty about the outcome (e.g., "My grade depends on many factors, such as the specific questions, my distractedness, etc."). Higher level construal of the more distant test may thus act to produce no less and even greater confidence in predicting the outcomes of a distant future math test than a near future math test.

This analysis is consistent with the view that overconfident predictions stem from individuals' overreliance on schematic models of future situations and neglect of background contextual factors (Griffin et al., 1990; Griffin & Ross, 1991). Similar explanations have been offered for the planning fallacy—the tendency to underestimate task completion times (Buehler, Griffin, & Ross, 1994) and the tendency to overestimate the intensity and duration of one's affective reactions to future events (Gilbert & Wilson, 2000; Wilson et al., 2000). Building on these accounts, CLT proposes that greater temporal distance increases the reliance on schematic representations and, as a result, may foster an unwarranted sense of confidence in predicting the outcomes that are implied by those representations (but not in predicting outcomes that are implied by low-level representations).

In summary, our predictions diverge from both the perspective of normative models of uncertainty and the perspective of future optimism. Specifically, if we take the position that temporal distance comes with uncertainty, then predictions for the more distant future would be less confident than predictions for the near future. If, however, we assume that temporal distance comes with optimism, then distant future outcomes should be more confident. Our predictions, however, are different from both perspectives, because we predict that level of construal would moderate the effect of temporal distance on confidence. Specifically, we predict that confidence would increase when it stems from abstract, central aspects of the situation, but not when it stems from concrete, low-level aspects of the situation.

The present studies investigate temporal distance effects on confidence in predictions regarding the results of psychology experiments and one's own performance. We examine how temporal distance changes individuals' use of high- and low-level information for making these predictions. Moreover, we assess the effects of temporal distance on individuals' confidence in predicting future outcomes and how much they are willing to bet on those outcomes. We expect temporal distance to increase the use of high-level information, but decrease the use of low-level information. Individuals should therefore feel more confident in predicting distant future than near future outcomes to the extent that high-level information affords more certainty regarding those outcomes.

Study 1

The Effect of Theories on Predicting the Results of Psychology Experiments

In this study, we examined the effects of temporal distance and the availability of a general theory on confidence in predicting the results of psychology experiments. Theories are usually abstract constructions of relations among entities in an idealized, noise-free

world. When tested empirically, however, theoretical predictions may fail to replicate because of nonsystematic influences of the specific conditions and circumstances of the test situation. Focusing on theories (or high-level construals of experiments) may therefore enhance confidence in theoretical predictions, whereas focusing on nonsystematic factors (low-level construals of experiments) may reduce confidence. For example, thinking of serial position effects on memory may increase one's confidence in being able to reproduce primacy and recency effects, whereas thinking of the specific memory items to be tested, the sampling of participants, and the exact task instructions may decrease one's confidence in replicating these effects.

According to CLT, theories should have a greater impact on predictions of the results of distant future than near future experiments, and the reverse should hold for nonsystematic factors. Therefore, participants should be more confident in making theory-based predictions of distant future experiments than near future experiments. This temporal effect should, however, depend on the availability of a theory that allows a specific prediction. When such a theory is not available, confidence is not expected to increase with temporal distance. To test these hypotheses, we manipulated the availability of the theory related to each of the psychological experiments. Some participants read a description of the theories, the experiments, and the predictions; whereas other participants read only a description of the experiments and the predictions, with no mention of the theories. We hypothesized that temporal distance will increase confidence in predicting the results of psychology experiments only when the related theory is made available.

Method

Participants. Participants were 57 psychology students (43 women) at the Open University in Israel who participated for partial fulfillment of course credit. Most of the participants (59.2%) were third-year undergraduate students and the rest were second-year students. Participants were randomly assigned to the four conditions making up the Time (near vs. distant future) × Theoretical Information (described vs. not described) design. They completed the questionnaires in small groups of 2–4 participants.

Procedure. Participants volunteered to take part in a study titled Psychological Experiments. They read short descriptions of the following five classic findings in psychology: primacy and recency effects in memory (improved memory for items positioned at the beginning or at the end of a list; Robinson & Brown, 1926), encoding specificity (improved memory when information available at encoding is also available at retrieval; Thomson & Tulving, 1970), in-group favoritism (a greater tendency to favor one's own group members after experiencing failure than after experiencing success; Tajfel, 1982), the effects of mortality salience on derogation of moral transgressions (predicted by terror management theory; Rosenblatt, Greenberg, Solomon, Pyszczynski, & Lyon, 1989), and excitation transfer (the transfer of autonomic arousal from one situation to another; Zillmann, 1971).

Half of the participants read a short description of the theory that gave rise to the predicted results, whereas the other half did not receive information about the theory but rather read only the description of the study and the prediction. Participants in both experimental conditions imagined themselves conducting an experiment either tomorrow morning (near future condition) or a year from now (distant future condition) and indicated how confident they were that the predicted effect would be found in their experiment on a 0%–100% scale (see the Appendix for an example).

Results and Discussion

Participants' confidence estimates in obtaining theory-consistent results were subjected to a 2 (time: near vs. distant) × 2 (theoretical information: available vs. unavailable) × 5 (Experiments 1–5) analysis of variance (ANOVA) with the first two factors as between-subjects variables and the last factor as a within-subject variable. The means are presented in Table 1.

The analysis showed that temporal distance per se did not have a significant effect on confidence ($F < 1$). However, as expected, temporal distance interacted with whether theoretical information was provided, $F(1, 60) = 8.90$, $MSE = 860.40$, $p < .01$, $\eta_p^2 = .13$. As Table 1 shows, temporal distance increased individuals' confidence in predicting theory-consistent results when the theory was described ($Ms = 76.7\% \pm 9.7$ vs. $66.0\% \pm 14.8$, for distant future and near future predictions, respectively), $F(1, 60) = 5.60$, $MSE = 860.40$, $p < .05$, $\eta_p^2 = .08$. In contrast, when the theory was not presented, there was a marginally significant effect of temporal distance in the opposite direction, indicating somewhat less confidence in predicting distant future results than in predicting near future results ($Ms = 67.7\% \pm 15.1$ vs. $76.6\% \pm 11.7$, respectively), $F(1, 60) = 3.53$, $MSE = 860.40$, $p = .07$, $\eta_p^2 = .06$.

The analysis also yielded a significant effect of experiment, $F(4, 60) = 10.13$, $MSE = 398.10$, $p < .001$, $\eta_p^2 = .14$, indicating that some experiments allowed more confident predictions than others. This effect, however, did not interact with time ($F < 1$) nor with the availability of theoretical information, $F(4, 60) = 1.54$, $p = .19$, and thus has no relevance to our hypothesis. There was no three-way interaction, $F(4, 60) = 1.50$, $p = .21$, suggesting that the joint effect of time and availability of theories on confidence did not depend on the specific content of the different experiments.

The results of this study demonstrate that participants were simply not more confident in or optimistic about obtaining the predicted results in more distant future experiments. Instead, temporal distance increased participants' confidence only when they

Table 1

Confidence in Replicating Classic Effects in Psychology by Temporal Distance and Theoretical Information (Study 1)

	Near future (n = 32)		Distant future (n = 32)	
	Theoretical information		Theoretical information	
	Available	Not available	Available	Not available
Primacy and recency	75.9 (21.1)	91.1 (6.8)	92.6 (7.5)	81.4 (16.5)
Encoding specificity	63.1 (23.8)	79.7 (19.0)	76.0 (19.3)	69.4 (16.6)
In-group favoritism	62.8 (23.5)	72.8 (26.4)	76.3 (22.6)	59.1 (27.8)
Mortality salience	65.9 (23.5)	72.8 (21.9)	63.3 (23.4)	72.1 (27.6)
Excitation transfer	62.2 (27.3)	66.4 (22.4)	75.3 (24.7)	56.5 (25.4)
Over all	66.0 (14.8)	76.6 (11.7)	76.7 (9.7)	67.7 (15.1)

Note. Confidence ratings were made on a 0%–100% scale. The numbers in parentheses are standard deviations.

were provided with a theoretical basis for the predictions.[1] These results support the assumption of CLT that temporal distance enhances confidence in prediction only when this confidence derives from high-level constructs. Although this study investigated lay predictions, the findings may be related to the experience of scientists who are often quite confident that their planned experiment will confirm their theory and end up much less certain as they get closer to actually running the experiment. We believe that this is the case because the theory receives less weight and nonsystematic error factors receive more weight from the more proximal time perspective.

Study 2

Predicting Performance: The Role of Task Format

Study 1 tested the effects of temporal distance on participants' confidence in predicting self-irrelevant outcomes. The next three studies examined temporal differences in participants' confidence in predicting their own performance. Our hypothesis is that different types of information determine confidence in predicting near future versus distant future performance. We distinguish between two types of information regarding performance: information pertaining to task format and information pertaining to the relevant ability. Consider a test of ability or knowledge. The format of the test (how the questions are being asked) constitutes a low-level aspect of performance and should therefore affect confidence in near future performance more than confidence in distant future performance. On the other hand, the knowledge being tested (what the questions are about) constitutes a high-level aspect of performance and should therefore affect confidence in distant future performance more than confidence in near future performance. Why does test format constitute a lower level feature than the ability being tested? We think that this is the case because the ability being tested is ordinarily seen as more central and essential than the format of the questions. As a result, when one is to construct an abstract, less detailed representation of the quiz, then one is more likely to retain information about the topic than information about the format. To illustrate, a multiple-choice quiz about history is more likely to be described as "a quiz on history" than "a multiple-choice quiz." Indeed, pretest data supported our assumption that ability is a more central aspect of a test than a question format.[2]

Study 2 examined the effects of question format on near future versus distant future predictions and actual performance on a trivia quiz. If question format is perceived as a low-level, secondary aspect of the quiz, then, according to CLT, it should affect confidence about near future performance more than confidence about distant future performance. Therefore, confidence about performance on difficult questions should increase over temporal distance more than confidence in performance on easy questions. To test this hypothesis, participants were asked to take a trivia quiz either in the same experimental session (near future condition) or in a second experimental session, 1 month later (distant future condition), and they actually took the quiz as scheduled. Unlike Study 1, the present study asked participants to make consequential bets on each predicted outcome. The quiz consisted of either multiple-choice questions (easy format) or open-ended questions (difficult format). Before taking the quiz, participants assigned

points between 0 and 100 to each question from a pool of questions from which the questions for the actual quiz were to be randomly selected. Participants expected to earn the number of assigned points if they answered the question correctly and lose the number of assigned points if they answered it incorrectly. Therefore, the number of points assigned served as an indirect measure of confidence. It is a fact well known to students (and confirmed in our pretests[3]) that multiple-choice questions are easier than open-ended questions (both because the distracters serve as memory cues and because there is a 25% chance to guess the correct answer without any knowledge) and should therefore be assigned more points. CLT predicts that this is what participants are likely to do for the near future quiz, but not for the distant future quiz, because question format, a low-level aspect of the quiz, is unlikely to be taken into account when thinking about the distant future.

Method

Participants. Participants were 72 Tel Aviv University students (55 women) who participated in the study to fulfill an introductory psychology course requirement. Participants were randomly assigned to the four con-

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[1] A pretest that manipulated time distance only and made theoretical information available for all participants yielded results equivalent to those of Study 1. Thirty psychology students (third-year undergraduates and first-year graduates) read short descriptions of five classic findings in psychology and their theoretical background (e.g., encoding specificity, object permanence in infants, stages of moral reasoning) and indicated their confidence in replicating these effects in either the near or distant future. ANOVA with time (near vs. distant) as a between-subjects variable and the five experiments as a within-subject variable showed that participants were more confident in predicting theory-consistent results for the distant future experiments than for the near future experiments ($Ms = 74.7\% \pm 9.9$ vs. $59.4\% \pm 16.2$, respectively), $F(1, 28) = 9.37$, $MSE = 927.90$, $p < .01$, $\eta_p^2 = .25$. There were no significant effects of experiment or interaction (both Fs < 1). This pattern of results is consistent with Study 1, and extends it to a different set of psychology experiments.

[2] Two pretests confirmed that knowledge domain is a higher level feature than question format. When allowed to choose only one piece of information, 92% of the 25 participants that participated in the first pretest preferred to receive information about domain of knowledge, and only 8% preferred to receive information about question format, $\chi^2(1, N = 25) = 17.60$, $p < .001$. Moreover, 92% preferred to receive the information about domain of knowledge before the information about question format, $\chi^2(1, N = 25) = 17.6$, $p < .001$. In another pretest, 46 participants were provided with one kind of information (either the knowledge domain or the question format) and asked about their interest in the other kind of information (see Sagristano, Trope, & Liberman, 2002, for a detailed description of this method). When provided with information about question type, 50% of the participants asked for additional information about the knowledge domain of the questions. In contrast, when provided with information about the knowledge domain of the questions, only 28% of the participants requested additional information about question type, $t(45) = 2.22$, $p < .05$, $\eta_p^2 = .10$. These results suggest that domain of knowledge is more a central and superordinate feature of performance than question format and that when choosing an abstract representation of a quiz situation, details about format are more likely to be omitted than details about knowledge domain.

[3] A pretest with 18 undergraduate psychology students confirmed that 88.9% of the students stated that multiple-choice questions would be easier than open-ended questions, $\chi^2(1, N = 18) = 10.89$, $p < .001$. Another question, "Which question format would allow you to gain more points for correct answers?" yielded a similar distribution of answers.

ditions making up the Time (near vs. distant) × Question Format (multiple-choice vs. open-ended) design. They participated in the experiment in individual sessions.

Procedure. Participants signed up for an experiment titled Trivia Quiz, which was carried out in two sessions. Upon arriving to the lab, participants were told that they would take a trivia quiz, either 15 min later (near future condition) or 1 month later (distant future condition). They were presented with a list of 40 trivia questions from 20 different domains (e.g., politics, geography, literature), and were told that during the second session they would answer 20 randomly selected questions from this list. Participants were asked to assign points ranging from 0 to 100 to each question according to the same rules described in Study 3 (i.e., they gain the points if they answer correctly and lose the points if they answer incorrectly). Participants were motivated to gain as many points as possible because an extra credit hour was promised (and actually awarded) to the 3 participants who would gain the highest number of points.

Half of the participants were told that the questions in the actual quiz would have four choice alternatives (e.g., "With which artistic movement is Picasso associated? (a) Cubism (b) Surrealism (c) Dada (d) Fauvism"), but the distracters were not actually presented when assigning the points. The other half of the participants was told that the same trivia questions would be open ended.

As soon as they finished the first session, participants in the distant future condition were thanked and asked to return to the lab on a specified date 1 month later in order to complete the second session. Participants in the near future condition proceeded directly to the second session, at which they were asked to answer 20 questions selected from the original list of 40 questions. Two sets of 20 questions were used, with one question from each knowledge domain in each set. Participants were randomly assigned to one of the two sets.

Results and Discussion

For each participant, we computed the number of points assigned as the total sum of the points assigned to the 20 questions (out of the original 40) that the participant answered. A normative strategy of assigning points requires assigning the minimum number of points (i.e., 0) when the subjective likelihood of answering correctly is lower than 50%, and assigning the maximum number of points (i.e., 100) when the subjective likelihood to answer correctly is higher than 50%.[4] The total number of points therefore reflects the participant's confidence in his or her ability to answer the questions correctly.

A Time × Question Format between-participants ANOVA on the number of points assigned yielded a significant main effect of time, indicating that more points were assigned when participants expected to take the quiz in the distant future than when they expected to take the quiz in the near future (Ms = 992.9 ±301.7 vs. 736.2 ±289.7, respectively), $F(1, 68) = 14.62$, $MSE = 81,158.00$, $p < .001$, $\eta_p^2 = .18$. Moreover, the analysis yielded the predicted Time × Question Format interaction, $F(1, 68) = 6.39$, $MSE = 81,158.00$, $p < .05$, $\eta_p^2 = .09$. As can be seen in Table 2, in the near future condition, more points were assigned to multiple-choice questions than to open-ended questions (Ms = 855.6 ±298.3 vs. 616.8 ±231.6, respectively), $F(1, 68) = 6.33$, $MSE = 81,158.00$, $p < .05$, $\eta_p^2 = .09$, whereas in the distant future condition, a similar number of points was assigned in the two question format conditions (Ms = 942.6 ±290.5 vs. 1043.2 ±312.5, respectively), $F(1, 68) = 1.12$, $p = .29$. The main effect of question format was insignificant, $F(1, 68) = 1.06$, $p = .31$.

A similar analysis was performed on the actual number of correct responses. The analysis showed, as expected, that the

Table 2

Points Assigned and Points Gained by Temporal Distance and Question Format (Study 2)

	Near future (n = 36)		Distant future (n = 36)	
	Multiple choice	Open ended	Multiple choice	Open ended
Points assigned	855.6 (298.3)	616.8 (231.6)	942.6 (290.5)	1,043.2 (312.5)
Accuracy (%)	49.2 (11.0)	25.6 (12.4)	50.8 (16.3)	29.7 (20.8)

Note. The numbers in parentheses are standard deviations.

number of correct responses was higher for multiple-choice questions than for open-ended questions (Ms = 50.0% ±13.7 vs. 27.6% ± 17.0, respectively), $F(1, 66) = 37.11$, $MSE = 242.50$, $p < .001$, $\eta_p^2 = .35$, regardless of time (Fs < 1) for the main effect of the Time and Time × Question Format interaction effect (see Table 2). The multiple-choice quiz was thus clearly easier than the open-ended quiz.

These results suggest that unlike confidence in near future performance, confidence in distant future performance was insensitive to question format, although the latter was an important determinant of actual performance. That is, time delay made participants assign a larger number of points to open-ended questions, although these questions were more difficult than the multiple-choice questions. Note that distant future optimism predicts that temporal distance would increase confidence in future performance regardless of question format. However, as can be seen in Table 2, temporal distance increased confidence for the open-ended question format, $F(1, 68) = 20.17$, $MSE = 81,158.00$, $p < .001$, $\eta_p^2 = .23$, but not for the multiple-choice format ($F < 1$). This finding is consistent with CLT. Specifically, if question format receives less weight in predictions of more distant future performance, then temporal distance is more likely to increase confidence when the question format is relatively difficult (i.e., open ended) than when it is easy (multiple choice).

Overall, the present results provide converging evidence for the assumption that low-level aspects of tasks are more influential in guiding predictions of performance in the relatively near future. CLT further proposes that the opposite may hold for high-level aspects of the task. Those aspects should be more influential in guiding predictions of distant future performance than near future performance. Study 3 tested this prediction.

Study 3

Predicting Performance: The Role of Perceived Ability

We argued, and our pretests actually showed (see Footnote 2), that the domain of knowledge tested by quiz questions was seen as

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[4] The normative strategy can be described mathematically as follows: Let p denote the subjective probability of answering correctly and x denote the number of points assigned. The expected number of points gained should then be equal to $px - (1 - p)x$, or $x(2p - 1)$. This expression will be maximum if $x = 100$ when $2p - 1 > 0$ (i.e., when $p > .5$) and if $x = 0$ when $2p - 1 \leq 0$ (i.e., when $p \leq .5$).

an essential and superordinate (i.e., high-level) aspect of performance on the quiz. CLT therefore predicts that the knowledge domain of the questions would receive more weight in predicting one's outcomes in a relatively distant trivia quiz. To test this prediction, the present study examined whether participants' beliefs regarding the extent of their knowledge in different domains has greater impact on their predictions of distant future performance than on their predictions of near future performance. The present study also addressed a potential interpretive problem in Study 2. That is, Study 2 presented participants with a pool of questions out of which the questions for the actual quiz were to be selected. It might be argued that the greater confidence regarding performance on the more distant future quiz simply reflected participants' belief that they would obtain the relevant knowledge by the time of the test. Although the similar number of correct answers in the two time conditions indicated that such goal was not actually accomplished, it could still be argued that this affected participants' confidence estimates. To avoid this problem, participants in the present study were presented with the list of general knowledge domains (e.g., art, literature) rather than the actual questions. We assumed that participants in the distant future condition were unlikely to plan on improving their knowledge in these broad domains for the quiz. The procedure was similar to that of Study 2, except that participants assigned points to a list of knowledge domains rather than to specific questions and rated their level of knowledge in each domain. Also, because Study 2 did not find any time effects on participants' performance on the quiz, this study assessed participants' predictions but not their actual performance on the quiz. We expected that the points participants would assign to a domain would be more closely related to their perceived ability in the domain when the quiz was expected in the distant future rather than in the near future.

Method

Participants. Participants were 62 Tel Aviv University students (50 women) who participated in the study to fulfill an introductory psychology course requirement. Participants were randomly assigned to each time condition (near vs. distant). They participated in the experiment in individual sessions.

Procedure. The procedure of this study was similar to the first session of Study 2, except that participants were presented with a list of 20 knowledge domains, with an example of a question in each domain: for instance, capital cities (e.g., "What is the capital of India?") or World War II (e.g., "The Allies' invasion of Normandy is also known as . . ."). Participants were told that during the second session they would be asked to answer one open-ended question from each domain, but the questions themselves were not presented. They were asked to assign points to each domain on a scale ranging from 0 to 100. As in Study 2, participants were told that for each correct answer they would gain the number of points assigned to that domain; for each incorrect answer, they would lose the number of points assigned to the domain. As before, participants were motivated to gain as many points as they could in order to win extra credit. After assigning points to all of the domains, participants indicated on a scale ranging from 1 (*poor*) to 13 (*excellent*) their level of knowledge in the different domains.

After completing the first session, the experimenter explained that the second session of the experiment (i.e., the actual quiz) would not be carried out. Participants were debriefed and thanked for their participation.

Results and Discussion

The total number of points assigned to the 20 knowledge domains was compared across the two temporal distance conditions. Consistent with the results of Study 2, participants assigned more points when they expected to take the quiz in the distant future than in the near future (Ms = 849.7 ±309.4 vs. 675.9 ±277.4, respectively), $t(60) = 2.33$, $p < .05$, $\eta_p^2 = .08$. Participants thus seemed more confident about their distant future performance than their near future performance.

To examine the relation between confidence and perceived knowledge, we computed within-participant correlations between the number of points assigned to each of the 20 domains and the self-rated knowledge in those domains. A t test on the z-transformed correlations yielded a significant effect of time, $t(60) = 2.04$, $p < .05$, $\eta_p^2 = .07$, indicating, as expected, that the correlations between points assigned to a question and self-rated general knowledge in the domain represented by the question were higher when participants expected to take the trivia quiz in the distant future than when they expected to take the quiz in the near future (rs = .85 vs. 79, respectively). These results indicate that self-rated knowledge in a domain influenced a person's confidence in his or her ability to answer a question from this domain in the distant future more than in the near future.

Study 2 showed that low-level information (i.e., the format of a test) has more impact on predicting near future performance than distant future performance. Complementing this finding, the present study showed that high-level information (the knowledge assessed by the test) had more impact on predicting distant future performance than near future performance. Together, Studies 2 and 3 support the hypothesized temporal shifts in the informational bases of future predictions.

Study 4

Predicting Performance: Replication and Extension

Studies 2 and 3 used an indirect measure of confidence; namely, the number of points participants were willing to "risk" in each prediction. In the present study, participants expressed their confidence more directly on a likelihood scale. This study also sought to replicate the differential effects of question format and tested knowledge on near and distant future predictions with a different aspect of question format; namely, the number of response alternatives in multiple-choice questions.

Participants were asked to take a trivia quiz either in the same experimental session (near future condition) or 1 month later (distant future condition). The quiz consisted of multiple-choice questions with either two or four response options. As in Study 3, participants were presented with a list of general knowledge domains and indicated their confidence in answering correctly a question pertaining to each domain. Confidence was expressed as a percentage from 0% to 100%. Because it is easier to select the correct response out of two options rather than out of four options, participants should express higher confidence in the two-option condition than in the four-option condition. CLT predicts that this is what participants are likely to do for the near future quiz, but not the distant future quiz. As in Study 3, participants also rated their level of knowledge in each domain.

Method

Participants. Participants were 81 Tel Aviv University students (56 women) who participated in the study to fulfill an introductory psychology course requirement. Participants were randomly assigned to the four conditions making up the Time (near vs. distant) × Number of Response Options (two vs. four) design. They participated in the experiment in individual sessions.

Procedure. Participants signed up for an experiment titled Trivia Quiz. Upon arriving at the lab, participants were told that they would take a trivia quiz, either 15 min later (near future condition) or 1 month later (distant future condition). They were presented with a list of 20 knowledge domains, similar to the ones presented in Study 3, with an illustration question for each domain. Participants were told that during the second session they would be requested to answer one question from each domain, but the questions themselves were not presented. Half of the participants were told that the questions in the actual quiz would have four response options, whereas the other half of the participants were told that the quiz would have only two response options.

Participants indicated their confidence in their ability to answer correctly the questions from each domain on a scale ranging from 0% to 100%. After expressing their confidence, participants indicated on a scale ranging from 1 (*poor*) to 13 (*excellent*) their level of knowledge in each domain. The experimenter then explained that the second session of the experiment (i.e., the actual quiz) would not be carried out. Participants were then debriefed and thanked for their participation.

Results and Discussion

A mean confidence score was computed across the 20 knowledge domains and subjected to a Time × Number of Options between-participants ANOVA (see Table 3). The analysis yielded a main effect of time, indicating that participants were more confident in their performance when they expected to take the quiz in the distant future than when they expected to take it in the near future (Ms = 56.3% ±13.9 vs. 49.6% ±14.3, respectively), $F(1, 77) = 4.76$, $MSE = 194.70$, $p < .05$, $\eta_p^2 = .06$. Moreover, the analysis yielded the expected Time × Number of Options interaction, $F(1, 77) = 3.75$, $MSE = 194.70$, $p = .056$, $\eta_p^2 = .05$. As can be seen in Table 3, this interaction indicated that participants tended to be more confident in their ability to answer two-option questions rather than four-option questions in the near future condition (Ms = 52.2% ±12.5 vs. 46.9% ±15.7, respectively), but not in the distant future condition (Ms = 53.0% ±14.2 vs. 59.7% ±13.1, respectively). The main effect of number of options was insignificant ($F < 1$). Thus, consistent with our hypothesis, the number of response options—a low-level aspect of a trivia quiz—produced the anticipated effect on subjective confidence in near future predictions but not in distant future predictions. Moreover, temporal distance increased confidence for the relatively difficult

Table 3
The Effects of Temporal Distance and Number of Response Options on Confidence (Study 4)

No. of options	Near future (*n* = 42)	Distant future (*n* = 39)
Two	52.2 (12.5)	53.0 (14.2)
Four	46.9 (15.7)	59.7 (13.1)

Note. Confidence ratings were made on a 0%–100% scale. The numbers in parentheses are standard deviations.

four-option question format, $F(1, 77) = 8.37$, $MSE = 194.70$, $p < .01$, $\eta_p^2 = .10$, but not for the easier two-option question format ($F < 1$). Like the results of Study 2, this finding is consistent with the CLT prediction that temporal distance is more likely to increase confidence when the format of the questions is relatively difficult (i.e., four-option questions) than when it is easy (two-option questions). According to CLT, temporal distance decreases the weight assigned to question format and thus prevents the reduction in confidence due to the difficult format.

As in Study 3, we computed within-subject correlations between the confidence estimate in each of the 20 domains and the self-rated knowledge in those domains. A Time × Number of Options between-subjects ANOVA on the *z*-transformed correlations yielded a significant effect of time, $F(1, 77) = 4.63$, $MSE = 0.13$, $p < .05$, $\eta_p^2 = .06$, indicating, as expected, that the correlations were higher when participants expected to take the trivia quiz in the distant future than when they expected to take the quiz in the near future (rs = .85 vs. 80, respectively). None of the other effects was significant (all ps > .15).

The results of the current study replicate and extend Studies 2 and 3 with a more direct measure of confidence and a different manipulation of task format. Taken together, the results of Studies 2–4 suggest that confidence in near future and distant future performance stems from different sources. Question format is a more important determinant of confidence regarding near future performance than distant future performance. In contrast, perceived expertise in the topic of the questions is a more important determinant of confidence regarding distant future performance than near future performance.

General Discussion

The present studies examined how temporal distance affects confidence in future prediction. According to CLT, individuals rely more heavily on schematic, theory-driven superordinate representations (high-level construals) to predict distant future outcomes and on more concrete subordinate representations (low-level construals) to predict relatively near future outcomes. Global and central aspects (e.g., general theories) are more likely to determine confidence in predicting the distant future than the near future.

Using different prediction tasks and confidence measures, the present studies provide convergent evidence for this proposal. Study 1 tested confidence in predicting the results of psychology experiments and found that temporal distance increased confidence only when the theoretical rationale for the experiment was provided (i.e., high-level, confidence-enhancing information). This suggests that the presence of confidence-promoting, high-level information, rather than temporal distance per se, increases confidence in prediction over temporal delay.

Studies 2–4 examined the effects of low-level aspects (i.e., the format of the trivia questions) and high-level aspects (i.e., the knowledge tested by quiz questions) on confidence in predicting one's own performance on a trivia quiz. As expected, Study 2 found that expecting a relatively difficult open-ended question format rather than multiple-choice format reduced confidence in near future performance but not in distant future performance. Study 3 showed that, unlike question format, participants' perceived knowledge in the domains of the quiz questions received

greater weight in predicting their distant future than near future performance. Finally, Study 4 replicated the results of Studies 2 and 3 with another more direct measure of confidence. The study showed that expecting a more difficult question format (four response options compared with two response options) reduced participants' confidence in their near future performance but not in their distant future performance. This study also replicated the greater correspondence between confidence and self-rated knowledge in distant future compared with near future performance predictions.

Overall, these studies demonstrate that temporal distance increases the impact of high-level information (e.g., theories, central aspects of performance) and decreases the impact of low-level information (e.g., noise, question format) on prediction. Individuals may predict more confidently a distant future than a near future outcome when the outcome is more strongly implied by high-level construals of the outcome. Thus, two complementary processes may contribute to unwarranted higher confidence in distant future predictions: underweighting of the uncertainty associated with low-level information and overweighting of the certainty associated with high-level information.

The present findings are consistent with the assumption of extant theories of intuitive prediction that errors and biases arise from overly schematic representations of the future. For example, it has been suggested that the planning fallacy (viz, the tendency to underestimate task completion times) results from individuals' reliance on oversimplified representations of future tasks (Buehler et al., 1994; Kahneman & Lovallo, 1991; Kahneman & Tversky, 1979). A visit of the in-laws is not part of the scenario of writing a paper, and therefore would not be taken into account in estimating the paper's completion time, even if known in advance. Similarly, Kahneman & Snell (1990, 1992) have proposed that individuals are often inaccurate in predicting their future likings (e.g., music, plain yogurt, ice-cream) because they tend to base their predictions on general intuitive theories of changes in hedonic utility. More recently, a program of research by Gilbert, Wilson, and their colleagues (Gilbert, Pinel, Wilson, Blumberg, & Wheatley, 1998; Wilson, Gilbert, & Wheatley, 1998; Wilson et al., 2000) suggests that individuals overestimate the intensity and duration of their affective reactions to positive and negative future events because they tend to focus on the event in question and fail to consider the diluting effects of other events.

Of interest, a recent study by Kruger and Evans (2004) showed that the planning fallacy is reduced when people are forced to think about concrete steps and procedures relevant to getting a task done. Specifically, participants prompted to "unpack" a multifaceted task (e.g., holiday shopping, Study 1) into its subcomponents (e.g., reviewing the names of all the persons on one's holiday shopping list) provided longer and less biased estimates of how long the task would take than participants in the global "packed" condition. It may be argued that the unpacked representation constitutes a low-level construal of the task in hand, whereas the packed representation constitutes a high-level schematic construal.

More directly related to the present studies is our earlier research on attributional inferences regarding near versus distant social behavior (Nussbaum, Trope, & Liberman, 2003). It was assumed that personal dispositions are relatively abstract and decontextualized constructs and are therefore more likely to be used for predicting others' behavior in the distant future than the near future. Consistent with this assumption, Nussbaum et al. found that perceivers give more weight to dispositional factors than to specific situational factors in predicting others' behavior in the more distant future. These results suggest that the "fundamental attribution error"—the tendency to attribute situationally constrained behavior to the actors' personal dispositions—is stronger when making distant future predictions than when making near future predictions.

The current findings are also consistent with research showing that individuals tend to be more optimistic about distant future than near future outcomes (Gilovich et al., 1993; Mitchell, Thompson, Peterson, & Cronc, 1997; Nisan, 1972; Savitsky et al., 1998). It is important to note, however, that according to CLT, greater optimism is a likely but not a necessary result of temporal distance. CLT suggests that greater temporal distance promotes optimism only when high-level construals imply a relatively high likelihood of desired outcomes. When low-level construals imply a high likelihood of desired outcomes, optimism may not increase and may actually decrease with greater temporal distance. For example, the fact that a quiz consists of multiple-choice rather than open-ended questions (Study 2) and few rather than many response alternatives (Study 4) implies a higher likelihood of correct answers even if one is merely guessing. However, because question format is part of a low-level construal of performance on a quiz, it is more likely to affect predictions of near future than distant future performance. As a result, the relative ease of the questions, which should in principle enhance optimism about performance, would fail to do so for predictions for the distant future. This, in turn, may counteract any tendency to be more optimistic about the more distant future performance.

Indeed, the results of Studies 2 and 4 showed that temporal distance led to more optimistic predictions when the question format was difficult (and thus underweighting the format promoted optimism), but not when it was easy (and thus underweighting the format reduced optimism). It is possible that a general tendency to be more optimistic about the more distant future was also operative in these studies and prevented confidence to decline over time with easy formats. However, in itself, optimism cannot explain the different temporal distance effects that were obtained with easy and difficult question formats.

Recent findings by Zauberman and Lynch (2005) also demonstrate the complex effects of time distance on optimism. They showed that people were more optimistic regarding the availability of both time and money resources in the future (in a month) compared with the present (today). Yet, this future optimism, or belief in "resource slack," was stronger for time than for money. From our perspective, it would be interesting to examine the possibility that time tends to be construed as a means (a low-level construal), whereas money tends to be construed as an end (a high-level construal). For example, people are usually more likely to think "I need time in order to make money" than "I need money to free up some more time." If so, CLT would predict that temporal distancing would reduce the weight given to time limitations more than the weight given to money limitations, as indeed found by Zauberman and Lynch. Of course, at this point this remains only a speculative suggestion, and further research is needed to examine the possible mediation by construal of the differential effects of temporal distance on considering money versus time limitations.

Another possibility is that our participants felt more accountable for near future predictions than for distant future predictions and thus became more cautious and less confident. This explanation would be consistent with research showing that the expectation that one's performance will be personally identified, evaluated, and bear consequences (Lerner & Tetlock, 1999) may reduce cognitive biases (e.g., Sedikides, Herbst, Hardin, & Dardis, 2002).

Several aspects of the present research argue against an accountability interpretation of the findings: First, although accountability may explain a main effect of increased confidence over time delay, it cannot explain our findings showing that confidence increased over time for some predictions but not for others (e.g., only when a theory is provided, as in Study 1, or only with difficult question formats, as in Studies 2 and 4). Likewise, accountability cannot explain why participants in our studies gave less weight to personal expertise in the near-future conditions of Studies 3 and 4. Second, the accountability explanation is less applicable to Study 1 because the predictions were hypothetical in both temporal distance conditions. Third, in Studies 2–4 participants in both temporal distance conditions were told in advance that their predictions would be evaluated and compared with their actual performance and that they would be rewarded for accurate predictions. Thus, participants were made accountable for distand future outcomes as well as for near future outcomes.

Why do people construe the more distant future more abstractly? We believe that this tendency originates from a habitual association between distance and lack of concrete knowledge. Ordinarily, information about concrete, contextualized features of events becomes available only as one gets closer in time to the actual events (see Liberman, Trope, & Stephan, in press; Trope & Liberman, 2003). More distant events are therefore represented in terms of general, abstract features. Our studies suggest, however, that this tendency is overgeneralized to situations in which the same information is available about near and distant future events. For example, although information about question format was available in both temporal distance conditions of Studies 2 and 4, participants disregarded this information in making predictions for the distant future. Similarly, participants could, in principle, base their predictions of their near future as well as distant future performance on their beliefs about their ability. Our findings show, however, that these beliefs received more weight in making predictions for the distant future than the near future. Thus, although differential knowledge could be the origin of the association between temporal distance and level of construal, the present research suggests that people continue to base their distant future predictions on higher level construals even when they have the same information about the near future and the distant future.

Conclusion

People usually have more information about the near future than the distant future. They should therefore make more confident predictions regarding the near future.

The results of the present studies suggest that temporal construal processes may result in systematic violation of this requirement. People tend to base their predictions of the more distant future on more schematic, higher level construals. These construals often afford a high-level of certainty. As a result, people may feel no less

and even more confident in predicting the distant future than the near future.

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Appendix

The Effect of Theories on Predicting the Results of Psychology Experiments— In-Group Favoritism (Study 1)

Participants in the available theoretical information read the following paragraph:

According to social identity theory, people are motivated to see the groups to which they belong in a positive way, because the belief that one's group is distinctively better than other groups allows them to maintain or enhance their self-esteem. The theory predicts that temporary reductions in individuals' self-esteem (e.g., after failure) will increase their tendency to discriminate against other groups in order to regain their sense of self-worth.

Both experimental groups read the following descriptions:

Imagine that tomorrow morning [a year from now] you will attend a soccer game. When the game is over you will contact five players from the winning team and five players from the losing team and ask them to give cold Coca-Cola bottles to players from their own team and to players from the competing team.

The research hypothesis is that the losers, more than the winners, will offer more Coca-Cola bottles to their own group members than to the members of the other group.

How certain are you that the hypothesized results will be obtained in the specific soccer game you will attend tomorrow [a year from now]?